

**US Airline Industry Trends and Performance  
1999-2004: Analysis of Form 41 Data**

by

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Submitted to the Department of Aeronautics and Astronautics  
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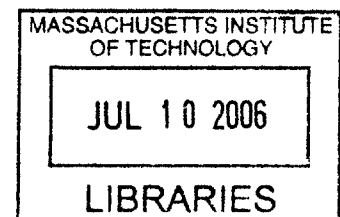
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**AERO**



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## Abstract

Since 2001, the US airline industry has faced an unprecedented set of challenges. Following the terrorist attacks of September 11, 2001, the airline industry reported tremendous losses and several of the largest US airlines went into bankruptcy. To recover from this situation and try to remain financially viable, many measures have been taken by airlines. As a result, the airline industry has been a very dynamic industry over the last few years.

The main objective of this thesis is to investigate the changes that occurred in this industry between 1999 and 2004. Only the performance of a subset of airlines, namely the 12 main passenger Majors, is examined. These 12 airlines are categorized into two subsets, the Legacies and the Lowfares, whose results are compared throughout this thesis. The analyses, that focus both on financial and operating conditions of the airlines, are mainly based on data from the Form 41 reports.

This study shows that in 2004, the traffic carried by the 12 Majors was almost back to 2000 levels, with a higher portion carried by the Lowfares though. It also shows that on average, the Majors flew their aircraft further and that, because the capacity was more closely adjusted to the demand, these aircraft were operated with a higher load factor in 2004 than in 1999. As regards the costs, this work reveals that, in spite of an overall increase in productivity – in labor, aircraft and fuel – the average unit cost increased for the Majors. In addition, the gap in unit cost between the Legacies and the Lowfares actually widened between 1999 and 2004, even though a significant part of this trend is due to a transfer of capacity to the regional airlines. Concerning the revenues, an overall decline of the yield is observed in this thesis, as well as a convergence of the yield of the two subsets of Majors. This analysis finally highlights the fact that, whereas Legacies have reported tremendous losses since 2001, most lowfare airlines were able to break-even or even make money in operations.

Thesis Supervisor: Peter P. Belobaba  
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# Contents

<b>Abstract</b>	<b>3</b>
<b>Acknowledgments</b>	<b>5</b>
<b>Table of Contents</b>	<b>8</b>
<b>List of Figures</b>	<b>10</b>
<b>List of Tables</b>	<b>11</b>
<b>Abbreviations</b>	<b>12</b>
<b>1 Introduction</b>	<b>13</b>
1.1 Structure of the US Airline Industry . . . . .	14
1.1.1 Majors <i>versus</i> Others . . . . .	14
1.1.2 Legacies <i>versus</i> Lowfares . . . . .	16
1.1.3 US Airlines and Bankruptcy . . . . .	18
1.2 Overview of the 12 Major Airlines in this Study . . . . .	19
1.2.1 Legacy Carriers . . . . .	19
1.2.2 Lowfare Carriers . . . . .	20
1.3 Thesis Overview . . . . .	22
1.3.1 Focus of the Thesis . . . . .	22
1.3.2 Data sources . . . . .	22
1.3.3 Thesis Outline . . . . .	23
<b>2 Traffic &amp; Capacity</b>	<b>25</b>
2.1 Traffic . . . . .	26
2.1.1 Passenger traffic . . . . .	26
2.1.2 Cargo Traffic . . . . .	30
2.2 Capacity . . . . .	33
2.2.1 Passenger Capacity . . . . .	33
2.2.2 Total Capacity . . . . .	34
2.3 Characteristics of the Traffic . . . . .	36
2.3.1 Average Load Factor . . . . .	36
2.3.2 Average Seating Capacity . . . . .	39
2.3.3 Average Stage Length . . . . .	40

2.3.4	Average Length of Passenger Haul . . . . .	42
2.4	Chapter Summary . . . . .	44
<b>3</b>	<b>Costs &amp; Productivity</b>	<b>45</b>
3.1	Operating Costs . . . . .	47
3.1.1	Total Operating Costs . . . . .	47
3.1.2	Unit Cost . . . . .	48
3.2	Breakdown of Operating Expenses . . . . .	53
3.2.1	Flying Operations . . . . .	58
3.2.2	Maintenance . . . . .	59
3.2.3	Passenger Service . . . . .	61
3.2.4	Aircraft & Traffic Servicing . . . . .	63
3.2.5	Promotion & Sales . . . . .	64
3.2.6	General & Administrative . . . . .	66
3.2.7	Depreciation & Amortization . . . . .	66
3.2.8	Transport Related . . . . .	66
3.3	Productivity . . . . .	68
3.3.1	Labor productivity . . . . .	68
3.3.2	Airplane productivity . . . . .	72
3.3.3	Fuel Efficiency . . . . .	74
3.4	Chapter Summary . . . . .	78
<b>4</b>	<b>Revenues &amp; Profitability</b>	<b>79</b>
4.1	Total Operating Revenues . . . . .	80
4.1.1	Passenger Revenues . . . . .	81
4.1.2	Other Revenues . . . . .	89
4.2	Operating Profitability . . . . .	92
4.2.1	Unit Cost, Unit Revenue & Unit Income . . . . .	92
4.2.2	Operating Margin . . . . .	95
4.2.3	Break-even Load Factor . . . . .	98
4.3	Chapter Summary . . . . .	100
<b>5</b>	<b>Conclusions</b>	<b>101</b>
5.1	Traffic & Capacity . . . . .	102
5.2	Costs & Productivity . . . . .	104
5.3	Revenues & Profitability . . . . .	107
5.4	Future Research . . . . .	109
<b>A</b>	<b>Landscape of the US Airlines Industry in 2004</b>	<b>111</b>
<b>B</b>	<b>Sample of data from Form 41</b>	<b>113</b>
	<b>Bibliography</b>	<b>115</b>

