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Understanding the Chaos of Airline Pricing

Alex Kons '00
Illinois Wesleyan University

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Abstract

Airline pricing is so distorted that often a full-fare paying passenger is seated next to a passenger who paid more then three hundred percent less for his or her ticket. What makes this situation so exasperating is that each passenger is receiving the same quality of seat and in-flight service, regardless of the airfare each paid. This paper will attempt to uncover the forces that have created this chaotic pricing system that has confused and annoyed passengers in today's air travel industry.

Keywords

airline industry

Understanding the Chaos of Airline Pricing

By Alex Kons

I. INTRODUCTION

"The airline industry's pricing system is a billion-dollar house of cards in which every customer is a futures speculator and Economics 101 is turned onto its head" (Fredrick, 1995). This statement highlights one of the most hidden frustrations that many air travelers feel. Airline pricing is so distorted that often a full-fare paying passenger is seated next to a passenger who paid more then three hundred percent less for his or her ticket. What makes this situation so exasperating is that each passenger is receiving the same quality of seat and in-flight service, regardless of the airfare each paid. This paper will attempt to uncover the forces that have created this chaotic pricing system that has confused and annoyed passengers in today's air travel industry.

Very few other industries have undergone anything like the drastic changes that have rocked the U.S. domestic airline industry in the past twenty years. Over this time period, the industry has evolved from a system of long established airlines flying a regulated route structure to a dynamic, free market environment where new airlines emerged and disappeared seemingly overnight. Recently the industry has become more characterized by massive market dominance by a small group of major airlines. Given its past volatility, there is little doubt that the industry will continue to transform over time. All the while, air travelers have continued to seek an understanding of all the chaos.

The focus of this paper will be on developing a model that demonstrates the effect two specific exogenous shocks had in creating the airline industry's current pricing system of vast airfare dispersion amongst passengers on the same flight. The model developed establishes that certain airlines have used market segmentation and price discrimination tactics as a result of these exogenous shocks. The organization of this paper is as follows. Section II provides historical background into the airline industry before 1979 when drastic changes began to occur. Section III develops a model for airline pricing on the basis of monopolistic competition in order to describe the determinants of the airfare charged for a given flight. Section IV builds from the model to describe the theoretical framework that leads to the hypothesis of the use of market segmentation and price discrimination in the airline industry. Section V presents historical analysis of the post-deregulation period in order to better understand the evolution of the current price system. Section VI breaks the mechanisms used by airlines to segment their customers and then provides empirical evidence of the use of price discrimination on routes between Atlanta and three separate cities. Section VII finishes with concluding remarks.

II. HISTORICAL BACKGROUND

Volatility in airfares is a relatively new phenomenon in the airline industry. Since air travel's creation, U.S. airlines had been subject to government regulation similar to that of public utilities. In 1938, Congress passed the Civil Aeronautics Act, which gave regulatory power to the Civil Aeronautics Board (CAB) to oversee the airline industry. The main purpose of this act was to keep sound economic conditions in the industry since it provided for the public's welfare. The CAB had the responsibility to regulate the following areas: market entry, rate determination, and antitrust authority. This allowed the CAB to determine which routes airlines would fly and establish airfares at rates the CAB found reasonable. Additionally, the CAB sought to prevent harmful alliances between airlines and stop any other forms of anti-competitive behavior between airlines (Dempsy & Gotz, 1992).

Regulation initially created a favorable environment and a group of established airlines arose and became known as the trunk carriers. For

the next 40 years, the 11 trunk carriers provided 87% of the air travel needs of the United States (Bailey, Graham, and Kaplan, 1991). Over this time period, the CAB consistently kept fares higher than the market level and severely restricted entry of new competition. As a result, the trunk carriers were more than willing to exist with each other as long as they continued to make consistent profits.

Yet by the 1970's the trunk carriers all were operating at record losses. The main reason for this was that the trunk carriers had ordered large numbers of new jet aircraft in order to prepare for forecasted booms in passenger demand. However, the recession of the early 1970's slowed demand for air travel, which along with the high cost of these new jets created prolonged losses for the trunk carriers. Many airline executives pushed the blame on the CAB since it was an easy scapegoat, even though fault really lay with the airlines themselves (Bailey, Graham, and Kaplan 1991).

While this problem persisted in the industry, opposition by lawmakers to the CAB began to form out of concern that the airline industry needed to be more competitive. Many began to advocate that the CAB had failed to provide for public welfare because it had created a monopolistic industry with inflated airfares. Unfortunately for the CAB, ample proof for this claim existed. For example, a group of interstate airlines had grown to provide more affordable air travel on their flights. These airlines were not subject to CAB authority as long as they flew within only one state. The most famous of these interstate airlines was Southwest Airlines, which flew in Texas. Southwest competed with trunk carriers on many routes and charged fares significantly lower, which generated greater air travel demand. More importantly, Southwest was also consistently profitable (Bailey, Graham, and Kaplan, 1991).

The prolonged stagnation of established airlines and the demand for more affordable air travel lead to the passing of the Airline Deregulation Act in 1979. The result of this act was complete elimination of the CAB's authority, leaving the airline industry in a free market. Almost immediately, a number of new airlines arose to compete with the trunk carriers and the industry would be changed forever (Glab and Peterson, 1994).

III. DEVELOPING THE MODEL

To understand the roots of chaotic pricing in the airline industry, it is necessary to know the unique nature of competition that exists in the industry. In order to develop the most coherent model for airline pricing determination, the industry is modeled in terms of monopolistic competition. This firm model applies to industries with a large number of firms that have some degree of product differentiation. Additionally, this model assumes that there are few barriers to entry and that some amount of brand loyalty exists (Mansfield, 1997).

