

# Airline Transportation & The American Society

Tahsin Hassan, Vasil Savov  
Advised by Professor Oleg Pavlov  
Department of Social Science and Policy Studies  
Worcester Polytechnic Institute  
Worcester, MA 01609  
(508) 831-5234  
[opavlov@wpi.edu](mailto:opavlov@wpi.edu)

May 1, 2008



# Contents

- Abstract: .....5
- 1. Introduction.....6
- 2. History – Regulated Skies .....7
  - 2.1. Regulation .....7
  - 2.2. CAB – Pricing Strategy .....9
- 3. End of the Regulation.....11
- 4. Effects of Deregulation.....12
  - 4.1. The pricing effect.....12
    - 4.1.1. The passenger’s perspective .....13
    - 4.1.2. The airline’s perspective.....13
  - 4.2. Airline Productivity and Expansion.....14
  - 4.3. Air Transportation Network System.....16
  - 4.4. Safety through the years .....22
  - 4.5. New Entrants .....23
    - 4.5.1. Effect of New Entrants on Airfare Pricing .....24
    - 4.5.2. Effects of new entrants on Airline Traffic.....24
  - 4.6. The Drawbacks .....27
    - 4.6.1. Spoke and Hub .....27
      - 4.6.2.1 Frequent Flyer Program .....28
      - 4.6.2.2. Computer Reservation System .....29
      - 4.6.2.3 Antitrust Law.....31
      - 4.6.2.4 New entrants & Airline failures .....32
- 5. Industries View of the current situation. ....34
- 6. Air Taxis - the future.....35
- 7. Airline Alliances – Once Rivals, Now Partners.....38
- 8. Economical Effects .....39
- 9. Social effects of improvement in aviation technology.....41
- 10. Environmental Effect.....43
  - 10.1. Noise Pollution .....43

10.2. Air pollution.....	45
11. Reforms .....	46
12. Conclusion .....	47
13. References.....	49
13.1. Works Cited .....	49
13.2. Websites.....	52

## Figures:

Figure 1: Before and After the Regulation .....	17
Figure 2: Air Traffic Hubs for 2007 .....	20
Figure 3: Comparative traffic growth of Dallas .....	25
Figure 4: US Traffic in millions 2006 – 2007 .....	26
Figure 5: Comparison of different reservation systems flight reservations .....	30
Figure 6: Boeing and Airbus forecasts .....	35
Figure 7: Causal loop Diagram for Airline Industry.....	39

## Tables:

Table 1: Percent of airline's domestic departures at hub .....	19
Table 2: Airport designations depending on the percentage of total boarding.....	21
Table 3: Accidents and Accident Rates by NTSB Classification.....	22
Table 4: Average change of real fares due to deregulation .....	24
Table 5: Start up jet 1979 – 1986.....	33
Table 6: The three major alliances.....	38

## **Abstract:**

The project addresses the airline transportation, the changes and the social aspects of it, especially in the Western world. There have been numerous studies concerning the economic aspect of the airline business industry. However, most of them have not looked at the social aspects of these changes.

In our report we attempt to combine both the economic and social end of perspective. To introduce our reader to the situation of air transportation, we include a small portion of air-transportation history. Later on, we move onto the domain of future steps that are being taken to address the mass transportation needs. A socio-economic look at the current situation is undertaken to gain some understanding of the current airline industry.

# 1. Introduction

Perhaps the most profound effect of the coming years is the massive population growth, and with that comes the inevitable question of the transportation needs. The obvious need to maintain and improve the current transportation network is no longer subtle. With the introduction of airliners as transport, society has experienced both positive and negative effects. In our report we would like to quantify these effects. To understand the current air transportation system, we include a small portion of history behind it.

Since the beginning of human culture there has been need of transportation. But it was with the invention of the airplane, that men fulfilled their dreams of owning the skies. The airline industry quickly evolved and became a must for long distance transportation means of the public. The airline industries evolved mainly in the Western world, more so in the US after World War II. However, as the complexity of maintaining a nationwide network grew the government started regulation of the airline industries; thereafter, in the wake of rising prices, and certain airline monopolistic competition, the US Federal Government decided to deregulate the airline industry. Following the deregulation, came the changing nature of airline network. The airline industry quickly adapted to what came to be known as the spoke and hub system instead of the previous point to point system. Due to the deregulation a huge decrease in ticket prices and increase in airlines as a means of public transportation was seen. But as the hub and spoke system matured, the aftermath was that most airlines stopped their service for less profitable routes, in turn increasing waiting time for the passengers. But the problems emerged on the airline side as well, when the predatory behavior of the airline industry halted growth of other

airlines. As of now whether deregulation was a better choice or not is still controversial. Throughout the course of the airline evolution the airline industry has affected the society. The environmental effect and the changing nature of the job world are a few of the profound effects the airline industry has had on the society. To understand the whole picture we need to take a step back to the history of airline regulation.

## **2. History – Regulated Skies**

### **2.1 Regulation**

Development of airline jets was secured after World War II. The Cold War between the Soviet Union and the United States following World War II further advanced the world of aviation, as more military research was handed over to the public transportation. But as air travel soared upwards so did the problems with airline industry. For example, air traffic control became a major issue. Furthermore, air traffic routes, flight expense and other economic affairs became harder to maintain. Thus the Federal Government was forced to create agencies to overlook both the economy and flight safety issues of the aviation industry.

In the beginning, regulation supporters argued that deregulation of the aviation industry would make the airlines concentrate only on flying high volumes in the high profitable routes, causing cut throat competition among the different airlines in the industry. The fear of this competition compelled the post depression-era members of Congress to vote for the Civil Aeronautics Act of 1938 (Bailey, 1985). As a result of this act, congressmen created the



independent board of members known as the Civil Aeronautics Board (CAB). CAB was one of the first agencies that came into existence to maintain the aviation industry in the US. It was mainly involved in the regulation processes.

However, later on safety and traffic control became too significant for the CAB handle alone. Following the accidents that took place in Grand Canyon in 1956 (two aircrafts collided, killing 128 people) the need for another agency became clear. Afterwards, the government enforced the Federal Aviation Act in 1958. Later on, this act created the Federal Aviation Administration (FAA). This administration was in charge solely of establishing and running a broad air traffic control system to maintain safe separation of all commercial aircraft through all phases of flight. On the other hand, CAB retained jurisdiction primarily over economic matters, such as airline routes and rates.

The CAB had four main functions:

- To award routes to airlines
- To limit the entry of air carriers into new markets
- To regulate fares for passengers
- To promote and develop it

The goals of the CAB were to provide the American citizens with the safest, most efficient, and least expensive air travel over the widest possible range. The agencies accomplished these objectives by regulating some aspects of the commercial aviation sector such as:

1. Dictating the route patterns between cities and the frequency of flights.
2. Managing fares for passengers and cargo.
3. Financing, subsidizing carriers flying on less profitable routes.
4. Controlling mergers and acquisitions.
5. Arranging inter-carrier agreements.

The separation of tasks between CAB and FAA helped the government maintain the aviation industry.

## ***2.2 CAB – Pricing Strategy***

The Civil Aeronautics Board had the responsibility of setting up airline ticket prices for each individual route. Prior to World War II, CAB set air fares similar to those of the first class railway fares. After 1942, CAB reviewed the pricing, and decided to increase prices as an across the board (flat) fare. Later on, the CAB started an investigation into the airline ticket pricing, known as the Passenger Fare Investigation of 1960. As a result of the investigation, CAB decided to set the price bar at 10.5 percent of the rate of return. However, the number of passengers declined in the 1970's and affected the financial stability of airlines. Due to price restrictions imposed by the CAB, they were not able to compensate for their losses and this caused the Board to review its previous pricing policies. Thus, it provoked another change in prices from 10.5 to 12 percent rate of return in the year 1974. However the price change was still inconsistent with public demands. The Board's lack of understanding of factors, which defined the airline ticket fares, led to an inefficient pricing strategy. To set the passenger fare, the Board

took into account the load factor, seating density, and cost of service standards, ultimately setting a rate of return related ticket fare for the airlines. However, the idea of taking cost of service into account was bloated, because the Board only looked at distance traveled while examining the cost of service. They did not take into account load factor<sup>1</sup>, fuel costs and other important factors (Bailey, 1985). Furthermore, CAB thought about the industry (rather than route plans), individual passenger fare, and service cost while setting the price envelope.

The CAB failed to implement a clear cut air travel pricing based on changing circumstances. For instance, the CAB did not consider the technological advances and its impact on the airline industry. In the late 1950's, because of these technological advances, the airlines were able to provide affordable long distance travel. In fact, some short distance travel was priced at a cost higher than the service cost while some long distance travel was priced at a much lower rate.

Another instance was the route mapping while setting up prices. The routes should have been a careful consideration to this pricing envelope that the committee would set. However the pricing was fruit of less thought process and more of following the rail-line pricing. Following its predecessor the rail-line administration, the Board decided to mimic the air transport traffic route to postal mail system routes. And thus the board never looked into the rationalization of the route mapping.

---

<sup>1</sup> Load Factor- The ratio of revenue passenger miles to available seat miles of a particular flight.

Furthermore, because of complexity of the route mapping, networking and other considerations the Board would not give authorization for a new airline to enter an already well adopted route market. Routes were given to mostly established airlines, thus limiting the competition and change of price in a dynamic and changing industry. CAB thus created a chaos when it came to pricing of the flights. CAB's failure in maintaining a healthy pricing brought about the demise of regulation in the aviation industry.

### ***3. End of the Regulation***

While regulation limited the cutthroat competition and rivalry between competing companies; it also gave rise to airline monopoly on the ticket prices. With the airlines controlling both; the services offered to the passengers and the industry itself, they had all the power to charge high rates which resulted in unfavorable consequences for consumers.