# List of Figures

2-1	Enplaned passengers . . . . .	27
2-2	Revenue passenger miles . . . . .	28
2-3	Traffic share (RPMs-based) in 2004 . . . . .	29
2-4	Revenue cargo ton miles . . . . .	30
2-5	Traffic share (RCTMs-based) in 2004 . . . . .	31
2-6	Available seat miles . . . . .	33
2-7	Extra capacity (ASMs-RPMs), by group . . . . .	34
2-8	Available ton miles . . . . .	35
2-9	Average passenger load factor, by group and by airline . . . . .	37
2-10	Average seating capacity size, by group and by airline . . . . .	40
2-11	Average stage length, by group and by airline . . . . .	41
2-12	Average length of passenger haul, by group . . . . .	42
3-1	Total operating expenses, by group and by airline . . . . .	47
3-2	Unit cost (CASM) by group . . . . .	49
3-3	Changes in unit cost and average stage length, 2000 <i>vs.</i> 2004 . . . . .	51
3-4	Changes in unit cost ex-Transport Related expenses and average stage length, 2000 <i>vs.</i> 2004 . . . . .	52
3-5	Operating costs breakdown for the 12 Majors in 2000 and 2004 . . . . .	56
3-6	CASM breakdown, 2000 <i>vs.</i> 2004 . . . . .	57
3-7	Flying operating expenses per block-hour, by group and by airline . . . . .	59
3-8	Maintenance expenses per block-hour, by group and by airline . . . . .	60
3-9	Maintenance cost per block-hour <i>vs.</i> average fleet in 2004 . . . . .	61
3-10	Passenger Service expenses per RPM, by group and by airline . . . . .	62
3-11	Promotion & Sales expenses per enplanement, by group and by airline . . . . .	65
3-12	Employment, by group . . . . .	69
3-13	ASMs per employee, by group . . . . .	70
3-14	Change in ASMs per employee and average stage length, 2000 <i>vs.</i> 2004 . . . . .	70
3-15	Block-hours per pilot, by group and by airline . . . . .	71
3-16	Change in aircraft utilization and average stage length, 2000 <i>vs.</i> 2004 . . . . .	73
3-17	Change in ASMs per aircraft-day and average stage length, 2000 <i>vs.</i> 2004 . . . . .	73
3-18	Crude Oil Prices . . . . .	74
3-19	Fuel consumption and fuel efficiency for the Majors . . . . .	75
3-20	Change in fuel efficiency and average stage length, 2000 <i>vs.</i> 2004 . . . . .	76
3-21	Fuel efficiency <i>vs.</i> average fleet age in 2004 . . . . .	77

4-1	Total operating revenues, by group . . . . .	80
4-2	Passenger revenues, by group . . . . .	81
4-3	Change in passenger revenues between 2000 and 2004, by airline . . .	82
4-4	Passenger revenue share in 2004 . . . . .	83
4-5	Average fare, by group . . . . .	84
4-6	Yield, by group . . . . .	85
4-7	Changes in yield and average stage length, 2000 <i>vs.</i> 2004 . . . . .	87
4-8	Unit passenger revenue (PRASM), by group . . . . .	88
4-9	Portion of passenger revenues in total operating revenues, by group .	90
4-10	Portion of passenger revenues in total operating revenues, by airline .	90
4-11	Unit cost, unit revenue and unit income, by group . . . . .	93
4-12	Operating margin, by group . . . . .	95
4-13	Operating margin, by airline . . . . .	97
5-1	Unit cost <i>versus</i> average stage length in 2003 . . . . .	105
5-2	Yield <i>versus</i> average stage length in 2003 . . . . .	108

# List of Tables

1.1	The Majors ranked by revenues as of 2004 . . . . .	15
1.2	The Legacy/Lowfare categorization among the Majors . . . . .	17
1.3	Bankruptcy among the Majors . . . . .	18
1.4	Main facts about the 12 Majors . . . . .	19
2.1	US industry passenger traffic and traffic share (RPM-based) for the two groups of Majors . . . . .	29
2.2	US industry cargo traffic and traffic share (RCTMs-based) for the two groups of Majors . . . . .	30
3.1	Unit cost (CASM) by airline . . . . .	50
3.2	Operating costs breakdown (in percentage), for 2000 and 2004 . . . . .	55
3.3	Unit cost breakdown (CASM) in 2004 and variation for 2000-2004 . . . . .	57
3.4	Average fleet age as of 12/31/2004, by airline . . . . .	61
3.5	Aircraft Servicing expenses, by airline . . . . .	63
3.6	Traffic Servicing expenses, by airline . . . . .	64
4.1	US industry operating revenues and revenue share for the two groups of Majors . . . . .	80
4.2	US industry passenger revenues and revenue share for the two groups of airlines . . . . .	82
4.3	Yield, by airline . . . . .	85
4.4	Annual changes for yield and unit passenger revenue, by group . . . . .	89
4.5	Average load factor <i>vs.</i> break-even load factor, by group and by airline . . . . .	99
A.1	US airlines as of 2004 . . . . .	112
B.1	Sample from Form 41 . . . . .	114

## Abbreviations

ALF	Average Passenger Load Factor
ALH	Average Length of Passenger Haul
ASM	Available Seat-Mile
ASL	Average Stage Length
ATM	Available Ton-Mile
BELF	Break-Even Load Factor
BH	Block-Hour
BTS	Bureau of Transportation Statistics
CASM	Unit Cost (Cost per Available Seat-Mile)
CPI	Consumer Price Index
DOC	Direct Operating Costs
DOT	Department of Transportation
FAA	Federal Aviation Administration
FTE	Full Time Equivalent
GAO	Government Accountability Office
GDP	Gross Domestic Product
IATA	International Air Transport Association
PRASM	Unit Passenger Revenue (Passenger Revenue per Available Seat-Mile)
RASM	Unit Revenue (Revenue per Available Seat-Mile)
RCTM	Revenue Cargo-Ton-Mile
RPM	Revenue Seat-Mile
RTM	Revenue Ton-Mile



# Chapter 1

## Introduction

This chapter serves as an introduction for this study. Through its first section, it provides an overview of the airline industry and presents some concepts that are used to categorize the airlines. The issue of bankruptcy is also briefly discussed.

The 12 US airlines that are the subjects of this study are then briefly introduced. The purpose of this section is not to make a complete description of each one of the 12 airlines, but rather to present some facts that may be helpful to better understand each airline's background.

In the last section of this introduction, the scope of this thesis is more precisely defined and an outline is provided.

## 1.1 Structure of the US Airline Industry

Worldwide, the commercial aviation industry is a large and growing industry. Air transportation service facilitates economic growth to the extent that it makes world trade, as well as international investment and tourism easier. It is therefore central to the globalization that takes place in many other industries. The United States is the largest single domestic market, accounting for about 20% of the RPMs<sup>1</sup> yielded worldwide in 2003 [10]. Yet the forecasts anticipate that the Asia-Pacific market, growing faster than the quite mature US market, could become dominant in the next fifteen years. US air traffic has expanded from about 170 million passengers in 1970 to about 700 million 34 years later. The demand was highly stimulated by the Airline Deregulation Act in 1978 that gave airlines all freedoms about setting their fares and choosing the domestic routes they want to fly. The Act also made easier the entry of new companies into the business. As a result, today the competition is very intense, especially on the domestic market that has become quite a low cost, low fare environment. Therefore, US airlines' margins are very thin in this domestic market.

Because of the large number of commercial airlines in the US (140 in 2004), many categorizations can be used to design different subsets. In the remainder of this section, two of these categorizations are presented. The first one groups the airlines according to their size – more precisely according to the size of their revenues – while the second one uses their business model to separate them.