As a whole, the airline industry follows the monopolistic competition model quite well. The barriers to starting an airline are actually relatively small when compared to many industries. Initial start-up costs of an airline are expensive, but sufficient financing has always been readily available to fund these costs. Also, airlines often do not own their airplanes, favoring instead to take advantage of the lower initial costs of leasing aircraft for short periods. Finally, passengers tend to develop some degree of brand loyalty towards one airline, especially when compensated for their loyalty, such as with frequent flyer programs (O'Conner, 1995).

In this paper, airlines will be classified based on two different strategic groups in order to analyze competition. The notion of two strategic groups in the airline industry is based on Margaret Peteraf's work, which classified an airline as belonging to either the major airline group or the low-cost airline group. These two groups have many key differences in their competitive structure.

Large networks of flights and billions of dollars in revenue characterize the major airlines. Low-cost airlines on the other hand fly only a limited number of routes and obtain far less revenue than the majors. Another difference between the two groups lies in their cost structures. Major airlines have highly unionized workforces and the most expensive airport facilities, while low-cost airlines are non-unionized and always focus on cost effective facilities. As the name implies, low-cost airlines hold a significant cost advantage over the major

airlines. Another important difference is that major airlines offer more passenger amenities than their low-cost counterparts. This implies such items as in-flight meals, roomy seats, and frequent flyer programs. Low-cost airlines focus solely on offering the most cost effective travel to their customers. Also the major airlines are all well established with steady operating histories, such as American Airlines, which has existed for 80 years. On the other hand low-cost airlines often initiate and leave markets so rapidly that they barely make long-term impacts on passenger flows. In fact, no member of the low-cost group has even been in business longer than thirty years (Peteraf, 1993).

To develop an effective model for pricing, there are certain aspects unique to the airline industry that will be incorporated to the monopolistic competition model. First, airlines demonstrate the tendency to form monopolies or oligopolies on certain routes between two cities. It is important to note that this does not affect the assumption of low barriers to market entry in the model because this type of monopolization does not prevent new competition in the short-run. It may be possible for new entrants to compete on a route with a monopolizing airline, but often new entrants do not survive in the long-term due to anti-competitive tactics used by established airlines. Many airlines successfully monopolize specific geographic areas of the country by concentrating their flights from a large city to surrounding cities. This tactic is known as the hub and spoke system. For example, since Northwest Airlines operates over seventy percent of the total flights out of Detroit, the airline's monopoly on many flights allows it to charge on average a 46% premium to its passengers (http://ostpxweb.dot.gov/aviation).

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The second unique aspect to consider is that passengers always value price of airfare and travel time convenience over any form of product differentiation. The higher qualities of in-flight amenities that the major airlines emphasize play very minor roles in determining the airline passengers chose. According to William O' Conner, "The speed, comfort, and safety aspects of the journey are more likely to be much the same, whichever airline a passenger selects" (1995 p.5). The primary reason passengers select a particular airline is based on the cheapest airfare and the most convenient departure and arrival times. As a result, airlines typically will match each other's fares on competitive routes, but attempt to gain more passengers than their competitors by offering more flights on the route. This maximizes the likelihood that passengers will get their preferred flight times. To passengers this form of differentiation is not easily perceived, because it does not involve the comfort of their seat or price of the ticket (O'Conner, 1995).

The final unique aspect of the airline industry and perhaps most important is that the total cost for providing a flight is almost solely determined by the airline's fixed costs. Regardless of the flight, the two principal costs are jet fuel and the labor costs of the crew. Passenger amenities constitute most of the variable costs, but these represent such a small portion of total costs that they are insignificant. In other words, the average total cost of a given flight is almost entirely determined by the average fixed costs (O'Conner, 1995).

Drawing on this aspect, it can be concluded that the marginal cost of an additional passenger on a flight is irrelevant. Since total costs are almost entirely made up of fixed costs, the airline pays for the production costs of a full flight regardless of how many passengers are actually on a flight. For example, if the average total cost to seat each passenger remains approximately $1000, then the marginal cost of seating 50 versus 100 people on the airplane is almost zero. However, a flight that departs with empty seats represents lost revenue since the airline has already paid the costs to provide

the seat (Dempsy & Goetz, 1992).

Taking these factors into consideration, the model developed to demonstrate airline fare determination for a flight must differ from how monopolistic competition determines price. Most importantly, the airline's choice of fare cannot be determined through the standard monopolistic competition model that dictates that the intersections of the marginal cost and marginal revenue curves determines the price the firm should charge. The reason for this is that the marginal revenue and cost curves do not intersect in this paper's model because of the assumption that the marginal costs of each additional passenger is insignificant for the airline. Since marginal cost and revenue serve no important role in this industry, they are eliminated from this model.

When an airline decides to offer a flight between two cities, it must first determine what sized airplane to use on the route. In the model of airline price determination, three different-sized categories of airplanes are used to demonstrate this decision. In Figure 1, ATC1 and Q1 represent costs and seating capacities of 50 to 70 passengers, which consists of small turboprop airplanes. ATC2 and Q2 correspond cost and capacity of airplanes holding 120 to 150 passengers, such as the Boeing 737. Finally, ATC3 and Q3 symbolize larger airplanes cost and seating of 200 to 260 passengers such as the Boeing 767 or McDonnell. Note that each ATC curve has its own distinct shape in order to represent its specific airplane type.