In addition, the CAB would consistently picked airlines from the available pool for a particular route rather than letting the market decide which airline should fly that route (Bailey, 1985). This caused the established carriers to gain monopoly on the market. Thus, new entrants into the aviation business were at a great disadvantage and were often shut out of key routes since the established airlines did not want new competition. A good example from today of this would be Virgin Atlantic not gaining access to US airports for a very long time. As discontent among the consumers regarding the fare-setting and regulation rose to a higher peak, the government decided to mandate the regulation process (Gudmundsson, 1998).

In later years of 1976-77, creation of Sky Train service by Laker Airways marked a milestone. It offered extraordinarily cheap fares for flights. They did not actually own planes but leased them from the major airlines. To compete with these charter planes, the major airlines reduced their prices. In the wake of all these events, the Congress passed the Airline Deregulation Act of 1978, which deregulated the airline industry. The major effect of this act was that for the first time, airlines could enter the market, and expand their routes whenever and wherever they found it profitable. This Airline Deregulation Act of 1978 finally marked the end of the regulation in the aviation industry.

## **4. Effects of Deregulation**

### ***4.1. The pricing effect***

There are different views on the effects of the deregulation of the airline industry. One of the views expressed was that it would create a monopoly in the airline industry. The other view was that the deregulation would cause the airlines to stop their service towards the less profitable routes. Right after the deregulation, a lot of airlines pulled out of less profitable routes, and concentrated on the more busy routes. Airlines like United American, and other big airlines suspended their services for passengers of smaller cities. On the contrary, the benefits of deregulation could be seen through the new ticket fares that were offered and through the new level of productivity that airlines reached (Bailey, 1985).

#### **4.1.1. The passenger's perspective**

In the first decade, following the deregulation, the average price per mile that passengers paid declined by 30 percent in real, inflation-adjusted terms (Kahn, 2007). People had the benefit of many different discounts offered but unfortunately the benefits from the price competition were not evenly spread. The ticket rates offered on densely traveled routes were much lower than the ones on sparingly traveled routes. Also, on the short haul routes smaller planes were used which led to more expensive price per mile in comparison to long distance routes where big jumbo planes were used. This caused an overall price discrimination in the average price per mile that passengers paid. Nonetheless, the consumers were able to enjoy the lower pricing of tickets due to deregulation.

According to Kahn (2007), in the years between 1976 and 1990, the average ticket fares that passengers had to pay declined by 30 percent in real, inflation-adjusted terms. An unprecedented number of passengers took advantage of these incentives. An estimate of the savings made by travelers due to these incentives can be quoted anywhere from \$5 billion to \$10 billion per year. (*Kahn 2007, Bailey 1985*).

#### **4.1.2. The airline's perspective**

The new pricing of tickets helped both the passengers and airlines. Airlines attracted a much larger customer pool with their low ticket fares and eventually filled the seats for flights that would otherwise go empty. Moreover, technological advances provided a breakthrough in

short distance traveling. The airlines started using small jets to fly over short haul routes. Additionally, with the introduction of Hub and Spoke system, they were able to decrease the flight frequency and increase their profit margin.

## ***4.2. Airline Productivity and Expansion***

Following the deregulation, the airline industry expanded rapidly. Not having a restriction on the ticket prices, airlines could give heavily discounted tickets for seats that otherwise would stay empty. This led to an increase in the average filling of the seats of a plane. In the first twelve years after the deregulation the number of filled seats rose up to 61%, whereas prior to deregulation, it was around 52.6% (Kahn, 2007).

On average the airlines did not fill more than 70 percent of their seats until 1997. But as of 2006, the industry is filling on average about 80 percent of its seats. In today's industry around 80 percent on average is the minimum that an airline needs to have in order to survive in the market (Kahn, 2007). Conversely, it is very hard to reach a much higher percentage. There are many reasons that prevent an airline from reaching a level close to 100 percent of the average filling. The airlines have to accommodate passengers and provide flights to them even though the seats are not filled up. They cannot cancel a flight because it is not filled up which leads to decrease in load factor. To increase productivity the airliners often try to combine flights whenever possible to reach a better seat filling percentage. Also in order to be able to offer their customers more destinations, airlines need to sell passengers tickets for a flight that is operated by another airline. For example a passenger can buy a ticket from Delta airlines from Boston to

Paris but actually he will be flying on Air France airplane and the flight will be operated by Air France.

Looking from the perspective of the years after the act of deregulation, the average filling of the airplanes has steadily risen to the current 80 percent. The basic factor in this regard, was the possibility to offer different prices for tickets which was impossible before the deregulation. Also the unpredicted rise in passengers that occurred after the deregulation introduced a higher filling percentage.

Another factor that needs to be taken into consideration is technological advances. Introduction of larger airplanes took airline productivity to a new height. Airlines had considered of using larger airplanes but this idea took more time to be shaped into reality. The reason is that because of safety regulation, and commercial issues, it takes an average of 10 to 20 years to implement an idea from its inception. For example the idea for the new airbus A380 was first revealed back in 1991 but it made its first commercial flight on October 25<sup>th</sup> 2007 between Singapore and Sydney (flight number SQ380). ([www.airbus.com](http://www.airbus.com)) (Last accessed 10/15/2007). This time lag in realizing a finished product from an idea, gave rise to the question of how airlines will increase productivity and passenger filling in the future. The aviation industry could not use the outcome of using larger airplanes until late 1980's. However, nowadays the number of passengers has reached almost a steady state. In 2003, 639 million passengers boarded airplanes at U.S. airports. And the number for 2006 is around 660 million. This allows the airline companies to make better predictions of the market. (<http://www.faa.gov/>) (Last accessed 10/15/2007)



The competition that came out of the act of the deregulation has also lead to increasing the number of domestic airports served by the big airline companies. For example American Airlines increased the number of domestic airports they served from 50 to 173 in just 9 years after the deregulation and in the same time United Airlines reached a total of 169 airports, compared to only 80 back in 1979 (Kahn, 2007).

These changes created a competitive atmosphere for the people to choose between different airlines. For example, if a passenger was to fly from Boston to Phoenix at the beginning of 1992 he would have had the possibility to choose between six different airlines. Another way of looking at this is that only 27 percent of the passengers traveled routes that were served by 3 or more airline companies in 1979, in constraint to 55 percent having this luxury by 1998.

### ***4.3. Air Transportation Network System***

The deregulation also created an indirect link between the airline expansion and the air transport network. Due to the changing nature of the network system, the airlines accumulated huge profits and expanded rapidly. Keeping in mind this huge expansion, a new and better transportation network was necessary to ensure the smooth functioning of the industry. This new network system was identified as the spoke and hub system. This system can better be understood by visualizing a bicycle wheel. The words "hub" and "spoke" of a bicycle create a vivid image of how this system works. A hub is a central airport that flights are routed through, and spokes are the routes that planes take out of the hub airport. The major airlines "adopt" key cities as their hubs or centers for their airline network operations. These key cities serve as a stop for most

flights, wherein airplanes come in and then disperse off to other low key destinations. To get even an even better understanding, Figure1 illustrates the differences between the airline network systems before and after regulation – spoke and hub vs. point to point:

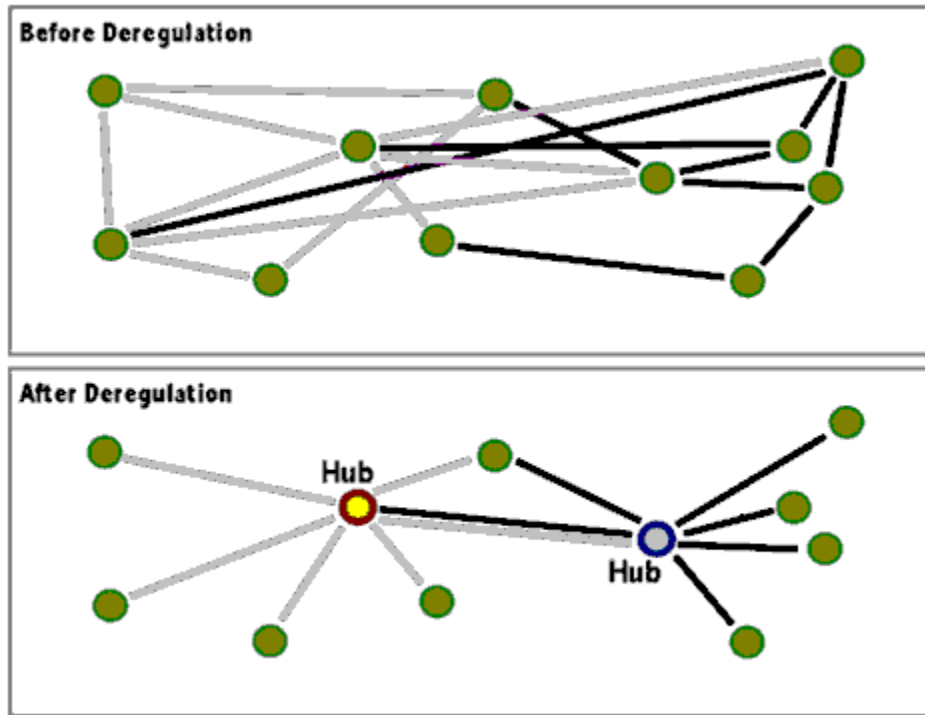


Figure 1: Before and After the Regulation (Rodriguez, 2007).

Source: <http://people.hofstra.edu/geotrans/eng/ch3en/conc3en/hubspokederegulation.html>

Before deregulation both grey and black companies provide service in a point to point network. After deregulation, companies have all the flights come to a major hub, and thereafter take their passengers to the intended destination. All the major carriers today have adopted the spoke and hub system network.