### 1.1.1 Majors *versus* Others

US *Department Of Transportation (DOT)* groups air carriers into three basic categories based upon their total operating revenues for a twelve-month period. The revenues ranges for the three categories are described below. For each category, the figure between parentheses indicates the number of US airlines that were in this category in 2004.

**Majors (19)** - The Majors are the airlines whose annual revenues exceed one billion dollars. They usually provide nationwide, and in some cases, worldwide service. In 2004, 19 US airlines met this requirement. They are presented in Table 1.1, ranked by revenues.

**Nationals (31)** - The annual revenues for those carriers are less than one billion dollars but more than one hundred million dollars. They usually serve particular regions of the country but may sometimes provide service on long-haul and even international routes.

---

<sup>1</sup>See definition in Section 2.1.1

**Regionals (31) and Commuters (55)** - Regional carriers' annual revenues are below one hundred million dollars. As implied by their name, Regionals' service is, for most part, limited to a single region of the country. Small Regionals, often called Commuters, represent the largest segment of regional airline business that "has been one of the fastest growing and most profitable segments of the industry since deregulation" [18].

In 2004, the US airline industry counted 140 airlines. They are presented in Appendix A, grouped according to the above categorization.

Table 1.1: The Majors ranked by revenues as of 2004

Rank	Airline	Rank	Airline
1	<i>Federal Express (FedEx)</i>	11	Alaska Airlines
2	American Airlines	12	ExpressJet Airlines*
3	United Airlines	13	American Eagle Airlines*
4	Delta Air Lines	14	<i>Atlas Air &amp; Polar Air Cargo</i>
5	Northwest Airlines	15	America Trans Air (ATA)
6	Continental Airlines	16	JetBlue Airways
7	US Airways	17	Comair*
8	Southwest Airlines	18	SkyWest Airlines*
9	<i>UPS Airlines</i>	19	Airtran Airways
10	America West Airlines		

In Table 1.1, the 3 carriers whose name is in italics are the *all-cargo airlines*, or *freighters*. These airlines carry only freight and do not provide service for transportation of passengers. Note that most passenger airlines also operate cargo divisions. In such a case, the freight is carried either in the same aircraft as the passengers – using “combi” aircraft where the main deck is divided into two sections, one for cargo and one for passengers – or in dedicated airplanes that carry nothing but freight.

The 4 airlines whose name is followed by an asterisk should not be compared with the other ones to the extent that they do not provide real nationwide service. Actually they are regional providers for bigger airlines:

- ExpressJet Airlines operates as Continental Express, the regional provider for Continental Airlines;
- American Eagle Airlines is a regional airline affiliate of American Airlines;
- Comair is a subsidiary of Delta Air Lines. The airline operates under the name Delta Connection;
- SkyWest Airlines primarily serves as a feeder airline for United Airlines – as United Express – and for Delta Air Lines – as Delta Connection.

Neither the all-cargo airlines, nor the regional airlines affiliate of Majors are considered for the analysis in this study. It is worth mentioning that among the 12 major airlines that remain, 6 are among the top 10 world airlines in terms of passenger traffic (as measured in RPMs).

### 1.1.2 Legacies *versus* Lowfares

Airlines can also be categorized according to their business model. Today, in the US airline industry, two primary types of business models can be found. The *legacy model* on one side, and the *lowfare, lowcost model* on the other side.

**Legacy carriers** - “Legacy airlines are essentially those airlines that were in operation before deregulation and whose goal is to provide service from ‘anywhere to everywhere’. ” [11]

**Lowcost, lowfare carriers** - Lowcost, lowfare airlines are the airlines that “entered the marketplace after deregulation and that primarily operate point-to-point service from *focus cities*” [11]. Because of a structure that allows lower operating costs, on average these airlines offer seats at lower fares than those offered by legacy airlines. Note that, even though these airlines are often called “lowcost airlines”, the term “lowfare airlines” is preferred in this thesis.

These definitions are neither very precise, nor very accurate. For instance, Southwest is an anomaly to the extent that it operated within Texas before deregulation (see Table 1.4). In addition to that, all airlines, including the so-called Legacies, offer some seats at competitively low fares since legacy carriers try to match the lowest fares offered by their lowfare competitors. As a result, it is now very difficult to find non ambiguous criteria that can help to determine which airlines are lowfare airlines, and which ones are not. However, some key features can help to distinguish a lowfare carrier. A non exhaustive list of these features is presented below.

**Simplicity** - One of the key words in the lowfare world is simplicity, *i.e.* the lack of complexity. As a matter of fact, lowfare airlines usually operate a fleet composed of very few aircraft types, sometimes even with a single one – the Airbus A320 or the Boeing 737 are commonly used for single type fleet. These aircraft, when operated by lowfare airlines, generally offers only one type of passenger class. The traditional differentiation in first, business and coach classes does not exist in the lowfare business model. On the fares side, in spite of the simplification that has happened over the past years in their fare structure, legacy airlines still operate with a more elaborate fare scheme – more emphasis on yield management through product differentiation – than lowfare airlines.

**Route structure** - Lowfare airlines usually structure their routes around a point-to-point model. By contrast, legacy airlines like to transfer the passengers they carry through their hubs. The hub-and-spoke system allows them to serve the greatest number of passengers, from as many locations as possible, in the most efficient way with a given set of resources. Therefore, Legacies’ route structure is much more centralized, with all routes converging to a very small

number of airports. Airlines with this type of route structure are often called *network airlines*. From a customer point of view, it means that as a passenger of a legacy airline, he is very likely to be carried to his destination through connecting flights. It should be mentioned that, strictly speaking, almost every airline in the world can be considered as a network airline to the extent that very few airlines can claim they do not sell flights with more than one leg. Yet, it is true that, on average, the hubs, or “focus cities” are not as important in the lowfare airlines’ system as they are for their legacy competitors. In addition to this difference of route structure, lowfare carriers generally do not provide much service on international routes even though some of them may serve destinations in Canada, in the Caribbean or in South America.

**Low costs** - Lowfare carriers were traditionally much more concerned with costs than Legacies. On the passenger servicing side, lowfare airlines offer less (if not no) on-board amenities. Free in-flight catering and other complimentary services are eliminated and replaced by paid-for services. As for the choice of airports, to reduce costs, lowfare airlines usually prefer to fly to secondary airports – for instance, Midway Airport in Chicago instead of O’Hare International Airport – because they have lower fees<sup>2</sup>. Note that since 2001, legacy airlines have done so much efforts to cut their costs and restore profitability that the differences on the cost side may not be as substantial as they used to be.