This model assumes that through adequate market research an airline can determine demand level for each flight, which allows construction of the demand curve in Figure 2. By comparing the demand curve with the average total cost curves for each airplane type, the airline can determine which size airplane will maximize profits for a given flight. As shown in Figure 2, the airline will choose Q2 as the airplane to operate because this airplane provides the greatest total area of profit of the three Q levels. The airline then uses Q2 to price off the demand curve, which establishes the appropriate single fare to charge. The model developed in this paper concludes that the airline's choice of Q-level leads to the determination of the fare charged. For the remainder of this paper, Q2 will be assumed to be the profit maximizing level of quantity.

IV. EFFECT OF SHOCKS AND HYPOTHESIS OF MARKET SEGMENTATION AND PRICE DISCRIMINATION

Now that the model has been developed to explain airline price determination, it will be demonstrated how airline pricing has been shaped by two key exogenous shocks. The effect of

Figure 1: ATC Curves for Q1, Q2, & Q3

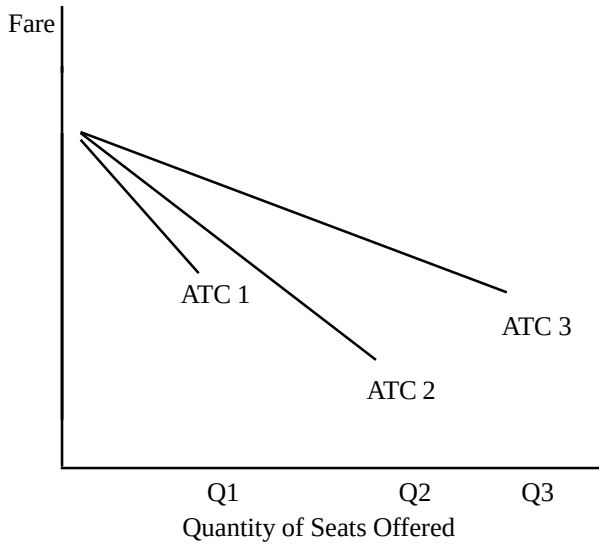
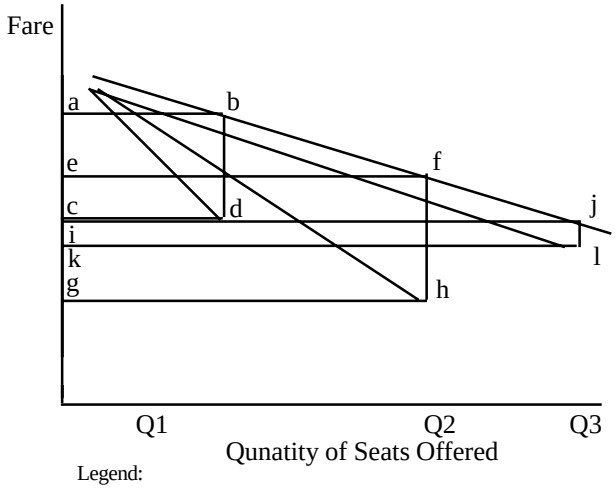


Figure 2: Determining Q Level for Flight



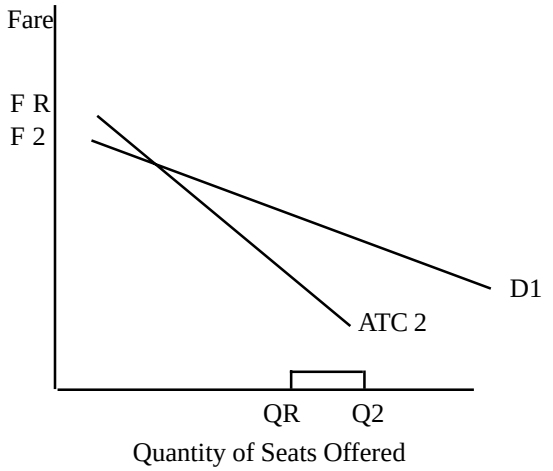
Legend:
F 1= Airfare charged for Q1 level
F 2= Airfare charged for Q2 level
F 3= Airfare charged for Q3 level
D 1= Demand Curve for individual flight

government regulation for one flight on the model is shown in Figure 3. By setting airfares above the market clearing level, the government prevents the airline on this route from filling all seats up to Q2. Yet, as long as competition is kept out on this flight, the demand curve is kept artificially high and the airline is content to fly with a partly full airplane at QR. The reason for this is that the airline is still making a constant profit despite not filling every seat because of the CAB keeping demand high by restricting competition. This characterizes the long-term stability for the major airlines that existed under regulation.

This steady environment was radically altered by the first exogenous shock to the model, which was the deregulation of the airline industry. The effect this has on the model is shown in Figure 4. Taking away the government's barriers to entry allowed for low-cost airlines to enter markets and compete with the major airlines. The entry of this new competition shifts the demand curve from D1 to D2, which causes profits for the major airlines to disappear. This demand shift caused by the entry of low-cost airliners causes the fare in this market to decrease from FR to FD. This lower airfare makes it impossible for the major airline to cover its average costs because of the higher nature of their costs when compared to the low-fare airline. Yet, the low-cost airline can make a profit at this new price level through its lower cost advantage. If it were not for the cost advantage shown in ATCL, new competition would not have entered the market and decreased the demand curve because airlines would not have been able to cover their average costs.