In essence, the spoke and hub system reduces the number of flights being used at one time. An illustration of this phenomenon is as follows: If a 100 people from five different states in the South-West need to go to Miami in a point to point system, these people maybe using 20

planes altogether with a total in-flight time of approximately 80 hours. However, in the spoke and hub system, all the 100 people will fly to a particular hub in the South-West area, and then take a common flight to Miami. The total flight-time in this case will be 40 hours. This drastically reduces the total flight time serviced by the airlines and the number of flights used. This phenomenon is more commonly known as the decrease in flight frequency.

Some of the major hubs used today by major airlines are listed below:

***Delta Air Lines (DL)*** uses

Hartsfield-Jackson Atlanta International Airport (ATL) (the world's largest hub),  
Salt Lake City International Airport (SLC).

***American Airlines (AA)*** uses

Dallas-Fort Worth International Airport (DFW),  
Chicago's O'Hare International Airport (ORD),  
Lambert-Saint Louis International Airport (STL),  
Miami International Airport (MIA), and  
San Juan's Luis Munoz Maren International Airport (SJU.)

Among the first few companies to adopt the spoke and hub system was FEDEX. After their success with this new system, other major airlines followed suit and took into account the spoke and hub system. In spite of this, the point to point network system (the previous network system) is still in use, even though the spoke and hub system proved to be more dominant and practical. The most notable of the airlines that still use this network system is Southwest Airlines. In table 1 below, we can see how much the airline network has shifted to spoke and hub system due to deregulation.

*Percent of airline's domestic departures  
at hub*

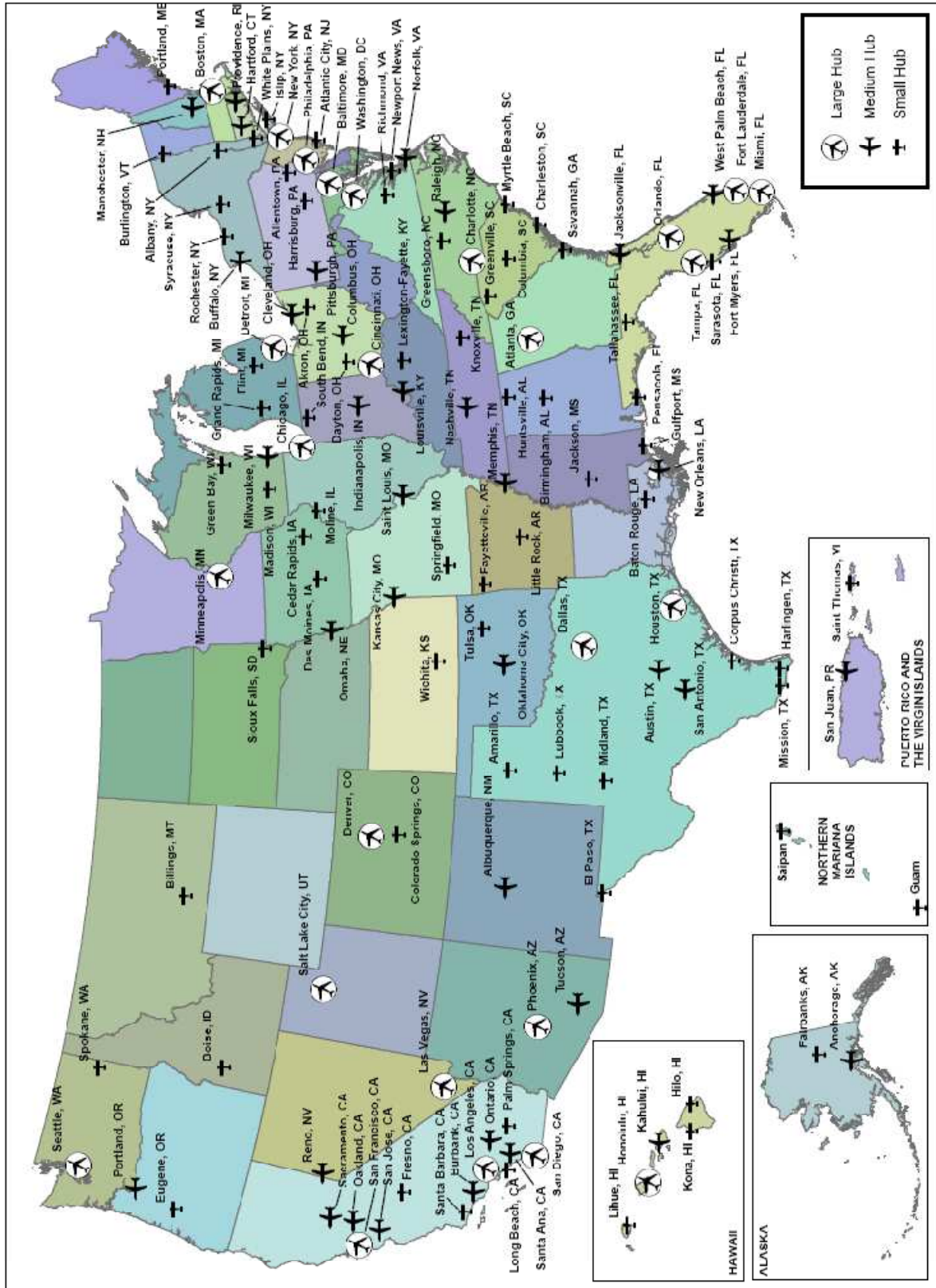
<i>Airline</i>	<i>Leading Hub city in 1983</i>	<i>1978 (2<sup>nd</sup> Quarter)</i>	<i>1983 (2<sup>nd</sup> quarter)</i>	<i>Percent Change in Departure in Hub</i>
American	Dallas Ft. Worth	11.2	28.6	113.7
U.S. Air	Pittsburgh	16.0	23.2	45.7
Continental	Houston	12.8	22.9	45.8
Delta	Atlanta	18.3	21.4	11.4
Eastern	Atlanta	18.3	21.0	1.0
Frontier	Denver	18.0	33.8	23.8
Northwest	Minneapolis	16.1	20.7	18.7
Ozark	St. Louis	15.5	35.6	53.7
Pan American	New York	12.3	24.0	-1.8
Piedmont	Charlotte	3.7	19.6	538.0
Republic	Minneapolis	3.4	7.7	91.1
TransWorld	St. Louis	11.9	33.0	81.3
United	Chicago	13.8	18.9	1.5
Western	Salt Lake City	10.3	16.9	129.3

*Table 1: Percent of airline's domestic departures at hub*

*Source: service Segment Data taken from CAB report to Congress (Bailey, 1985).*

From the table 1 we can see that, between 1978(beginning of the deregulation) and 1983 the major airlines have seen an increase of airline departures in hub system anywhere between 45 to 130 percent. This illustrates how the spoke and hub system has dominated after the deregulation. Figure 2 below gives a map of the latest hubs in the United States, which are labeled according to their size.

# Air Traffic Hubs 2007



NOTE: An Air Traffic Hub is a community or geographic area whose airport(s) serve at least .05% of all explained (boarded) passengers in the United States. All locations displayed here had a total enplanement of 30,000 or more for 2006. They are categorized based on their share of total explained passengers: Large, 1% or more; Medium, 0.25%-0.50%; and Small, 0.05%-0.24%. Source: BTS data as of April 2007.

Figure 2: Air Traffic Hubs for 2007

Figure 2 also depicts the influence of spoke and hub in today’s airline industry. As we can see, almost all the airlines now have some sort of a hub, with most of the larger hubs concentrated in the busier cities, and the smaller hub in the smaller and less busy cities. The airports hub size designations (i.e., large hub, medium hub, small hub, and nonhub) are given by Federal Aviation Administration (FAA) based on the percentage share of total U.S. passengers boarding from an airport (Table 2).

<b>Type of Airport</b>	<b>Percent of total boardings*</b>
Large hubs	>1%
Medium hubs	0.25% – 0.99%
Small hubs	0.05% – 0.25%
Nonhubs	<0.05%

*Table 2: Airport designations depending on the percentage of total boarding*

\*Percentages of total passenger boardings by scheduled air carriers in the 50 states, the District of Columbia, and other U.S. areas designated by the FAA.

#### 4.4.Safety through the years

Although there has been a dramatic rise in the air traffic, statistically speaking the safety of air travel has also increased. This can be established from the Accident Database (Table 3) of FAA which shows that there have been 20 to 45 percent less accidents involving airplanes in the recent years .The Accident Database was established in 1962 by the Civil Aeronautics Board (CAB). Approximately 1,900 new event records are added each year. Each record contains data about the aircraft, environment, injuries, sequence of accident events, and other topics.

Year	Accidents				Aircraft Hours Flown (millions)	Accidents per Million Hours Flown			
	Major	Serious	Injury	Damage		Major	Serious	Injury	Damage
1987	5	1	12	16	10.645	0.470	0.094	1.127	1.503
1988	4	2	13	11	11.141	0.359	0.180	1.167	0.987
1989	8	4	6	10	11.275	0.710	0.355	0.532	0.887
1990	4	3	10	7	12.150	0.329	0.247	0.823	0.576
1991	5	2	10	9	11.781	0.424	0.170	0.849	0.764
1992	3	3	10	2	12.360	0.243	0.243	0.809	0.162
1993	1	2	12	8	12.706	0.079	0.157	0.944	0.630
1994	4	0	12	7	13.124	0.305	0.000	0.914	0.533
1995	3	2	14	17	13.505	0.222	0.148	1.037	1.259
1996	6	0	18	13	13.746	0.436	0.000	1.309	0.946
1997	2	4	24	19	15.838	0.126	0.253	1.515	1.200
1998	0	3	21	26	16.817	0.000	0.178	1.249	1.546
1999	2	2	20	27	17.555	0.114	0.114	1.139	1.538
2000	3	3	20	30	18.299	0.109	0.109	1.093	1.475
2001	5	1	19	21	17.814	0.281	0.056	1.067	1.179
2002	1	1	14	25	17.290	0.058	0.058	0.810	1.446
2003	2	3	24	25	17.468	0.114	0.172	1.374	1.431
2004	4	0	15	11	18.883	0.212	0.000	0.794	0.583
2005	2	3	11	24	19.390	0.103	0.155	0.567	1.238
2006	1	2	7	21	19.560	0.051	0.102	0.358	1.074

Table 3: Accidents and Accident Rates by NTSB Classification 1987 through 2006, for U.S. Air Carriers Operating Under 14 CFR 121 (Title 14--Aeronautics and Space, part 121 --operating requirements: domestic, flag, and supplemental operations) 2(FAA – Safety Division) the database is available to the public at <ftp://www.nts.gov/avdata/>. (Last accessed 10/20/2007)

<sup>2</sup> Note: A database query tool is available at [http://www.nts.gov/nts/query.asp#query\\_start](http://www.nts.gov/nts/query.asp#query_start) (Last accessed 10/20/2007) to search for sets of accidents using such information as date, location, and category of aircraft.