**Alliances** - In the lowfare model, alliances with other airlines are generally less developed. This is only understandable since, in that model, the logic of multiplying the destinations served through codesharing and alliances does not make as much sense. One of the consequence from a passenger point of view is that lowfare airlines’ frequent flyer programs are usually less elaborate.

Based on these features, as well as on what is commonly found in the literature, a grouping of the 12 “main” Majors was decided. The grouping used in this thesis is presented in Table 1.2. This table also presents the 2-letter IATA airline designators associated with each one of the 12 Majors. These designators, that are commonly used worldwide, will be abundantly used throughout this document.

Table 1.2: The Legacy/Lowfare categorization among the Majors

Legacy Majors	IATA Code	Lowfare Majors	IATA Code
American Airlines	AA	Alaska Airlines	AS
Continental Airlines	CO	America West Airlines	HP
Delta Air Lines	DL	America Trans Air (ATA)	TZ
Northwest Airlines	NW	Southwest Airlines	WN
United Airlines	UA	JetBlue Airways	B6
US Airways	US	Airtran Airways	FL

<sup>2</sup>Secondary airport may also be seen as an operational advantage to the extent that they are usually less congested.

In this study, 6 among the 12 “main” Majors are accepted as Legacy, while the 6 others are considered as Lowfare. It should be emphasized that there is no clear consensus about Alaska Airlines. Therefore, even though it was decided to consider AS as a lowfare airline, results presented in this thesis show that it would have been equally relevant to categorize it in the legacy group.

### 1.1.3 US Airlines and Bankruptcy

Pre-1978, bankruptcies were extremely rare in the regulated environment. Since 1978, there have been more than 100 bankruptcy filings, although not all of these have resulted in liquidation. Indeed, US Bankruptcy Code and Federal Rules of Bankruptcy Procedure offer airlines different ways of addressing their financial issues. The most common one, that are very different from each other, are *Chapter 11* and *Chapter 7* procedures. The airlines engaged in Chapter 11, known as *Reorganization*, are allowed to continue operating. Chapter 11 bankruptcy is an attempt to stay in business while the company is being reorganized through a plan approved by a court. The airline’s debts may sometimes be relieved, at least partially, by the court providing an opportunity for a fresh start. That is the reason why Chapter 11 bankruptcy is sometimes seen as a competitive advantage. The circumstances under which a company engages in Chapter 7 are more extreme. A Chapter 7 bankruptcy, known as *Liquidation*, involves the airline shutting down its operations and the airline’s assets being collected and sold off to pay back the creditors. Note that a Chapter 11 bankruptcy may also include selling off some of the airline’s assets as a part of reorganization.

Table 1.3 is an apercu of bankruptcy procedures among the Majors since the deregulation of 1998.

Table 1.3: Bankruptcy among the Majors

Airline	Filing date	Emerging date
Continental Airlines	9/24/83	6/30/86
Continental Airlines	12/3/90	4/27/93
America West Airlines	6/27/91	8/25/94
US Airways	8/11/02	3/31/03
United Airlines	12/9/02	2/1/06
US Airways	9/12/04	9/30/05
ATA Airlines	10/29/04	-
Delta Air Lines	9/14/05	-
Northwest Airlines	9/14/05	-

It should be highlighted that American Airlines is the only legacy Major that has never filed for bankruptcy protection. On the contrary, ATA is the only lowfare Major that has ever filed for bankruptcy. In addition to that, ATA is one of the three Majors that, as of February 2006, are still under bankruptcy protection.

## 1.2 Overview of the 12 Major Airlines in this Study

This section introduces the 12 Majors whose performance is analyzed in this thesis. Some basic facts are first presented in Table 1.4, including the airlines' main hubs, that are designated using the 3-letter IATA airport codes. A paragraph with summary information is then dedicated to each airline.

Table 1.4: Main facts about the 12 Majors

	<b>Founded</b>	<b>Headquarters</b>	<b>Main hubs</b>
<b>AA</b>	1930	Fort Worth, TX	DFW, ORD, MIA, JFK,
<b>CO</b>	1934	Houston, TX	IAH, EWR, CLE
<b>DL</b>	1928	Atlanta, GA	ATL, CVG, JFK, SLC
<b>NW</b>	1926	Eagan, MN	MSP, DTW, MEM, AMS, NRT
<b>UA</b>	1926	Elk Grove Village, IL	ORD, DEN, SFO, LAX, IAD
<b>US</b>	1939	Tempe, AZ	CLT, PHL
<b>AS</b>	1932	Seattle, WA	SEA, PDX, ANC
<b>HP</b>	1983	Tempe, AZ	PHX, LAS
<b>TZ</b>	1973	Indianapolis, IN	MDW
<b>WN</b>	1971	Dallas, TX	-
<b>B6</b>	2000	Forest Hills, Queens, NY	JFK
<b>FL</b>	1993	Orlando, FL	ATL, MCO

### 1.2.1 Legacy Carriers

#### American Airlines (AA)

American Airlines is the largest airline in the world in terms of passengers transported, and the second-largest airline (behind Air France-KLM) in terms of total operating revenues. It is an international carrier that flies to destinations all over the world. It serves destinations in the United States, as well as in Canada, Latin America, the Caribbean, Japan, India and Western Europe – it is one of the two US carriers permitted to fly to London Heathrow Airport. AA is a founding member of the OneWorld alliance. [19]

#### Continental Airlines (CO)

Continental operates scheduled flights to the Americas, Europe and Asia. It should be emphasized that, as of 2004, CO had the youngest fleet among the Legacies. On the alliance side, Continental has been a member of the SkyTeam alliance since 2004. In early 2006, Continental was rated “the most admired US airline on Fortune magazine’s America’s Most Admired Companies airline industry list”. [20]

#### Delta Air Lines (DL)

Delta’s international network spans North America, South America, Europe,

Asia and the Caribbean. Delta Air Lines is a founding member of the SkyTeam alliance. On 14 September 2005, *i.e.* the same day as Northwest, the airline filed for bankruptcy protection under the pressure of high labor costs and record-breaking jet fuel prices. [21]

#### **Northwest Airlines (NW)**

Northwest Airlines, a member of the SkyTeam alliance, serves many destinations worldwide. It is worth emphasizing that, in addition to its three main hubs in the United States, the airline also operates flights from a hub in Asia (from Narita International Airport near Tokyo) and from the KLM's hub at Schiphol Airport in Amsterdam. Thanks to its hub in Asia, Northwest Airlines carries more passengers across the Pacific than any other US carrier. The airline also carries more air cargo than any other passenger airline. Yet, the airline operates under bankruptcy protection since 09/14/2005 (same day as DL). [22]