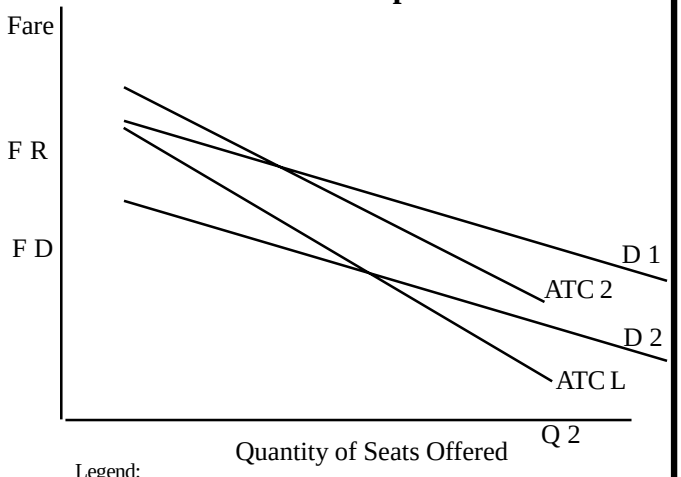
The second major exogenous shock that affected the airline industry's pricing came into effect at the same time as deregulation, which was the information technology revolution and the development of the computer reservation system. During the 1960's, the major airlines had worked to develop a computerized system that would allow them to know the flight details of any passenger on any of its routes. At first, these systems were seen more as means to boost labor productivity by making it easier to handle large amounts of reservations (Williams, 1994). Yet, by the mid-1970's, the airlines began to see that a reservation system had potential as a valuable tool to increase the number of passengers. Therefore, the airlines joined together and attempted to create an unbiased industry-wide system. However, the government overturned this attempt on the grounds of anti-trust violation. As a result, the five largest airlines each committed to creating their own reservation systems

Figure3: Effect of Government Regulation



Legend:
Q2- quantity offered by airline
QR- quantity filled as a result of government price setting
F2- airfare as determined by market
FR- airfare as determined by government intervention

Figure 4: Entry of Low -Cost Competition



Legend:
D 1- demand curve that existed before Deregulation Act
D 2- demand curve as a result of new competition
ATC 2-average total cost curve for major airline
ATC L-average total cost curve for low-cost airline
FR- previous airfare under regulation
FD-airfare created by deregualtion

at the same time the Deregulation Act was passed (Glab and Peterson, 1994).

As Figure 4 indicates, the influx of low-cost airlines brought forth by deregulation created a very unfavorable environment for the major airlines. The low-cost airlines could compete directly with the major airlines on a given route, fill all seats at a reduced fare, and still make a profit. The major airlines' attempts to leave fares at the higher price in hopes that passengers would appreciate the higher service level of the majors proved impractical because, as discussed before, passengers value the lowest airfare over any amenity. What many of the major airline executives were failing to recognize was that deregulation had created an environment where a major airline charging a single price on a route would not allow profitability. This notion combined with characteristics unique to the airline industry made it necessary for the major airlines to segment their passengers on each flight according to each one's willingness to pay and then use price discrimination methods to steal consumer surplus. This method of maximizing the price each passenger paid for their ticket could allow the major airlines to make profits despite the cost advantage held by the low-cost airlines.

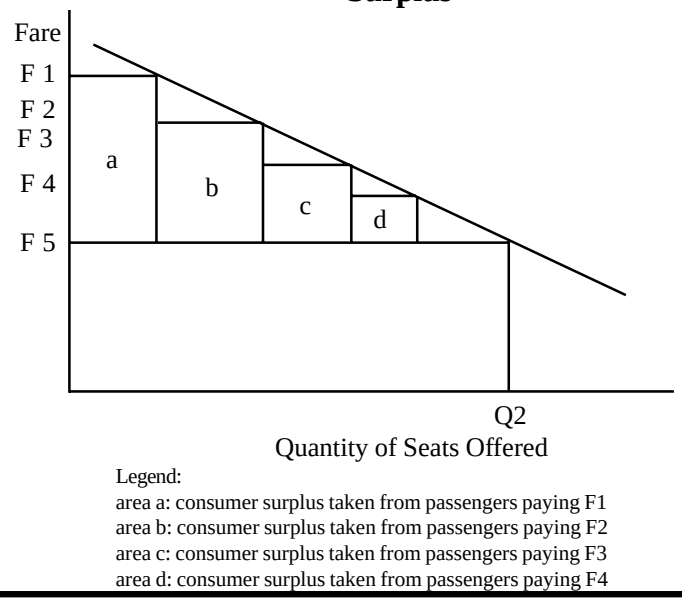
In order to understand this concept of segmenting each passenger on a flight, it must first be made clear that each passenger on a flight has different reasons for travel. For example, a business traveler often has no advance warning concerning when he or she will travel and has a strong necessity to get to where he or she is going as expediently as possible. Therefore, this group of travelers has a very low price elasticity, which means they are more willing to pay a higher airfare in order to guarantee travel on a specific flight that would be needed for their travel itinerary. Contrast this type of passenger with a vacationer who has had advance knowledge of their vacation period and does not have a strong urge to get to their destination at any specific time. Thus, vacationers will have high price elasticity and fervently value price before convenient flight times. These two types of travelers represent the two extremes of air travelers with various other groups having price elasticities somewhere in-between. In reality, an airline continually attempts to segment the market for one flight as much as possible if the willingness to pay is known. Predicting this out of so many potential travelers would be a daunting task if it were not for the use of computer reservation systems to provide the key to this information. Through research into a flight and effective use of a reservation system, a major airline obtains the ability to predict the willingness to pay of each passenger on the airplane.