From Table 3 above, we can see the aircraft operation has steadily grown over the years, while the accidents have stayed relatively constant. As a result, the actual ratio of accidents to miles flown has decreased significantly. For instance, in 1987, 10.645 million miles were flown, whereas in 2006 19.56 million miles were flown. However, the damage factor went down from 1.503 to 1.074 per million miles.

In spite of pricing deregulation, the safety factor of air travel is still largely under regulation. The Federal Aviation Administration regulates certain safety procedures that the airlines must follow. The Safety division of the FAA is working towards the goal of limiting the three-year rolling average fatal accident rate to 0.010 fatal accidents per 100,000 departures. To achieve this, the FAA Safety division has put forth different requirements like having EGPWS - **Ground proximity warning system** – which every air carrier within the US has had to comply with after October 1<sup>st</sup> 2007. As of June 2007 the accident rate is 0.022 fatal accidents per 100 000 departures.

#### ***4.5.New Entrants***

Another interesting effect of the post deregulation was an increase in competition among the airline companies. Startup and small airlines were able to enter the market for the first time in 40 years. Smaller airlines were able to do so, since they did not have to agree to the demands of the larger established airlines. With increased availability of travelling and higher passenger numbers, the total operating revenues for the major national and international airlines rose substantially (Windle, 2007). In spite of the speculation that new entrants would not survive in



the post regulation market, they continued to thrive as profitable airline companies and are the cause of major competition and price change in today's market.

#### 4.5.1. Effect of New Entrants on Airfare Pricing

A new entry to the market by a new company creates a downward pressure on prices. In a Senate hearing, the researcher Steven Morrison presented the data in table 4 regarding the effects on pricing due to a new competition entry.

Type of Route	Fare Change (Using 1996:4 Passenger Weights)
Routes not served by new entrants in 1996:4 (5,983 routes)	-14.7%
Routes served by new entrants in 1996:4 but not by Southwest Airlines (1,579 routes)	-30.5%
Routes served by Southwest Airlines in 1996:4 but not by other new entrants (372 Routes)	-47.2%
Routes served by both Southwest Airlines and other new entrants in 1996:4 (360 Routes)	-54.3%
All Routes (8,294 routes)	-32.2%

*Table 4: Average change of real fares due to deregulation factor presented to the Judiciary board concerning Antitrust, Business Rights, and Competition (Morrison, 1998)*

The data in table 4 shows the difference between routes served by the new entrants (mostly small carriers). Routes served by the small carriers caused the fare to go down significantly; in some cases as much as 54.3 %.

#### 4.5.2. Effects of new entrants on Airline Traffic

The new entrants also have a positive effect on the airline traffic. These positive effects of a new competition can be traced back to the regulated period. Even in the regulated period, CAB did not have complete control over the interstate airline infrastructure. The new startup

companies took advantage of the situation and lowered their prices. This in turn further expanded the network of interstate routes, thus allowing huge flow of traffic.

Between the years of 1949 through 1962, some small airlines created a huge rise in traffic with low ticket pricing in the state of California. A few airliners in California created an alliance to serve the intrastate market; where they would charge less fare than the established carriers and would attract a larger consumer base. The Pacific Southwest Airlines itself would carry 28 percent of total traffic between Los Angeles and San Francisco in 1962. This phenomenon was called the California Experience. In 1971, another airline called the Southwest Airlines created a similar phenomenon in Texas.

Figure 6 depicts the traffic difference between a regulated market against a slightly less regulated market of Houston and California in the regulated period.

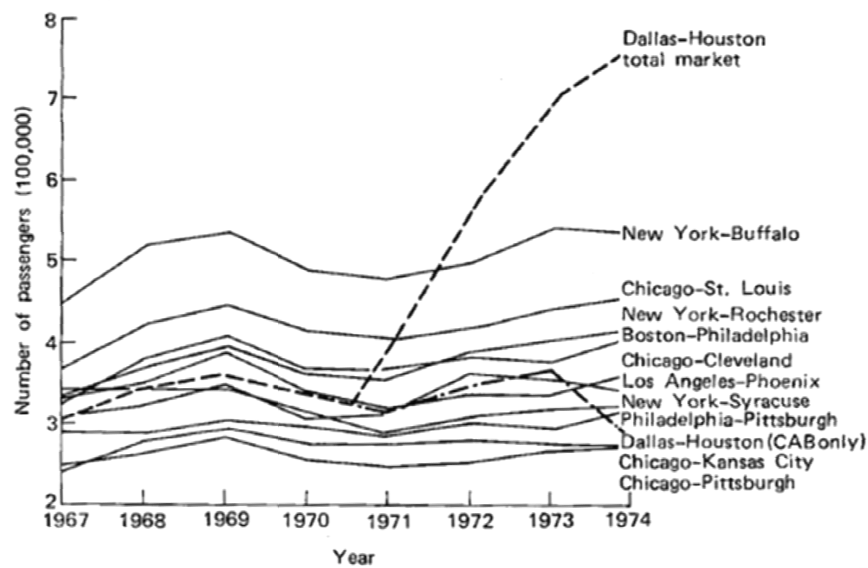


Figure 3: Comparative traffic growth of Dallas – Houston Market with the average of the ten most similar markets under 500 miles served by CAB carriers exclusively (Bailey, 1985)

The Dallas-Houston market was slightly less regulated as opposed to Chicago, New York regulated markets. The new entrants took full advantage of this varying market, and increased the overall traffic in those markets.

The full impact of the new entrants in the aviation industry was felt in the aftermath of deregulation. The air traffic rose to a staggering 440-450 millions in the years between 2006-2007. Figure 7 illustrates the huge affect new entrants' intervention have on air traffic after deregulation.

2006-2007 US airline traffic in millions

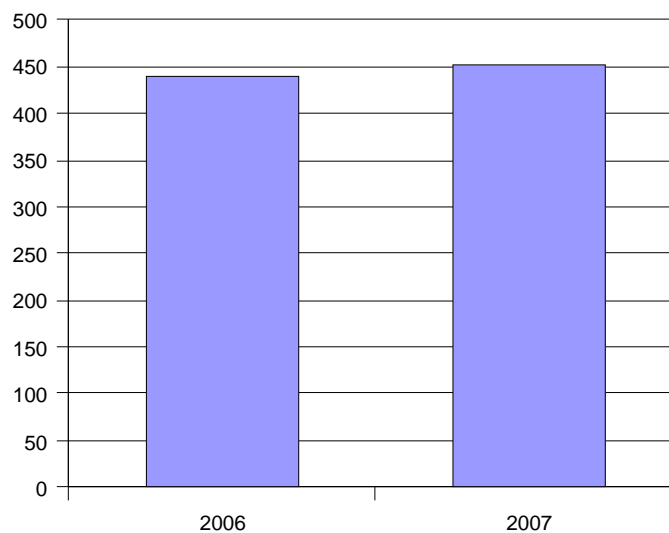


Figure 4: US Traffic in millions 2006 – 2007<sup>3</sup>

---

<sup>3</sup> Source: US department of Air Transportation. (Bureau of transportation statistics) report: July 2007 Airline Traffic Data: U.S Airlines Carried Record Number of Passengers in July

Over the years, United States has seen a dramatic increase in the air traffic. Comparing Figure 3 to Figure 4, it can be seen that the air traffic has risen by about 200 times in the last 30 or so years.

#### **4.6. The Drawbacks**

Although deregulation has had its profound positive effects, unfortunately, it still has its downsides. Proponents of the regulation system have been arguing about the long term effects of the deregulation.

##### **4.6.1. Spoke and Hub**

The disadvantage of the current airline network further extends to the passenger side, since the monopolistic airlines increase airfare for the passengers. In 1990, according to the Air Transport Association prices per mile were usually much higher on less densely traveled routes rather than on more densely traveled ones; the reason was less competition on the small markets. The wait around time has doubled due to spoke and hub system. For example, last year in Heathrow and other UK airports (major international hubs of Europe) airlines were hit by 22% surge in complaints, of which second-biggest cause for complaint was delays (McLaughlin, 2007). Moreover, in the hub and spoke system, the airlines tend to only serve the most profitable routes, leaving small city passengers in dismay.

An inevitable consequence of the spoke and hub system is that, only a handful of airlines would dominate a hub, and thus the entire network connected to it. As the hub and spoke network matures, it becomes increasingly difficult for the air carriers with fewer number of

flights to compete both for hub and spoke access, mainly because of the principles of agglomeration economics (United States. General Accounting Office 1991). Since only a few of the airlines dominate the hub, they can gain monopoly of the market and thereafter increase the fare for the passengers. Moreover, at the wake of the spoke and hub system, the competition becomes a threat not only to small airline companies - large airline companies become endangered as well. The failure of Eastern Airlines, Midway, and Pan American, and the bankruptcy of carriers such as Continental, America West, and TWA just show that the spoke and hub system creates a no-holds barred system, where most of the competitors will get abolished. In recent years, the airline industry has requested that this effect be addressed. Airline companies have tried to merge to decrease competition, and as a result have produced an array of failures (Windle 2000, Kahn 2007). Regulation substantially insulated each airline from the competition. By wiping out all regulation and allowing airlines to enter any network, there was an estimated 25 percent increase in the average number of airlines per route. However, if a certain route were to be dominated by a single airline, that leaves no opportunity for others to develop successful flights over that same route.