#### **United Airlines (UA)**

United Airlines is an international carrier that operates extensive domestic networks (in the Midwestern and Western United States) but that is also prominent in transcontinental, transpacific and transatlantic service – UA and AA are the only two US carriers allowed to operate flights to London Heathrow Airport. UA is a founding member of Star Alliance (1997). On February 1, 2006, UA emerged from Chapter 11 bankruptcy protection, under which it had operated for about 38 months. As of 2006, UA's bankruptcy case is the largest and longest airline bankruptcy case in history. [23]

#### **US Airways (US)**

US Airways' network spans the North America, Central America, the Caribbean and Europe. US became the 15<sup>th</sup> member of the Star Alliance in May 2004. On September 12, 2004, US Airways filed for Chapter 11 bankruptcy protection for the second time in two years. One year later, it emerged from bankruptcy. Also in September 2005, the merger of US Airways Group, Inc (the holding company that owns US Airways) and America West Corporation (the parent company of America West Airlines) was completed. The goal of the merger is "to create the world's largest lowfare airline". [24]

### **1.2.2 Lowfare Carriers**

#### **Alaska Airlines (AS)**

Alaska's route system spans more than 40 cities in the United States, Canada, and Mexico. But the airline's service is really focused on the US West coast as well as to and within the State of Alaska. The airline's fleet, that is quite heterogeneous, is one of the youngest among the Majors. One of the reason why Alaska Airlines is categorized as a lowfare airline in this study is that the airline claims to structure its routes around a point-to-point model: "We are really a



point-to-point system: it is just that one point is almost always Seattle” (Bill Ayer, Alaska Airlines’ CEO). [25]

#### **America West Airlines (HP)**

America West Airlines provides service throughout the US, Canada, Mexico and Costa Rica. In September 2005, HP and US merged together “to create the world’s largest lowfare airline” (see section about US for more details about the merger). [26]

#### **ATA Airlines (TZ)**

ATA Airlines, that serves more than 20 destinations throughout the US, the Caribbean area and Mexico, recently entered a codesharing arrangement with Southwest. The airline has been operating under Chapter 11 reorganization since 27 October 2004. [27]

#### **Southwest Airlines (WN)**

Southwest Airline is the second oldest lowfare Majors after Alaska Airlines, whose categorization into the lowfare subset is disputable. WN flies to about 60 cities all across the country since it serves destinations in more than 32 states. The airline operates about 450 aircraft, all of which are from the Boeing 737 family. Actually, Southwest is the airline that purchased the most B737 in the world. Reporting its 32<sup>nd</sup> consecutive year of profitability in 2005, Southwest history has been a real success story from the beginning. Note that in 2004, Southwest injected capital into ATA – resulting in Southwest’s 27.5% ownership stake in ATA – and entered into a codesharing arrangement with the airline, that was Southwest’s first domestic codeshare arrangement. [28]

#### **JetBlue Airways (B6)**

Founded in February 2000, JetBlue is the youngest Major. JetBlue follows Southwest’s approach of offering lowfare travel, but distinguishes itself with the amenities, like its all-leather seating and its in-flight entertainment. The airlines, that serves more than 30 cities around the country and the Caribbean, has been profitable since its second year. It used to operate a single-type fleet – only Airbus A320 aircraft with a single-class configuration of 156 seats – but in 2005, it began delivery of a smaller aircraft, the Embraer 190. The current rate of growth of its fleet is quite impressive with a new aircraft delivered approximately every 10 days. [29]

#### **Airtran Airways (FL)**

Airtran operates throughout the eastern US and the Midwest. It achieved the “Major carrier” status only in 2004 and therefore, as of 2004, it is the smallest Majors. Airtran’s hub is “at Hartsfield-Jackson Atlanta International Airport (ATL), the world’s busiest airport by passenger volume, where it is the second largest carrier” after DL. As of 2004, Airtran had the second youngest fleet after JetBlue with 2.5 years for FL *versus* 2.2 years for JetBlue. Its all-Boeing fleet is so rapidly expanding that Airtan recently became the fastest airline in history to have its 100<sup>th</sup> airplane delivered. [30]

## 1.3 Thesis Overview

### 1.3.1 Focus of the Thesis

The initial purpose of this thesis is to investigate the main changes that occurred during the last few years regarding financial and operating condition of the airline industry.

For the sake of simplicity, it was decided to limit the scope of this thesis to the performance of the Majors and more precisely of the passenger Majors that provide nationwide service. Thus, neither the all-cargo airlines, nor the subsidiaries are examined in this thesis. The 12 Majors that remain account for about 90% of the total passenger traffic carried by US airlines as measured in RPMs (see Chapter 2 for the definition). Then, it is only natural to postulate that most of the trends for the whole industry can be properly evaluated from the results of this subset of airlines.

It was also decided to focus the analysis on the changes that occurred from 1999 to 2004. The upper limit (year 2004) was imposed by the fact that, when the analysis was initiated, full data for 2005 were not available. Only data for the first two quarters were available. Since the airline industry is a highly seasonal business, it would not have made sense to interpolate data for the third and fourth quarters. About the starting year (year 1999), it can be justified by recalling that 9/11 is one of the, if not the, most important events of the past few years in the sense that it triggered deep changes in the industry. Thus, to be able to analyze the impact of this event, a two or three years period of time before 2001 must be included in the period of study. Yet, in an attempt to fully measure the impact of the terrorist attacks of September 11, the analyses in this thesis are usually more focused on the period 2000-2004 than on the period 1999-2004.

### 1.3.2 Data sources

The main source of data used for this analysis is the *Form 41* reports. The Form 41 is a financial statement that each major, national and large regional US airline must report to the US DOT. It includes balance sheets, income statements, and aircraft operating expenses by equipment type, as well as summary operating statistics by equipment type. It also includes traffic schedules. A sample of the Form 41 is reported in Appendix B. The sample, that is extracted from the Schedule P5.B, concerns American Airlines and Alaska Airlines.

In addition to individual results, an average over the 12 Majors as well as averages for both the legacy and lowfare subsets were computed. The results are provided for

the sake of the analysis since they may help to identify the differences between the two business models. They may also be useful to understand how well an airline does compared to other airlines within its own group.

For some of the metrics analyzed in this thesis, the performance of the whole US airline industry is also depicted<sup>3</sup>. The data are taken from *2005 Economic Report* by the Air Transport Association [6]. These information may be useful to reveal some trends concerning the whole industry that may not have been fully captured by the results of the Majors. However, it should be emphasized that the data for the whole industry include data regarding all-cargo carriers that do not generate any RPM or ASM. Therefore computing the result for the whole industry may not be fully relevant for every metric (see Section 2.3.2 for more details regarding this issue).