Once the willingness to pay for each passenger is determined, the airline can then adjust fares according to the types of passengers purchasing tickets. This results in groups of travelers with lower price elasticities paying a higher airfare than those with higher price elasticities, which clearly represents price discrimination. The form of price discrimination practiced here falls somewhere between first and second-degree discrimination. In first-degree discrimination, the firm is specifically aware of the price that consumers are willing to pay for the seat and thus can maximize the consumer surplus taken from their customers (Botimer, 1996). This serves as the goal of the major airlines and is partly attained by using computer reservation system, yet the sheer number of potential customers for a flight makes first-degree unobtainable. Second-degree discrimination allows the firm to take some, but not the entire consumer surplus by offering a few, well-defined pricing categories. The airlines create so many different classes of prices that most consumer surplus is taken, thus making this form of price discrimination stricter than second-degree (Botimer, 1996). The large size of potential customers makes first-degree impractical, but the vast number of prices possible with computerized reservations allow the airlines to obtain more consumer surplus than second-degree discrimination offers.

Previous studies have examined the vast dispersion in airfare prices that exists for passengers on a given route. One of these aimed specifically at this paper's notion that a key linkage between price dispersion and discrimination exists. The work of Borenstein and Rose used Gini coefficients as measures of dispersion and revealed two key findings. First, they found that price dispersion was inversely related to how much market share an

airline has on a given route. In other words, an airline is less likely to offer a range of airfares if it carries most of the passengers on a route. This is evidence that monopolization of a route makes price discrimination unneeded for an airline. The second finding was that airport dominance and the lower concentrations of tourist traffic both decrease price dispersion. Airport dominance implies an airline offering a significant number of flights, which increases the likelihood of the airline having monopoly routes. Since tourists represent a highly elastic passenger group, an airline is less likely to be able to use price discrimination tactics in order to draw consumer surplus. This study's principal conclusion agrees with that of this paper, which is that most of the dispersion in airfares is linked to price discrimination tactics used by airlines (Borenstein and Rose, 1994).

Figure 5: Use of Segmentation to Steal Consumer Surplus



Legend:
area a: consumer surplus taken from passengers paying F1
area b: consumer surplus taken from passengers paying F2
area c: consumer surplus taken from passengers paying F3
area d: consumer surplus taken from passengers paying F4

The practice of market segmentation followed by successful price discrimination served as the means for the major airlines to compete successfully with low-cost airlines in the deregulation era. By offering low fares, customers who only will pay lower prices can be obtained. These fares are offset with passengers who pay higher fares, in order to allow the airline to make a profit despite some fares being below average costs. Figure 5 demonstrates the use of this system. Five categories of fares are used in this case, each designed to steal consumer surplus from five different groups of passengers based on their elasticites. The environment of deregulation and the computer reservation system created this system, which explains the origin of the price dispersion that exists to this day.

V. ANALYSIS OF THE POST-DEREGULATION ERA

To properly understand the effect low-cost airlines had in shaping competition, it is necessary to examine the strategies of these firms in more detail. Probably the most interesting of these airlines to analyze is People Express which began operations in April, 1981. The airline's plan was to focus on high frequency, low cost air travel on the East Coast, which had been an underdeveloped market under regulation. From the start, People Express set out to keep operational costs at the bare minimum. The airline concentrated its operations out of Newark Airport, which at the time offered very low facility costs and also provided convenient access to New York City. People Express's aircraft were leased for short time periods, thus saving on the high cost of new aircraft. Employees were all non-unionized and often worked multiple positions, such as both flight attendant and ticket agent. Additionally, passenger comforts were limited by requiring passengers to pay for amenities such as baggage check-in and in-flight beverages (Peterson and Glab 1994).

This bare minimum cost structure allowed People Express to charge fares significantly lower than the major airlines, allowing the airline to hold a crucial advantage in competing with the majors. For example, when People initiated service from Newark to Norfolk, it offered a one-way fare of $35. The only fare offered up to this point by the

incumbent major airline US Air had been $82. The entry of People Express forced US Air to drop its fare to $35. Even matching fares could not help US Air compete and shortly after the airline ceased flying the route and diverted its resources to routes without low-cost competition (Glab and Struken, 1994). The situation faced by US Air on this route precisely follows the predictions of Figure 4. US Air simply could not cover its average costs at the low fare that People Express was able to charge, thus causing it to stop flying from New York to Norfolk. This example typifies the reaction of most major airlines to entry by low-cost airlines. It was possible for the majors to battle the low-cost airlines by taking short-term losses in hopes of outlasting the low-cost competition in the long run. However, most majors instead chose to pull out or reduce service on routes with low-cost competition. The majors also tried ineffectively to slice their costs by retiring less efficient jets and furloughing workers, but it proved impossible to bring average costs down to the level of the low-cost airlines. Industry analysts at the time compared the majors to lumbering dinosaurs, doomed for extinction (Glab & Struken, 1994).

As the problems continued for the majors, People Express and other low-cost carriers continued to enter more routes as profits rose. In fact, by the summer of 1984, People Express was the fastest growing company in American history at the time. The major airlines were finally beginning to see that the old system of pricing with one standard fare was not going to allow profitability (Glab & Struken, 1994). At first, the major airlines tried tinkering with the old system in order to induce more revenues. For example, United Airlines ran one promotion in late 1982 where coupons for reduced ticket prices were given to passengers during flights. This represented a primitive attempt by United to segment their passengers into frequent and new customers and price discriminate against new customers (LaCroix, 1984). As was the case with most of these methods created by the majors, coupons failed to remedy the profitability problems faced by United.