#### **4.6.2.1 Frequent Flyer Program**

The dominant airline is able to provide frequent flyer program (FFP) rewards, and other discounts to attract passengers. In some cases the dominant airlines are able to block gates and other facilities for their competitors in certain hubs and airports. When an airline provides service frequently between two end points, passengers become more interested, and if these

passengers are loyal to the airline company, they receive FFP's. Since FFP depends on the miles that the passenger has traveled, the passenger is more interested in flying with a company and a route that he will use most in the future (Peteraf 1994, Borenstein 1989). The expected FFP increases if the passenger has more destinations, more miles to fly from his preferred departure point.

#### **4.6.2.2. Computer Reservation System**

Other major factors that affect the passenger pool are TACO & CRS. Travel agent commission (TACO) override program was introduced by some of the major airlines right after airline deregulation. In the TACO system agreement a travel agency would provide 80 percent of its booking to an airline; and the airline would pay the travel agent a 15 percent of the commission instead of its usual 10 percent commission or so. In the early 1990's the travel agents would write more than 80 percent of all tickets. On the contrary, during the regulation travel agents ticket sale would only constitute around 50 percent of the total ticket sale. The other major factor was Computer Reservation System.

The carriers with own computer reservation system (CRS) are able to manipulate the travel agents. The following picture shows a typical CRS system in early 1980's. The competitor's flight would not show at all, or it would be showed on later screens. In the figure we can see that the Frontier airlines is listed as the most convenient flight in SABRE, however in the Apollo CRS system it does not show up in the first three screens. Because of TACO and CRS the travel agents would normally book more flights for the airline than their other competitors.

	SABRE						APOLLO					
	A/L	FLY NBR	CITY PAIR	DEPT	ARRY	STP	A/L	FLY NBR	CITY PAIR	DEPT	ARRY	STP
SCREEN #1	1 FL	403	DTWDER	730A	833A	0	1 UA	221	DTWDER	820A	915A	0
	2 UA	221	DTWDER	820A	915A	0	2 UA	825	DTWDER	450P	545P	0
	3 AA	181	DTWDRD	820A	820A	0	3 FL	27	DTWDER	606P	708P	0
	4 AA	379	DEN	900A	1026A	0	4 7NW	732	DTWKEE	800A	752A	0
	5 DL	239	DTWCVG	822A	914A	0	5 RC	55	DEN	835A	959A	0
	6 DL	721	DEN	957A	1045A	0	6 UA	533	DTWDRD	745A	742A	0
						7 AA	379	DEN	900A	1028A	0	
SCREEN #2	1 AA	527	DTWDFY	845A	1021A	0	1 UA	955	DTWDRD	900A	900A	0
	2 AA	333	DEN	1120A	1214P	0	2 CO	15	DEN	1005A	1127A	0
	3 UA	955	DTWDRD	900A	900A	0	3 UA	955	DTWDRD	900A	900A	0
	4 CO	15	DEN	1005A	1127A	0	4 UA	263	DEN	1015A	1143A	0
	5 AA	527	DTWDFY	845A	1021A	0	5 RC	589	DTWNSP	1010A	1130A	1
	6 FL	362	DEN	1115A	1211P	0	6 RC	573	DEN	1205P	100P	0
						7 RC	589	DTWKEE	1010A	1002A	0	
						8 UA	661	DEN	1140A	102P	0	
SCREEN #3	1 AA	291	DTWDRD	1044A	1045A	0	1 7RC	563	DTWNSP	1015A	1045A	0
	2 AA	579	DEN	1135A	101P	0	2 UA	663	DEN	1158A	1250P	0
	3 RC	563	DTWNSP	1015A	1045A	0	3 7RC	563	DTWNSP	1015A	1045A	0
	4 RC	573	DEN	1205P	100P	0	4 RC	573	DEN	1205P	100P	0
	5 NW	55	DTWNSP	945A	1022A	0	5 TW	293	DTWSTL	1030A	1101A	0
	6 NW	503	DEN	1205P	100P	0	6 TW	561	DEN	1220P	128P	0
						7 7RC	563	DTWNSP	1015A	1045A	0	
						8 NW	503	DEN	1205P	100P	0	

**Figure 10.1** Comparison of flight information displayed by various computer reservations systems. (This is the schedule information a travel agent will see when requesting information on flights between Detroit and Denver on July 15th leaving at 7 A.M.)

*Figure 5: Comparison of different reservation systems flight reservations*

However, we need to keep in mind that if used as marketing device programs such as FFP, TACO and CRS opens doors for consumers for more options. Thus airport share has a positive effect on fares because of marketing devices such as FFP's and TACO'S. (Borenstein 1989, Copeland 1988).

Under ensuing pressure , in 1983 CAB conducted study of reservation system. The host airline CRS would mostly show its own airlines on the first computer screen for a certain destination and later on the other competitor to the travel agent. Approximately 70 percent of the booking was sold from the first screen causing the CRS host airliner to gain massive advantage over its competitor. Following the findings, the 1984 law suit from 11 airliners caused the CRS bias to be limited. However, the air carriers found a way to bypass the law suit. The large

carriers would try to create mergers and gain a larger share of the market and dominate with their own CRS system. Moreover they would charge excessively for other carriers.

However in the late 90's and early 2000 the airlines decided to decrease the travel agent commission, and also increase the internet booking system. The inception of internet booking has curved down the monopolistic control of the CRS and travel agent booking. Additionally, the dominance of the CRS system was substantially decreased because of antitrust laws.

#### **4.6.2.3 Antitrust Law.**

Like other unregulated industries aviation industry also suffers from unlawful competition. To battle this odd there needs to be direct implementation of anti-trust laws. Some of the improper conducts by some airline companies include:

- Use of computerized reservations systems (CRS) to handicap smaller competitors.
- Discriminatory fares in response to the small airlines.

A notable situation is the British Airways and Virgin Atlantic competition. Previously, London air transport system through the "London Air Traffic Distribution Rules" had given British Airways (BA), an unchallengeable control over Heathrow airport. In 1977, to support London's other airport Gatwick, the British Government took initiatives and stated that all airlines that were planning to operate a scheduled service to or from London for the first time to use Gatwick instead of Heathrow. Also it stated that airlines that did not already operate an international scheduled air service in Heathrow prior to April 1, 1977 would not be permitted to commence operations at Heathrow. In addition, the "London Air Traffic Distribution Rules" banned all new all-cargo as well as all charter flights from Heathrow as of April 1, 1978. This in a way had given British Airways a monopolistic control over the Heathrow airport. (The



Economist, 1991) However, in the early 1980's the government decided to amend the rule to provide a fairer competition to other airlines. BA had previously gone against the Government's decision to abolish the "London Air Traffic Distribution Rules"(much as its USA counterpart of the United States Airline Deregulation Act of 1978). This led startup airline like Virgin Atlantic commence operations at Heathrow (Wikipedia). BA then fought against Virgin Atlantic to gain control over Heathrow. In the process BA went extraordinary lengths to which the company went to try to demolish competition from Virgin. As the anti-trust law was imposed, BA had to settle out of court giving Virgin a bill of £3million (BBC, Business Week). But it does not always mean that the new air carriers are getting perished in the race, in fact sometimes they provide a much tougher competition to the established carriers.

#### **4.6.2.4 New entrants & Airline failures**

Both in the pre & post deregulation period, the new airlines have suffered severely while surviving in the market. Right after deregulation a number of new airlines emerged and went bankrupt within a few years. Within the year 1979 to 1981, 55 new carriers emerged, of whom 23 are presented in Table 6. Of the 21 airlines only 3 were operational as of mid 1990.

**Start up jet 1979-1986**

	Entered Service	Ended Service
Air Atlanta	1984	1986 Bankruptcy
Air Chicago	1980	1982 Bankruptcy
Air One	1983	1984 Bankruptcy
America West	1983	1994 Bankruptcy(reemerged)
American international	1982	1984 Bankruptcy
Florida Express	1984	1988 Acquired by Banrif
Frontier Horizon	1984	1985 Bankruptcy
Hawaii Express	1982	1983 Bankruptcy
Jet America	1982	1986 Acquired by Alaska
McClain Airlines	1986	1984 Bankruptcy
MGM Grand Air	1987	1993 Became charter then folded
Midway	1979	1991 Bankruptcy
Midwest Express	1984	Still operating
Muse	1981	1985 Acquired by SouthWest
New York Air	1980	1985 Acquired by Continental
Northeastem	1982	1984 Bankruptcy
Pacific East	1982	1984 Bankruptcy
Pacific Express	1982	1984 Bankruptcy
Peopl Express	1981	1986 Acquired by Continental
Presidential	1985	1986 Bankruptcy
SunWorld	1983	1988 Bankruptcy

*Table 5: Start up jet 1979 – 1986 Source (Bailey)*

The reason behind the new entrants' failure has been a debatable question. However, most economists agree that these airliners had huge lack of belief in new marketing strategy. Most of these airlines have failed to adopt a new marketing strategy and followed pre-deregulation management rather than creating a post-deregulation management corporation. Lack of management experience, lack of strategy, poor understanding of market, insufficient working capital coupled with insufficient margins and loans, these aircrafts failed by large margins (Windle 2000, Gudmundsson 1998).