### 1.3.3 Thesis Outline

In addition to the current chapter that serves as an introduction, this thesis is comprised of four chapters. Chapter 2 discusses the most noticeable trends in traffic as well as in capacity. The next two chapters deals with the financial questions. In the first part of Chapter 3, operating costs incurred by airlines and their variations are described. The second part is dedicated to the analyses of some productivity metrics in different areas – labor, aircraft and fuel. Chapter 4 completes the financial analysis by first investigating the revenues side, and then dealing with the profit issue. The last chapter, namely Chapter 5, concludes this work with a summary of the most notable results presented in this study.

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<sup>3</sup>It should be stressed that the figures regarding the whole US industry are not the results of the airlines that operate within the US territory – some of which may be foreign carriers – but rather the results of the US airlines – that also includes the results due to traffic outside the US territory.



## Chapter 2

# Traffic & Capacity

The changes in the demand experienced by the Majors and in the supply they offered in response to this demand are analyzed in the first two sections of this chapter.

The demand can be measured by looking at the traffic, both the passenger traffic and the cargo traffic. The airlines under study in this thesis are primarily passenger focused and therefore, the cargo traffic is often not of primary importance. Yet, since cargo traffic may be accountable for a non-negligible part of the total operating revenues, it is included in the analysis, not with as much details as passenger traffic though.

Concerning the supply, it is basically represented by the products offered by the company to satisfy the demand. In the case of a passenger focused airline, the primary products are available seats on the flights of its network. Therefore, the capacity offered by the airline is the best measure of its supply. Similarly to the demand, the capacity can be broken down into passenger capacity on one side, and cargo capacity on the other side.

The main characteristics of the traffic are then highlighted in the last section. This includes the portion of seats filled, the size of the aircraft, and some trends concerning the length of the flights.

## 2.1 Traffic

The data analyses included in this section show that, in spite of a steep drop in the years immediately after the terrorist attacks of 9/11, the traffic carried by US airlines in 2004 was at least back to 2000 levels, no matter the metric used (enplaned passengers, revenue passenger miles or any metric related to cargo traffic). As demonstrated in the next chapters, it does not mean that all the airlines were back to profits in 2004 but a rebounding traffic is still a good hope for the whole industry. Many justifications for this rebound can certainly be found but the most important are probably among the followings:

- US Gross Domestic Product (GDP) growth really resumed in 2003. Indeed, from about +4% before 9/11, it decelerated down to +.8% in 2001, and +1.9% in 2002. In 2003 and 2004, the annual rate of growth was respectively +3.0% and +4.4%<sup>1</sup>. Data reveal that historically, GDP growth and traffic growth have been quite correlated.
- Travelers' confidence in aviation security had slowly been restored. The very intensity of efforts to protect aviation from new terrorist attacks may partially explain this recovery of confidence. Another aspect that may be worth considering is that people were starting to forget what happened on 9/11.
- The first response of airlines to the initial traffic drop was to reduce fares. This had obviously induced people to fly and contributed to resurgence of traffic. The question of fares will be further analyzed in Section 4.1.1.

### 2.1.1 Passenger traffic

In the airline industry, the most commonly used metrics to measure the traffic are the number of *Enplaned Passengers* and of *Revenue Passenger-Miles*. Even though both these metrics measured traffic, they do not provide exactly the same information in the sense that the number of revenue passenger-miles takes into account not only the number of enplanements but also the distance flown. Therefore, by combining these two measures – and many others – one can learn a lot concerning the type of traffic carried by each airline.

#### Enplaned Passengers

The number of enplaned passengers, also called number of enplanements, are the total number of passengers that have been transported by the airline. A passenger flying on a connecting flight with two legs is accounted for two. For each group of airlines,

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<sup>1</sup>These data concerning the real GDP growth come from the US Bureau of Economic Analysis and American Express Financial Advisors.

the changes in traffic, as measured in enplaned passengers, is presented on Figure 2-1.

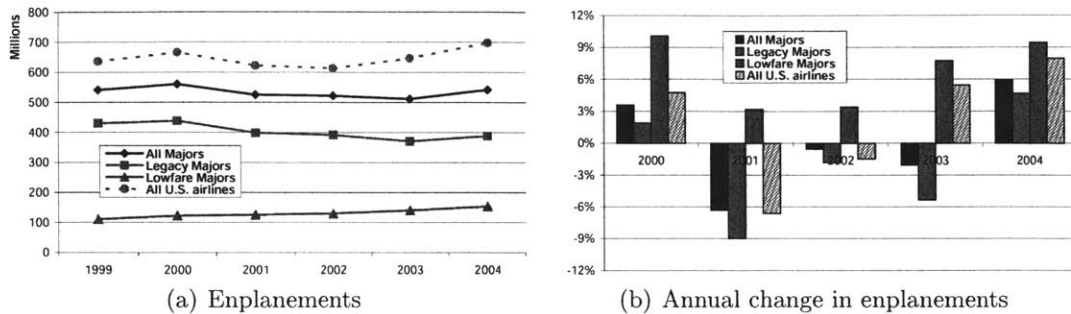


Figure 2-1: Enplaned passengers

During the 90's, US traffic, as measured in number of enplanements, had gained about 3.6% on average each year [18]. But this trend was interrupted by 9/11 events as can be seen on Figure 2-1(b). In 2001, the US traffic decreased by about 6.3% but the decline slowed down in 2002 (with “only” -1.5%). As soon as 2003, a significant growth was back, that amplified in 2004. The results for the first quarters of 2005 seem to indicate that this growth may be sustainable. As a result, US airlines reported more enplaned passengers in 2004 than in 2000.

When looking more specifically at the results from the 12 Majors, it appears that, as a group, they were more affected by the terrorist attacks than the whole industry. They experienced quite the same drop in 2001, but the traffic they carried did not rebound before 2003 and it “only” gained 6.0% in 2004. Thus, the total variation for the period 2000-2004 is negative (-3.3%). The difference with the variations experienced by the whole US airline industry may be due to the increased use of regional airlines by the Majors. Indeed, after 2001, many Majors (generally the Legacies) decided to transfer their short-haul routes to regional airlines through contractual arrangements. This stimulated regional airlines growth – and consequently industry growth – but delayed the Majors’ traffic rebound.

The trends for the legacy subset were quite similar to the trends for the whole group of Majors but the Legacies suffered even more from 9/11. In 2001, the number of enplaned passengers declined by almost 9%, and then by 5.3% in 2003. As a consequence, in 2004, the number of enplanements was still 11.4% below 2000 levels.

The passenger traffic for the lowfare carriers has grown every single year even though the growth slowed down in 2001 and 2002 (more than +8% in 2000, 2003 and 2004 compared to less than +3.5% for 2001 and 2002) resulting in a 26% increase between 2000 and 2004.

## Revenue Passenger Miles

A *Revenue Passenger-Mile* (or *RPM*) is a passenger transported one mile<sup>2</sup>. What differs from the enplaned passengers is that the length of trip is taken into account when computing the RPMs. A passenger flying on a 2000-mile trip contributes twice as much as another passenger traveling on a 1000-mile trip.