As the problems continued for the major airlines, the technological revolution was creating an explosive growth in the major airlines' computer reservation systems. The new competition sparked by deregulation had brought about so many new airlines and flights that passengers could no longer rely on the airlines to determine the best fare for a flight. It is important to note that each system's database listed all possible airline flights regardless of whether an airline owned the reservation system. This was necessary because many passengers had to make connections between flights on two different airlines to meet their travel needs. The number of travel agencies using reservation systems soon turned out to be crucial in the post-deregulation environment. The competitive advantage that computer reservation systems provided for the major airlines soon became readily apparent (Williams, 1994).

As a result of consumer demand, travel agencies soon became the consumer source for unbiased flight information. To meet the demands of travel agencies for fast access of all available airline information, airlines that owned computer reservation systems actively marketed their units to the agencies. Figure 6 demonstrates the massive growth in travel agencies in the aftermath of deregulation, which was accompanied by almost all agencies using computer reservation systems. As shown, the number of travel agencies grew over 150% and almost every one used a computer reservation system. The most popular systems were American's *SABRE* and United's *Apollo*, which collectively controlled over half of the total number held by travel agencies (Williams, 1994). The importance of an airline owning its own reservation system at this time cannot be overstated. "An in-house CRS has provided airline managers with a degree of clarity about the demand for various offerings that one would ordinarily associate with the hypothetical examples contained in microeconomic textbooks" (Williams, 1994). The growth of CRS gave the major airlines the mechanism, in which to know their customer's willingness to pay, which allowed the use of discriminatory pricing.

The major airline's response to the low-cost competition finally arrived on January 18, 1985, when American Airlines announced that one out of every three seats would be sold at heavily discounted

prices. The new fare called the Ultimate Super Saver matched the fares of low-cost airlines on every route where they competed with American. This single act took away the vital advantage that low-cost airlines had been exploiting over the majors, which was that they could make profits at low airfares. The key to the new Ultimate Super Saver was that it carried a number of purchase restrictions that prevented it from being the accessible to passengers at any given moment. By using their CRS to estimate elasticity levels, American could alter the number of discounted seats offered as demand changed. Other airlines with reservation systems soon followed American's strategy and the system of pricing that exists today was in-place (Glab & Struken, 1994). This system has become known as yield management, which represents nothing more then a technical term for successful market segmentation followed by price discrimination.

Although no one predicted it at the time, the adoption of yield management became the prime cause of the downfall of the low-cost airlines. With yield management in place, the major airlines could compete with the low-cost airlines at lower prices, yet still make profits due to the revenue generated from higher fares obtained from passengers who could not obtain discount fares. As predicted in the model, these passengers were typically business travelers that were more willing to pay for the convenient schedules offered by the majors. Passenger choice almost always went with the major airlines, because they tended to offer more flights on their routes and also offered better passenger amenities (Glab & Struken, 1994). The results of yield management are best demonstrated in Figure 7, which shows the entry and exit of low-cost airlines by year. Note that almost every low-fare airline was gone by 1986, which was only a year after American initiated its yield management system.

No other low-fare airline left in such spectacular fashion as People Express. At the start of 1986, the airline became the sixth largest airline in the country and even had international service to Europe. Yet, in the next two quarters People Express lost over one hundred million dollars and soon was bankrupt by the late spring. The principle reason for People Express' dramatic collapse was due to the loss of its customers to the low prices generated by the majors' yield management systems. It took a little over a year for People Express to go from an airline with a limitless future to bankruptcy. People Express was bought out by Texas Air Corporation in January of 1987 and merged into Continental Airlines. Coincidently, airfares immediately began to go up on routes that People Express had served (Dempsey & Goetz, 1992). The collapse of People Express demonstrates just how powerful the weapon of market segmentation and price discrimination was in helping the major airlines crush their low-cost competition.

VI. APPLICATION OF MODEL

A. Understanding Purchase Restrictions

Thus far, historical evidence has been provided to describe the adoption of market segmentation and discriminatory pricing tactics by

Figure 6: Growth of Travel Agencies and Computer Reservation Systems

Year	No. of Agents	% with CRS
1977	13454	5
1979	16112	24
1981	19203	59
1983	23059	85
1985	27193	90
1987	29370	95

CRS Market Shares in 1985

System	Vendor(s)	% of Locations	% of Agency generated revenues
Sabre	American	35	46
Apollo	United	24	28
Pars	TWA/Northwest	13	10
System One	Texas Air	17	10
Datas II	Delta	10	5

Figure 7: Results of Low-Cost Airlines

Carrier	Year of Entry	Year of Exit	Reason for Exit
Former Intra-state Airlines			
Air California	1979	1987	Acquired by American
Air Florida	1979	1984	Bankruptcy
Pacific Southwest	1979	1987	Acquired by US Air
Southwest	1979		
Former Charter Airlines			
Capitol	1979	1984	Bankruptcy
World	1979	1985	Withdrew from scheduled services
Newly Formed Carriers			
Air Atlanta	1984	1987	Bankruptcy
Air One	1983	1984	Bankruptcy
American International	1982	1984	Bankruptcy
America West	1983		
Brainiff	1984	1989	Bankruptcy
Florida Express	1984	1988	Acquired by Brainiff
Hawaii Express	1982	1983	Bankruptcy
Jet America	1981	1987	Acquired by Alaska
MGM Grand	1987		
Midway	1979	1991	Bankruptcy
Midwest Express	1984		
Muse	1981	1985	Acquired by Southwest
Northeastern	1983	1985	Bankruptcy
Pacific East	1982	1984	Bankruptcy
Pacific Express	1982	1984	Bankruptcy
People Express	1981	1986	Acquired by Texas Air
Presidential	1985	1989	Bankruptcy
Regent Air	1985	1986	Bankruptcy