However, during the mid 1990's the small new entrants changed their marketing and management strategy. This led to dramatic success in the aviation market by the new airliners. The have revolutionized work rules and labor cost. The new entrants have used the choice of

aircraft as their most significant advantage. Since they look at a low load factor<sup>4</sup> break-even method, (that is number of passenger and fare implementation to just make enough revenue to stay in market) they use only low labor cost operators. Also judging from the frequency and short haul flights, they are able to use low cost, slower aircrafts, which means that their investment is much lower than their bigger competitors. Under regulation these new managerial skills had been severely restricted (Meyer 1986, Morrison 1998). Deregulation has placed a new meaning to the marketing and strategic planning versus the CAB belief of legal regulations.

## **5. Industries View of the current situation.**

With the dramatic change after the deregulation, the aviation industry experts have expressed mixed reactions. The rising dissatisfaction and waiting time for the passengers due to hubbing, has created a drive to go more towards point to point system in the future. This will mean that the air-taxis and short haul aircrafts will dominate the next market. However, oppositions of this notion have argued that this is unlikely, since changing the airline network is very costly and airliners would like to make more profit using bigger airplanes which can only be done in a spoke and hub network. Recently, Boeing has taken a big gamble in producing more

---

<sup>4</sup> This indicator, compiled monthly by the Air Transport Association (ATA), measures the percentage of available seating capacity that is filled with passengers. Analysts state that once the airline load factor exceeds its break-even point (the labor cost+ flight cost), then more revenue can be yielded by the airliner.

efficient smaller aircraft with better materials and better range. Eclipse aviations Very Light Jet also happens to be a strong contender in this case.

In contrast Airbus believes that the future market belongs to large aircrafts, specifically with its venture of the Airbus A380. It is not the engineering and the technologies that are dictating the future of airplanes and airline as one would think but it is the market – the passenger’s need (Clark, 2001). Whether the aviation industry will adopt to using smaller or larger airplanes , is still a question at large.

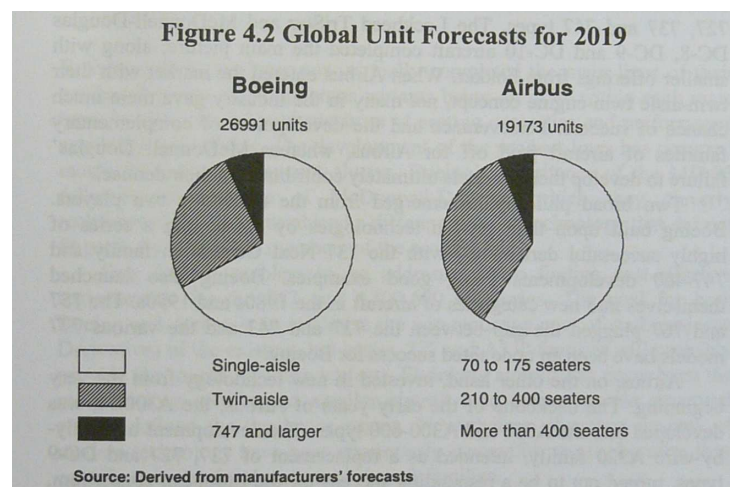


Figure 6: Boeing and Airbus forecasts. Source: (Clark, 2001)

However, the drive to operate with smaller aircrafts has certainly shown fruitful results in the past few years. Furthermore, Boeing’s big gamble has fueled interest in the small aircrafts and air taxis.

## 6. Air Taxis - the future

The inclusion of air taxis in modern aviation network has certainly created an interesting phenomenon. The air taxis have taken the chance to go to smaller airports and serve the less

dense routes. Unlike hubs and spokes , the smaller routes pose less competition. With the absence of competition they can still provide the passengers a low fare and still earn profit out of it. Since, there is no competition; there is no fear of getting ousted by discriminatory fares by the big airlines. Furthermore, technological advances in industry has introduced low cost jet planes (VLJ being one of them) and led to a new era. SATSair , Linear Air, Pogo are some the more prominent ones in this respect. SATSair uses small SR22 Cirrus aircraft, and they have consistently done well in the airline market with only 26 airplanes.

The Boston based Startup Company Linear Air has gained momentum in the market with their Very Light Jet. The four- to six-passenger aircraft will retail as low as \$1.4 million, less than half the price of today's lowest-priced jets, and cost well under \$1 per nautical mile to operate. This leads to the fact, that in near future charter aircrafts will be able to provide service to middle class passengers at a very low price (Loyalka, 2005) The number of companies operating business aircraft in the U.S. nearly doubled over the past decade. Transportation Department statistics show as many as 16,000 passengers use regional airports (an airport serving traffic within a small geographical area) per day, which is where these charter planes and companies need to operate. A small fraction of these people will make the air taxi venture profitable (Palmeri, 2007).

However, it is not only the size and choice of routes that is affecting better revenue for the air taxis. The new marketing systems that make charter airplane booking a lot easier, has fueled the rising profit margin of these companies. Virgin charter happens to be on the forefront of this new managerial and marketing scheme.

The idea behind Entrepreneur Richard Branson's Virgin Charter is to introduce an online marketplace for charter flights. The idea of this marketplace can be closely related to the online marketing of Ebay. The idea of creating an internet based booking system has been debated for a while. In this new business idea buyers will still try to book their trips online, but the other advantage of this system would be that they can locate available charter flights & check for the charter airlines safety rating. Thereafter, charter operators receive buyers' trip request and those that can meet the buyers needs will compete to book the flight with the buyer. Although the idea seems tangible, the affect is fairly huge.

According to Businesweek and Virgin Charter CEO there are 2500 operators and over 10,000 business Jets will be glued to a single operation due to Virgin Charter. Due to this most charter flights will not suffer from the so called "empty leg"<sup>5</sup> syndrome, which means most of the charter seats will be booked ( Palmeri 2007, Schaefer 2007). These empty legs hold about 40 percent of charter traffic and are a major cause of inefficient private jet travel (Schaefer, 2007). What virgin charter offers is a solution to this empty leg syndrome for airliners. Although the idea has been around for a while, Virgin is the first major organization to introduce the idea. (Palmeri 2007, [www.virgincharter.com](http://www.virgincharter.com)). (*Last accessed 10/21/2007*)

---

<sup>5</sup> It is common in the aviation industry for airlines to have to fly empty from one destination to another. May be , the flight will have full seat booking from one destination; but on it's way back the flight may not have filled all it's seat. This phenomenon is called the empty leg syndrome. It is more common in charter flights than commercial large airplanes. When a client books a charter flight and the charter performs it, after completion of such a trip the aircraft must return to its base. Hence the charter airlines fly back empty to its base.

## 7. Airline Alliances – Once Rivals, Now Partners

Every airline company is aiming to be able to serve more and more destinations and to be able to offer global access in order to have more passengers but without undertaking a huge capital investments. Thus, in the wake of rising airline competition from the smaller airliners, we see a shift in the larger airliners marketing strategy. Instead of fighting among themselves for dominance the larger airliners is trying to form an alliance, and oust the smaller airliners. The post deregulation has seen many mergers, and bankruptcy of airliners. However, today there are three major airline alliances:

- Star Alliance
- One World Alliance
- Sky Team Alliance

Sky Team					Star Alliance				
	Date Joined	Pax Traffic RPK Million	Passengers Million	Revenue \$ Million		Date Joined	Pax traffic RPK Million	Passenger Million	Revenue \$ Million
Aeroflot	Apr-06	20750	7	2540	Adria Airways	Dec-04	1019	1	167
Aeromexico	Sep-99	14500	9	3604	Air Canada	May- 97	75290	30	8422
Air France KLM	Sep-99	189253	70	26036	Air New Zealand	Mar-99	25568	12	2512
Alitalia	Jul-01	37969	24	5940	All Nippon Airways	Oct-99	58949	50	12040
Continental Airlines	Sep-04	114659	45	11208	Asiana	May-03	19225	12	3003
CSA-Czech Airlines	Mar-01	7784	5	922	Austrian Airlines	Mar-00	22894	10	3078
Delta Air Lines	Sep-99	193006	119	16191	Blue1*	Nov-04	908	1	226
Korean Air	Jul-00	49046	22	7424	Bmi British Midland	Jul-00	5558	6	1570
Northwest Airlines	Sep-04	121994	56	12286	Croatia Airlines*	Dec-04	1200	2	226
Total		748961	357	86151	LOT- Polish Airlines	Oct-03	6284	4	853
World Share		0.19	0.173	0.191	Lufthansa	May-97	108185	51	22371
One World					SAS				
	Date Joined	Pax traffic RPK Million	Passenger s Million	Revenue \$ Million		Date Joined	Pax traffic RPK Million	Passenger Million	Revenue \$ Million
Aer Lingus	Jun-00	12563	8	1093	Singapore Airlines	Apr-00	82742	17	8030
American Airlines	Sep-98	222412	98	20712	South African	Apr-06	24300	7	3034
British Airways	Sep-98	111859	36	15122	Spanair	Jun-03	5974	7	1225
Cathay Pacific	Sep-98	65110	15	6548	Swiss Intl. Air Lines	Apr-06	20469	10	2860
Finair	Sep-99	16753	9	2317	TAP Air Portugal	Mar-05	14536	6	1683
Iberia	Sep-99	49060	28	6073	Thai Airlines	May-97	49930	18	4056
LAN	Jun-00	17491	8	2506	United Airlines	May-97	183262	67	17379
Qantas Airways	Sep-98	86986	33	9524	US Airways	May-04	62582	40	10610
Total		528216	235	63895	Vang	Oct-97	28506	13	2810
World Share		0.147	0.113	0.142	Total		823868	388	114380
					World Share		0.209	0.187	0.254

Table 6: The three major alliances Source:(Iatrou, 2007)

The formation of the alliances has led to setting up efficient global networks. The above table shows the trend in aviation industry to merge instead of competing with other airlines.