Figure 2-2 illustrates graphically the changes in traffic for the whole industry and for the 12 Majors between 1999 and 2004, while Table 2.1 shows how this traffic was shared over the subsets of Majors.

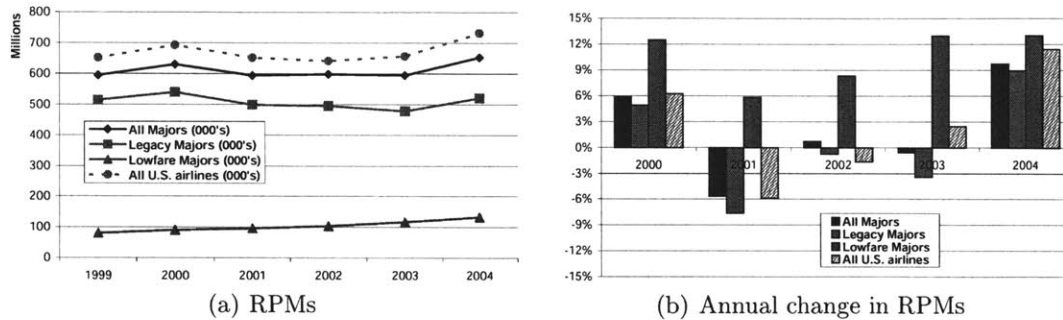


Figure 2-2: Revenue passenger miles

The results presented on Figure 2-2 show that the variations in traffic as measured in RPMs really look like the variations in traffic as measured in enplaned passengers. Yet, the RPMs were less affected by the overall depression of the industry – weaker decreases and stronger increases. This trend could already be observed back to the 90's when US traffic (as measured in RPMs) had gained about 4.2% on average each year, compared to +3.6% for the number of enplanements [18]. The variation in passenger traffic for the whole industry between 2000 and 2004 was about 1 percentage point higher when measured in RPMs than when measured in enplanements (+5.7% instead of +4.7%).

Concerning the 12 Majors, the number of RPMs they reported in 2004 is above (+3.6%) its equivalent for 2000, on the contrary to what is observed when dealing with enplanements (-3.3%). As concerns the legacy carriers, they did not succeed in yielding the same quantity of RPMs in 2004 as what they did in 2000 (-3.5%) but the drop is much smaller than for enplanements (-11.4%). The performance of the lowfare group was much more impressive. Even though the growth of their passenger traffic as measured in RPMs slowed down in 2001 and to a least extent in 2002 (about +13% in 2000, 2003 and 2004 compared to less than +6% in 2001), the total variation from 2000 to 2004 is an astonishing +46%.

<sup>2</sup>Throughout this thesis, the word "mile" is used to designate a statute mile, *i.e.* 5,280 feet or 1,609 meters.



Since the difference between the RPMs and the enplaned passengers lies in the trip length, this stronger growth for the RPMs may be explained by longer passenger haul (see Section 2.3.4 for more details).

The trends highlighted in the above paragraph show that the variations in passenger traffic were quite different for the two groups of Majors – +46% for the Lowfares *versus* –3.5% for the Legacies. Therefore, it is only logical to wonder how the traffic share of each subset had changed between 1999 and 2004. Table 2.1 and Figure 2-3 provide relevant information to investigate this issue. Table 2.1 presents the changes in traffic share between 1999 and 2004 for the two group of airlines while Figure 2-3 details the traffic share of each one of the 12 Majors in 2004.

Table 2.1: US industry passenger traffic and traffic share (RPM-based) for the two groups of Majors

	1999	2000	2001	2002	2003	2004
US industry passenger traffic ( $\times 10^9$ RPMs)	652.0	692.8	651.7	641.0	656.9	731.9
Legacy Majors' share	78.9%	77.9%	76.5%	77.2%	72.8%	71.2%
Lowfare Majors' share	12.3%	13.0%	14.6%	16.1%	17.8%	18.0%

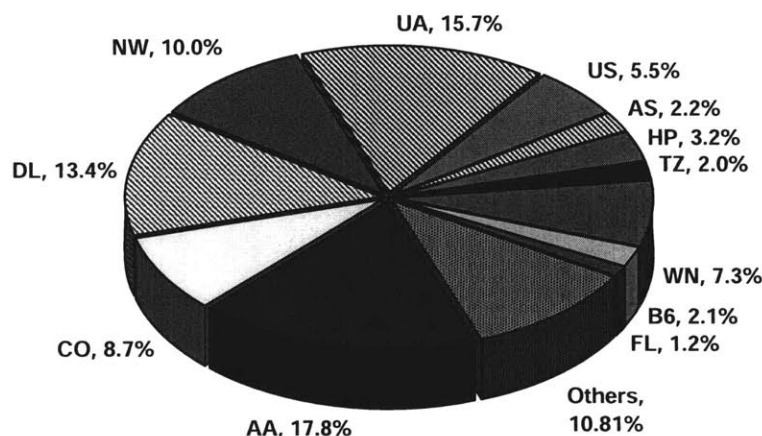


Figure 2-3: Traffic share (RPMs-based) in 2004

Note that in Table 2.1 as well as in Figure 2-3, the traffic shares are RPM-based, which means that the traffic share of each airline is equal to the ratio of its RPMs over the RPMs yielded by the whole US industry (first line in Table 2.1).

During the period under analysis, the 12 Majors yielded about 90% of the total RPMs but each group's contribution was deeply modified. In 1999, the 6 legacy Majors carried about 79% of the total RPMs, while the 6 lowfare Majors contributed to about 12%. In 2004, these figures became respectively 71% and 18%. Then, even though legacy airlines continued to dominate the market, their overall share was eroded by lowfare airlines' fast expansion.

An analysis of Figure 2-3 reveals that, with the exception of US and CO (whose traffic share is 5.5% and 8.7% respectively), each Legacy had a two-digit traffic share whereas for the airlines from the lowfare group, the traffic share was a single-digit number. Actually except for WN, all lowfare carriers carried 3% or less of the total passenger traffic. Thus, even though they were gaining traffic share each year, in 2004 lowfare carriers were still one order of magnitude smaller than the Legacies. As an additional evidence of the dominance of the market by the Legacies, it can be underlined that in 2004, the 4 largest airlines – AA, US, DL and NW – carried as much as 57% of the total RPMs (compared to more than 62% in 2000).

### 2.1.2 Cargo Traffic

The RPM is a measure of the demand in passenger service. One can define a corresponding metric for cargo service, the *Revenue Cargo-Ton-Mile* (shortened to *RCTM*). One revenue cargo-ton-mile corresponds to one ton<sup>3</sup> of cargo – mail, freight or anything else that is not passengers-related – transported one mile. Note that when dealing with total traffic – passenger and cargo – a commonly used metric is the *Revenue Ton-Mile (RTM)* defined as the sum of RPMs and RCTMs.