Source: Williams 16

the major airlines. It is now necessary to describe the mechanisms the major airlines have used to ensure that only passengers with low willingness to pay obtain discounted airfares. After all the entire goal of yield management fails to be met if passengers with high willingness to pay end up purchasing cheaper tickets. To alleviate this problem the major airlines developed a system of restrictions on discounted tickets that has prevented this from occurring. Essentially, a fare restriction acts as a fence to prevent passengers with higher willingness to pay for air travel from obtaining lower airfares and allows the airlines to steal the valuable consumer surplus that maximizes profits on a flight. Three common restrictions that will be analyzed in this paper are advance purchase, minimum stay, and off-peak travel requirements. The effect of these restrictions on passengers will be compared between a highly price sensitive vacation traveler and a price insensitive business traveler.

Advance purchase requirements necessitate that passengers buy their tickets before a given date, which can range from two weeks to a month before the date of their flight. To passengers flying for vacations this restriction is little trouble because vacation time is usually known and planned out well in advance. Yet for business passengers, these fares are almost always unattainable because complete travel itineraries are rarely known until a few days before the business trip. Therefore, this restriction ensures that vacationers obtain the limited number of discounted seats for a given flight.

Discounted airfares also often contain a minimum stay requirement for passengers. The most common type of this restriction is that passengers stay through Saturday night at their destination before making their return flight. For a vacationer this presents little trouble because their vacation period extends typically over a weekend and Sunday is the desired day to return home. Conversely, a business traveler typically has fulfilled the purpose of his or her trip during the week and is very unwilling to waste their weekend away from home in order to save on airfare. Thus, this restriction serves to block business travelers from obtaining lower fares.

The final restriction examined is the requirement that passengers traveling on discount tickets fly on off-peak flights. Since airlines typically offer multiple numbers of flights over the course of a day between two cities, some flights generate greater demand than others. Flights with high demand typically are during the week from midmorning until early evening, thus these flights are in the peak-demand periods. Conversely, the off-peak period is either early in the morning, at night, or during the weekend. Since the demand is higher for peak flights, the airlines strictly limit the number of discounted seats on these flights in order to steal as much consumer surplus as possible. For a vacationer, travel on off-peak flights would be seen as a small hassle if it were necessary to save significantly on the airfare. Yet for a business traveler, off-peak travel creates too much travel because his or her ultimate need is to their destination as their schedule demands, which is almost always during peak periods. Therefore, on off-peak flights, a significant number of seats are sold at discounted prices to provide for passengers with a low willingness to pay.

B. Case Study: Atlanta and Delta Airlines

Now that the foundations have been laid for understanding how the airlines effectively segment their passengers, an analysis of three different routes will demonstrate the use of price discrimination. Delta Airlines will be used as the major airline for analysis on three separate routes that all originate in Atlanta. This choice was made because Delta operates one of the largest single operations in Atlanta of any airline in the world. Therefore, this airport dominance allows Delta to hold monopolies on many flights, which results in higher airfares. By analyzing Delta's flights from Atlanta to three different cities where it faces varying levels of competition, the dynamics of segmentation and price discrimination become readily apparent.

The first flight for analysis is from Atlanta to Little Rock, where Delta is the only airline offering nonstop service. Figure 8 shows the various fares offered to passengers on these flights. Delta does offer two discounted and two standard fares for the route. Notice that the discounted fares both carry purchase restrictions requiring advance

Figure 8: Atlanta to Little Rock Price Analysis

Fares Offered	Cost	Advance Purchase Requirements	Minimum Stay Requirements	Flight Limits	Refundable
Discount One	$392	Two Weeks	Through Saturday	None	No
Discount Two	$573	One Week	Through Saturday	Weekend Travel	No
Standard One	$786	N/A	N/A	N/A	Yes
Standard Two	$1,074	N/A	N/A	N/A	Yes

purchase of either one or two weeks and do not allow return flights until Sunday. Also, neither of the discounted fares are refundable in the case of cancellation. The advent of the yield management system has allowed for consumers to obtain some discounted airfares even though Delta holds a monopoly on the route. The principle reason Delta still offers discounted tickets lies in the fact that selling them at discounted fares allows for each flight to fly as close to its maximum capacity as possible. This allows Delta to avoid the losses associated with having empty seats on the flights for this route. Notice how the increase in airfares stays relatively consistent at around $200 as the fare classes change from discount to standard. Delta's monopoly on the flights between Atlanta and Little Rock does not necessitate a lot of variability in fares to adjust for the varying levels of each passenger's willingness to pay.