## 8. Economical Effects

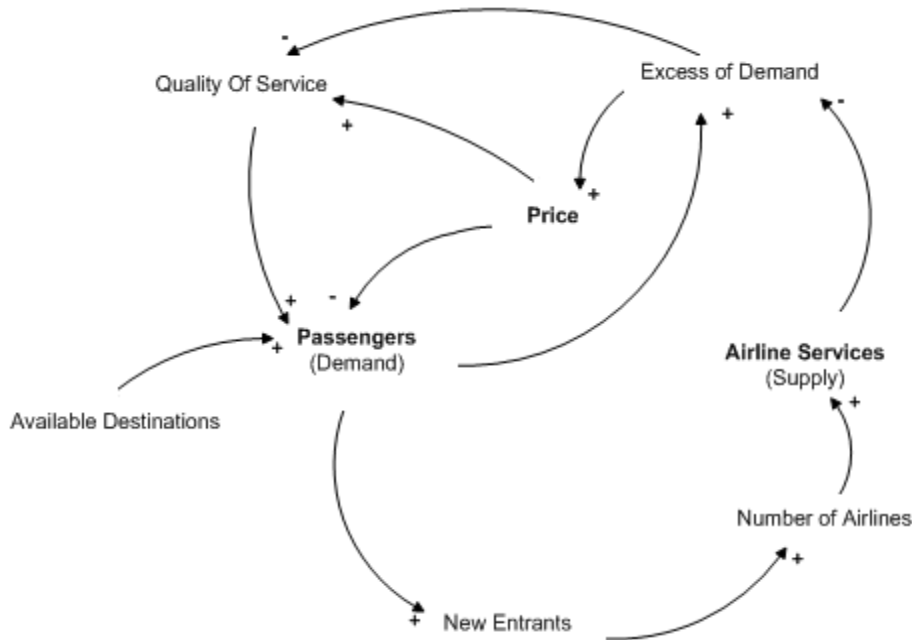


Figure 7: Causal loop Diagram for Airline Industry

Different factors play a role into molding of an economical environment. The airline industry is a complex economical system that directly and indirectly gets affected by many factors. The driving force of this industry is of course demand – the people need to travel every day to different destinations.

Since the deregulation, the demand for air transportation is constantly rising, for various reasons. The world population has increased more than 20% over the last 20 years; the globalization has forced a constant movement of the people to various distances all over the



world. Peoples need to travel creates a demand that is met by the airline supply. The deregulations of the airlines lead to unbinding competitions between airlines and considerable price drops. The latter half of the decade after deregulation used the technological advances to further pressure the price down to the middleclass people expenditure range. The worldwide economic development fueled leisure money expenditure; coupled with that the cheap ticket prices created more and more and demand for flights.

As a result of demand, the aviation market expanded. The bigger airlines now offer more routes, dozens of flights to passenger's choice. The passenger thus sticks with his airline choice. This in turn creates a loyal customer pool for the airlines. To provide more flights to the same route airlines have created spoke and hub, where they maintain dominance in a hub region. Also another thing that needs to be noted is the airline mergers. Because of the demand a lot of new airlines tried to enter the market, but as we stated earlier most of them didn't manage to survive the market. One of the reasons being the fact that these small airlines cannot fight against the bigger alliance airlines because of hub dominance, low ticket pricing. Thus these small airlines cease to exist after a while, and file for bankruptcy.

Perhaps the most interesting aspect of airline industry right now is how the marketing side of it has evolved after deregulation. More and more competition has come in. And the airlines have been made to change their ways of marketing and performance. In today's world a passenger would expect to get better pricing, easy ticketing, better scheduling and good hosting from the attendees. The airlines have thus gone out of their business shell to provide a better customer experience. Today it is not the airline, the size of the airline or routes that dictate profit, but it is more likely better marketing and airline network policy that dictates the profit margin

and hence the airline industry. A better marketing strategy means a larger gain at the customer base. Customers now look for a combination of better pricing (provided by frequent flyer), better service (online ticketing, attendees) to fly with a certain airlines.

However, in future we expect to see this causal loop change dynamically because of the rapid development of technologies. Offering new options are evolving air taxis and VLJs. We can expect these new small airliners to survive and create a further price drop. Furthermore, it would be interesting to see how today's aviation industry copes with tomorrows marketing strategy. More people like Richard Branson with ventures like Virgin Galactic and Virgin Charters are opening horizons for the passengers and companies alike which will affect the airline industry. At this point we can only speculate that this change will be on the positive side for both the passengers and airliners.

## **9. Social effects of improvement in aviation technology**

A lot of people have lost sight of the technological advances and their effects on the airline industry, while judging the pre and post deregulation era. The pre deregulation period airline industry was severely limited in resources when it came to technologies. With the commence of new technologies, VLJS and small airliners the future of airline industry looks bright. These small aircrafts can sustain medium range journeys, and serve small communities and regional airports. The small airliners thus can use these aircrafts to gain market on the community based transportation. The airline deregulation created a hollow in the small non profitable routes. But these small aircrafts can fill the gap. The bigger airliners because of load factors and profit margin did not want to serve small communities and short routes. Possibly even in future; these

large airliners will not be able to sustain these markets with a small passenger mark up. However, in the small airliners case, they will have enough passengers for their small aircrafts in the short distance routes. This means that the passengers of the small community and in a sense the entire society will be able to gain from the technological advances of small aircrafts.

Looking back to deregulation, the then airliners did not have a choice of these short haul small airliners, which is why they could not afford the rising cost of maintain a short route with a marginal amount of passengers. If these small airliners were there CAB would have had a much better way to implement their pricing for routes, and both the passengers and the airliners would in fact have gained from these. The post deregulation period has been able to utilize this advantage, and the airliners have been able to gain profit from this by reducing the ticket price to nominal price and maintain a high load factor.

Right after deregulation most of the small routes were abandoned by the airliners, but the air taxi system and small aircrafts have filled that gap. This has allowed for the small communities to grow. Imagine a person wants to come to NY from Worcester, and either he has to take a four hour bus journey, or drive for 3 hours. Instead he can save time by flying with a small charter plane, by spending a bit more money. This will certainly be in advantage for the Worcester community, by giving them more choices to travel.

## **10. Environmental Effect**

The airline industry not only had an economical effect on the society but it also had a profound environmental effect on the society. The aviation industry has been widely successful in keeping a low profile for the pollution due to airline transport. The aviation industry has been a major source greenhouse gases and noise pollution throughout the years. The environmental effects of aviation industry growth have been a much debated subject for years; however no substantial regulatory rule has been implemented to keep in check the aviation-industry-pollution check.

### **10.1. Noise Pollution**

Noise pollution damages peace and quiet of life for the residents nearby the airport. Wildlife is damaged due to excessive noise emissions nearby the airports. Studies have shown that noise creates learning disability among children. The World Health organization (WHO) in their report of “community Noise” has included the following problems.

Hearing Problems  
Pain  
Communication and speech perception  
Reading acquisition among children  
Annoyance  
Sleep disturbance  
Psychological reactions during sleep  
Stress  
Effects on heart rate, respiration  
Cardiovascular effects  
Nausea  
Headache  
Reduction in sexual drive  
Insomnia

Loss of appetite  
Mental disorder  
Productivity  
Effects on social behavior

People living nearby the airport are subjected to long exposures to noise. WHO limits the noise level to 55 dB for proper human interaction, but the current noise levels around the airports are much higher than that. Although the airline industry has accepted the problems associated with noise pollution, it has cleverly denied any link between aviation and pollution. The airline industry has frequently said that the noise level footprint (measure in number of people exposed to noise) is shrinking with the inclusion of low noise airliners. However, what it has failed to mention is that the number of airplanes are going up, and with that the noise pollution is also going up. The more airlines we will have, the greater use of lands for hubs, terminals and runways will be needed. This in turn will cause more noise pollution. Not only does the noise pollution affect the health of the nearby people living in the neighborhood, it also involves monetary terms. The housing rent and charges go down because of the excessive noise near the airports. However, the hotel business gains momentum due to the vicinity of the airport.

The aviation industry has presented the idea that the noise level is going down by use of low noise airliners. However, the measurement of noise level data itself is convoluted. If one uses a particular noise measurement data set, it can nullify the recognition of noise problem. If someone uses data that only looks at peak levels of noise, then the damage done overtime by noise exposure will not be recognized by looking at that data and vice versa. The aviation

industries attempt to reduce noise pollution just by introducing quieter aircrafts do not account for rapid growth of air industry, night time flights and freights etc.

The problem relies in the fact, that different airliners use different measures for calculating noise. Lufthansa/Condor used noise protection hangars for their specific airliners at their Hamburg maintenance base. But those noise hangars are geared towards specific airlines. Likewise all the measures taken by the airliners are very specific to a certain airport and only addresses certain environmental objectives set forth by that airport (Morrell 2000).

## ***10.2. Air pollution***

Air pollution is an even more serious challenge than noise pollution. Air transport is a major reason for the deteriorating environment surrounding us. The emissions of Nitrogen Dioxide play a large role in the disruption of ozone layer above us.

Furthermore During flight, aircraft engines emit carbon dioxide, oxides of nitrogen, and oxides of sulfur, water vapor, hydrocarbons and particles which alter chemical composition of the atmosphere. The effects are both long term and short term. Many of the emissions from aircraft change the absorption of solar radiation and the absorption and emission of thermal radiation. A recent study of the three-day period after September 11, 2001, when all commercial flights in the US were grounded, has shown some evidence of a 1°C to 2°C increase in the day-night difference in temperature over US. (Royal Commission Special Report)This is consistent with

the theory that aircraft contrails and act to lower day-time temperatures by reducing solar radiation and raising night-time temperatures by reducing heat loss .

However even the most basic need to meet the NO<sub>2</sub> emission level has been step aside. Although there are laws requiring a (NO<sub>2</sub>) level, the annual mean concentration of nitrogen dioxide (NO<sub>2</sub>) is being exceeded at airports. One example being Heathrow where the limit for NO<sub>2</sub> was 54 µg/m<sup>3</sup>. However it has been consistently exceeded.

From our previous discussions it can be concluded that further growth of the aviation industry is inevitable. However, with the same certainty we can also say that pollution, environmental deterioration due to aviation industry is also inevitable.

## **11. Reforms**

Like all industries there involves certain steps that need to be taken for efficiency of the system. For the airline industry this seems to be an absolute need. First, the government takes laissez faire step, where it does nothing. Second, the government could actively attempt to make markets more competitive by allowing new competitors to operate on routes, by dissolving preferential arrangements between hub-dominating carriers and their hub airports . Third , it can regulate and create price margins to save the passengers and small airlines from being exploited. Fourth, would be that the Government takes into account the air taxi industry to apply low fare point to point system and allow a new airline network system to breathe. The airline industry relies primarily on the federal government to provide sufficient air traffic control and on federal

and local authorities for airports, which they can provide easily. A reform in the air traffic flow will definitely help.

When it comes to meeting the needs on the environmental scale; the Government must restrict the number of flights each year, and enforce advanced aircraft use to the level at which aviation generated pollution limits will not be breached.

## **12. Conclusion**

There is no opposition to the fact, that air transport is an amenity that has become a must. The affordability and speed that air transport delivers today have made international travel accessible to people all over the world. Aviation industry directly provides jobs for millions of people all over the world. Indirectly the aviation industry facilitates trade in goods, industrial developments and economic services. However, the soaring trend of aviation growth has also left us with the concern of a monopolistic market, and an unfathomable pollution scale.

The deregulation of airline industry has brought good news in some places. Deregulation has induced airline competition and therefore falling airfare prices. However, the proponents of deregulation failed to see the aftermath of hub and spoke network system, where only a handful of airlines gains monopoly over the market. Added to this, the fact that fuel prices have steadily grown over the past decade, the airline industry has suffered from billions of dollars of losses. Thus there seems to be a trend of airline failures and bankruptcy that can be observed in the recent years. The only way out of a bankruptcy seems to be joining larger airline alliances. As of



April 2008, Delta & Northwest airlines announced their merger, proving that the airline market's fragile situation(Maynard).

Deregulation was supposed to bring free market, where the customers would freely shop for their flight. But the frequent flier programs and monopoly on the hubs have bounded the passengers to stick with only handful airlines. The airline mergers due to deregulation and hub-spoke network provides a much larger route network, but not necessarily larger choice pool for the customers.

However, the deregulation has allowed for the smaller startup companies to become successful, which in the days of regulation would not have been possible. In the future, from the market side it would be interesting to see whether the larger airliners dominate, or the smaller air taxis. What is the future of passenger air travel; Airborne Taxi? Point to point, Scrub the spoke and wheel? Prospective future seems to address towards point to point system with VLJ's. Or maybe the future is still in the big jets - new Airbus starts operating will show how good it is. Most probably the future will be somewhere in the middle, combination of the spoke and hub and the point to point system. Only the future needs of the passengers will determine what will prevail and what regulatory needs should be taken. The governments should come up with steps on financing the small airliners, yet maintain a sort of *laissez faire* notion for the market. The deregulation has offered the airline market with both positive and negative effects. However, there is no right or exact answer as to how we can make the air-transportation system bereft of negative effects of deregulation, and only keep the positive effects. In any case we can be sure of one thing, the growth of aviation industry is inevitable, and with that all of its complexities will grow as well.

## 13. References

### 13.1. Works Cited

Bailey, Elizabeth E., David R. Graham, and Daniel P. Kaplan. Deregulating the Airlines. Vol. 10. Cambridge, Mass.: MIT Press, 1985.

Borenstein, Severin. "Airline Mergers, Airport Dominance, and Market Power." The American Economic Review 80.2, Papers and Proceedings of the Hundred and Second Annual Meeting of the American Economic Association (1990): 400-4. <<http://links.jstor.org/sici?sici=0002-8282%28199005%2980%3A2%3C400%3AAMADAM%3E2.0.CO%3B2-L>>.

---. "The Evolution of U.S. Airline Competition." The Journal of Economic Perspectives 6.2 (1992): 45-73. <<http://links.jstor.org/sici?sici=0895-3309%28199221%296%3A2%3C45%3ATEOUAC%3E2.0.CO%3B2-6>>.

---. "Hubs and High Fares: Dominance and Market Power in the U.S. Airline Industry." The Rand journal of economics 20.3 (1989): 344-65. <<http://links.jstor.org/sici?sici=0741-6261%28198923%2920%3A3%3C344%3AHAHFDA%3E2.0.CO%3B2-4>>.

Clark, Paul. Buying the Big Jets: Fleet Planning for Airlines. Aldershot: Ashgate, 2001.

Copeland, Duncan G., and James L. McKenney. "Airline Reservations Systems: Lessons from History." MIS Quarterly 12.3 (1988): 353-70. <<http://links.jstor.org/sici?sici=0276-7783%28198809%2912%3A3%3C353%3AARSLFH%3E2.0.CO%3B2-N>>.

Evans, William N., and Ioannis N. Kessides. "Localized Market Power in the U.S. Airline Industry." The review of economics and statistics 75.1 (1993): 66-75. <<http://links.jstor.org/sici?sici=0034-6535%28199302%2975%3A1%3C66%3ALMPITU%3E2.0.CO%3B2-4>>.

Gudmundsson, Sveinn Vidar. Flying Too Close to the Sun: The Success and Failure of the New-Entrant Airlines. Aldershot, Hants, England; Brookfield, Vt., USA: Ashgate, 1998.

Iatrou, K. O., Mauro. (2007). *Airline choices for the future: From alliances to mergers*. Aldershot, England; Burlington, VT: Ashgate.

Kahn, Alfred E., "Airline Deregulation", The Concise Encyclopedia of Economics. Liberty Fund, Inc. Ed. David R. Henderson. Library of Economics and Liberty. 2 October 2007. <<http://www.econlib.org/LIBRARY/Enc/AirlineDeregulation.html>>.

(Last accessed 10/27/2007)

Loyalka, Michelle Dammon. "Your Air Taxi is almost Ready." Business Week Online (2005): N.PAG. .

Maynard, Micheline "Thirty years later, airline deregulation offers mixed legacy". NEW YORK TIMES NEWS SERVICE(April,2008)

Mclaughlin, Martyn "Airlines hit by 22% surge in passenger complaints" The Scotsman (2007): <<http://thescotsman.scotsman.com/index.cfm?id=1158322007>>

(Last accessed 10/27/2007)

Meyer, John R. "Bailey, Graham, and Kaplan's Deregulating the Airlines." The Rand journal of economics 17.3 (1986): 461-6.

<<http://links.jstor.org/sici?sici=07416261%28198623%2917%3A3%3C461%3ABGAKDT%3E2.0.CO%3B2-2>>.

Palmeri, Christopher. "Virgin Charter: Ready for Takeoff." Business Week Online (2007);

Peteraf, Margaret A., and Randal Reed. "Pricing and Performance in Monopoly Airline Markets." Journal of Law and Economics 37.1 (1994): 193-213. <<http://links.jstor.org/sici?sici=0022-2186%28199404%2937%3A1%3C193%3APAPIMA%3E2.0.CO%3B2-M>>.

Scafer, Eric "Virgin Charter Bets on Private Jet Marketplace." Helium Report(2007): <<http://www.heliumreport.com/archives/855-virgin-charter-bets-on-private-jet-marketplace>>

(Last accessed 10/23/2007)

"A Row Over the Rows at Heathrow." Economist 318.7689 (1991): 49-50. .

United States. General Accounting Office. Airline Competition : Effects of Airline Market Concentration and Barriers to Entry on Airfares : Report to Congressional Requesters. B-242870 ed. Washington, D.C: U.S. General Accounting Office, 1991.

Windle, Robert. "Flying Too Close to the Sun: The Success and Failure of New-Entrant Airlines." Transportation Quarterly 54.3 (2000): 169-71.

## 13.2. Websites

- <[http://www.centennialofflight.gov/essay/Commercial\\_Aviation/Dereg/Tran8.htm](http://www.centennialofflight.gov/essay/Commercial_Aviation/Dereg/Tran8.htm)>  
(Last accessed 10/23/2007)
- <[http://en.wikipedia.org/wiki/Virgin\\_Airlines](http://en.wikipedia.org/wiki/Virgin_Airlines)>  
(Last accessed 10/27/2007)
- <<http://www.aef.org.uk/downloads/EmissionsImpos.pdf>>  
(Last accessed 01/22/2008)
- <<http://www.rcep.org.uk/aviation/av12-txt.pdf>>  
(Last accessed 01/22/2008)
- <<http://www.jstor.org/view/00221465/di976050/97p0939e/0>>  
(Last accessed 01/22/2008)
- <<http://www.iata.org/NR/rdonlyres/3E8DA787-45FE-4E3C-A295-0AB92148541D/44201/AirlineEnvironmentalReportingSurvey.pdf>>  
(Last accessed 01/22/2008)
- <[http://www.faa.gov/airports\\_airtraffic/airports/environmental/environmental\\_desk\\_ref/media/desk\\_ref\\_chap18.pdf](http://www.faa.gov/airports_airtraffic/airports/environmental/environmental_desk_ref/media/desk_ref_chap18.pdf)>  
(Last accessed 01/22/2008)
- <[http://www.faa.gov/airports\\_airtraffic/airports/environmental/environmental\\_desk\\_ref/media/desk\\_ref\\_chap15.pdf](http://www.faa.gov/airports_airtraffic/airports/environmental/environmental_desk_ref/media/desk_ref_chap15.pdf)>  
(Last accessed 01/24/2008)
- <[http://www.landrum-brown.com/MasterPlans/PVD/PDFs/Ch\\_5\\_Social\\_Impact.pdf](http://www.landrum-brown.com/MasterPlans/PVD/PDFs/Ch_5_Social_Impact.pdf)>  
(Last accessed 01/24/2008)