The next route for analysis is between Charlotte and Atlanta, where Delta's competition is US Airways, which also is a major airline. Figure 9 lists the fares offered on this route. The effect of competition causes increased variability in prices

Figure 9: Atlanta to Charlotte Price Analysis

Fares Offered	Cost	Advance Purchase Requirements	Minimum Stay Requirements	Flight Limits	Refundable
Discount One	$198	Three Weeks	Through Saturday	None	No
Discount Two	$238	Two Weeks	Through Saturday	None	No
Discount Three	$438	One Week	None	None	No
Standard One	$612	N/A	N/A	N/A	Yes
Standard Two	$972	N/A	N/A	N/A	Yes

than on the Atlanta to Little Rock route. Restrictions on the discounted fares seem well placed to partition passengers and allow for biased pricing to succeed. Additionally, it is very likely that Delta and US Airways both strictly limit the number of seats sold at discounted fares. This allows each airline to capture passengers with very low willingness to pay and squeeze out more consumer surplus from the less flexible in their travel needs.

The final route examined is from Atlanta to Boston, which best demonstrates the practice of market segmentation and price discrimination. The primary reason for the wide dispersion in airfares demonstrated in Figure 10, is that Delta competes with the low-cost airline, Air Tran, on this route. Just as the model developed in this paper predicted, the effect of low-cost competition causes Delta to segment and discriminatorily price against passengers as much as possible. When Air Tran began flying between these two cities, Delta had to lower fares to Air Tran's level in order to prevent losing passengers. Therefore, Delta used the principles of yield management to create the route's fare structure. There are five discounted fares on the route, which are designed specifically to match Air Tran's fares. The low prices placed on these fares allows Delta to obtain many of the highly price sensitive passengers that would select Air Tran for their travel needs if each airline charged only their standard fare. Due to its higher costs, Delta's standard fare is much higher then Air Tran's. Therefore, Delta uses five sets of discounted fares to compete with Air Tran for passengers with low willingness to pay. Delta knows that by properly restricting the fares the airline can prevent these fares from resulting in high levels consumer surplus.

Discount Fares One through Three appear to be targeted toward passengers traveling for the purposes of leisure. The restrictions that allow this to occur are the use of advance purchase requirements and the limitations placed on what day a passenger can select to travel. For business travelers, the advance purchase requirements make it especially difficult for them to obtain these lower fares since they often do not know their travel itineraries until the day before they need to leave. Discount Fares Four and Five are designed to meet the needs of business travelers with slight flexibility in their travel needs. As indicated in Figure 10, these fares only carry the restriction that travelers use early morning and evening flights, which are off-peak times of the day. This is less of a hassle to travelers than requiring them to stay through Saturday. The use of these discounted fares with fewer restrictions seems to indicate that Delta wants to take as many travelers as possible from Air Tran.

The huge jump in price from the discounted to standard fares is due to the fact that on a given flight Delta must make-up for the significant number of discounted tickets sold by maximizing the price that passengers that are insensitive to increases pay. Delta is demonstrating exactly how a major airline steals consumer surplus from the lower elastic group of travelers. Compare the increase in price from the highest discount fare to the lowest standard fare on this route to this increase on the previous two routes. On the Atlanta-Boston route the increase is approximately 300%. However, on the previous two routes, the increase from discount to standard is only about 40%.

Passengers paying the standard fare are obtaining benefits by paying these higher fares, such as the ability to receive refunds for travel and, perhaps most importantly, the flexibility to travel on any one of Delta's flights between Atlanta and Boston. By providing more flights than Air Tran between the two cities, Delta is able to obtain more time-sensitive passengers who are willing to pay a premium in order to get to where they need to go. Delta's tactics of yield management in this market allow the airline to fend off competition from Air Tran and still make profits by stealing consumer surplus from price insensitive passengers.

VII. CONCLUDING REMARKS

Airline pricing was drastically changed by the influx of low-cost airlines brought by deregulation and the creation of computer reservation systems. The revolutionary concept of varied pricing according to demand is one of the sole reasons that the major airlines were able to fend off the low-cost airlines and increase their dominance of the nation's air transportation needs. Deregulation has made air travel affordable for a

much larger portion of the population.

The prime purpose of this paper was to serve as an overview of the events that lead to the creation of the pricing system used in air travel today. Although airfares seem to change so chaotically, the system itself can be seen quite simply as evolving from the major airlines need to segment each customer based on their willingness to pay for travel. Once this is determined from computer reservation systems, the airline simply follows through by discriminatorily pricing to steal consumer surplus. Understanding how the airlines develop their price structure can allow for passengers to obtain low airfares.

A key policy implication that this paper makes apparent is that businesses should seek alternative methods to conduct transactions rather than through using air travel. Essentially finding alternatives to air travel will causes airlines to lose out on their most critical customers for producing revenue. As the information technology revolution continues, it may become more conceivable for business to be conducted through teleconferencing rather than in-person. As a result, the airlines will have to stop discriminating against business travelers in order to keep them flying. This will signify a major change in the strategy that airlines use to price. Other technological advances such as the growth of internet travel bookings signify that the airlines must upgrade their pricing methods into the 21st century. Nevertheless, market segmentation and price discrimination tactics have played a significant role in assuring the continued dominance of major airlines.

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Figure 10: Atlanta to Boston Price Analysis

Fares Offered	Cost	Advance Purchase Requirements	Minimum Stay Requirements	Flight Limits	Refundable
Discount One	$138	Two Weeks	Through Saturday	Midweek Evening	No
Discount Two	$198	One Week	None	Midweek Evening	No
Discount Three	$256	3 days	None	Evening Return	No
Discount Four	$316	None	None	Morn. And Evening	No
Discount Five	$398	None	None	Morning	No
Standard One	$1,172	N/A	N/A	N/A	Yes
Standard Two	$1,474	N/A	N/A	N/A	Yes
Standard Three	$1,706	N/A	N/A	N/A	Yes

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