Figure 2-4 and Table 2.2 present the variations in cargo traffic, as measured in RCTM, for the 12 Majors between 1999 and 2004.

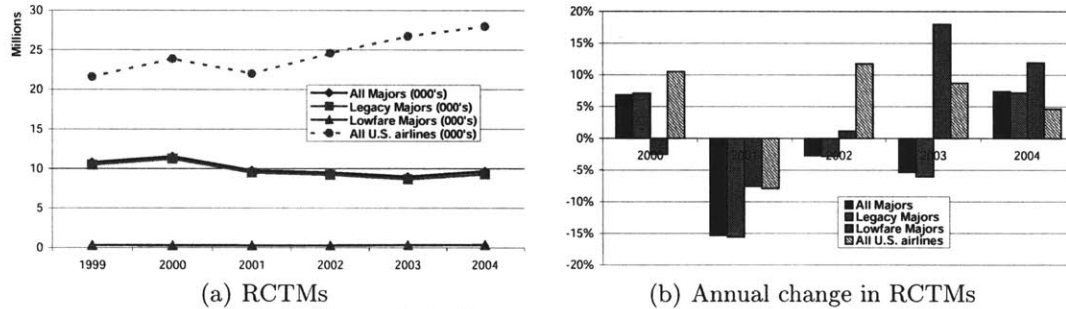


Figure 2-4: Revenue cargo ton miles

Table 2.2: US industry cargo traffic and traffic share (RCTMs-based) for the two groups of Majors

	1999	2000	2001	2002	2003	2004
US industry cargo traffic ( $\times 10^9$ RCTMs)	21.6	23.9	22.0	24.6	26.7	28.0
Legacy Majors' share	48.5%	47.0%	43.1%	37.5%	32.4%	33.2%
Lowfare Majors' share	1.4%	1.2%	1.3%	1.1%	1.2%	1.3%

<sup>3</sup>Throughout this thesis, the word "ton" is used to designate a short ton, *i.e.* 2,000 pounds.

Note that in Table 2.2, and later in Figure 2-5, the traffic shares are RCTMs-based, which means that, for each airline, it is equal to the ratio of its RCTMs over the total RCTMs generated by the whole industry (first line in Table 2.2).

The trends were quite similar for cargo traffic and passenger traffic. Similarly to what happened for the passenger traffic, total cargo traffic encountered a significant drop in 2001 (-8%). Even though cargo business was declining prior to the attacks, more stringent federal safety rules imposed on air cargo after 9/11 may have led some companies to ship goods through alternate surface carriers (trains or trucks). But cargo traffic recovered more quickly from terrorist attacks than passenger traffic. More generally, it is true that historically air freight has grown faster than passenger traffic: “Since the 1960s the annual rate of growth of international air freight has been outpacing passenger growth at times by two to three percentage points” [3].

Another trend that can not be ignored is that the portion of cargo carried by the 12 Majors together has not stopped declining since 1999. From half of the total cargo carried by the US airlines in 1999, it fell down to about one third in 2004. The reason is twofold. First, the total cargo traffic boosted with almost 30% additional cargo traffic between 1999 and 2004, in spite of an 8% decrease in 2001. Then, during the same 5-year period, the cargo business of the 12 Majors contracted by about 10.6%, with a huge 10% drop in 2001. Indeed, as airlines cut flights and used smaller aircraft, the amount of cargo space available was significantly reduced. Moreover, government restrictions on the types of cargo that airlines are allowed to carry together with passengers severely curtailed cargo traffic. For instance, a rule forbade passenger airlines to carry parcel post heavier than 16 ounces after 9/11. Only cargo shippers were allowed to ship those packages.

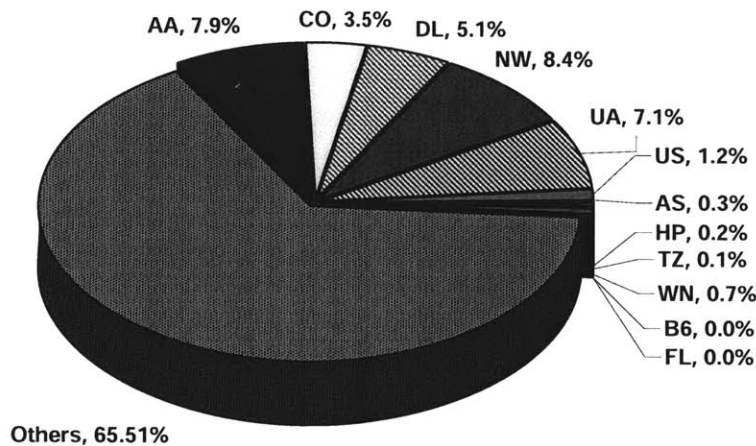


Figure 2-5: Traffic share (RCTMs-based) in 2004

Figure 2-5 details the traffic share of each one of the 12 Majors in 2004. This figure highlights how negligible the lowfare major airlines were in the cargo business. In 2004, they accounted for about 1.3% of the total cargo traffic including .7% for Southwest solely. Among the Legacies, the ranks were globally the same than for the

passenger traffic with the exception of Northwest. In 2004 Northwest, that ranked fourth for passenger traffic, led the way when considering cargo traffic. In the cargo business, the three “giants” were (the RCTMs, in millions, are provided between parentheses) FedEx (9,991), Atlas/Polar (5,428) and UPS (5,309) [6]. Northwest, with “only” 2,338 million ton-miles was far behind.

It is also worth noticing that the portion of traffic carried by the Majors is much smaller when dealing with cargo than when looking at passenger traffic. Whereas the 12 Majors have always transported about 90% of the passenger traffic, in 1999 their cargo traffic share was “only” 50% and it even declined during the period under analysis, down to 34.5% in 2004. This is only logical since these 12 Majors are primarily passenger airlines (see Section 4.1.2 for a deeper analysis apropos the weight of the cargo business for these airlines).

## 2.2 Capacity

On the supply side, the capacity – passenger capacity as well as cargo capacity – offered by the US airlines was also severely affected by 9/11 attacks. Indeed, faced with an overall decrease of the demand, the airlines adjusted their capacity to better match the market.

### 2.2.1 Passenger Capacity

The counterpart of a RPM from a supply point of view – *i.e.* from the airline point of view – is an *Available Seat-Mile* (or *ASM*). An available seat-mile is defined as one aircraft seat flown one mile. Figure 2-6 presents the variations in passenger capacity as measured in ASM for the two groups of Majors as well as for the whole US industry.

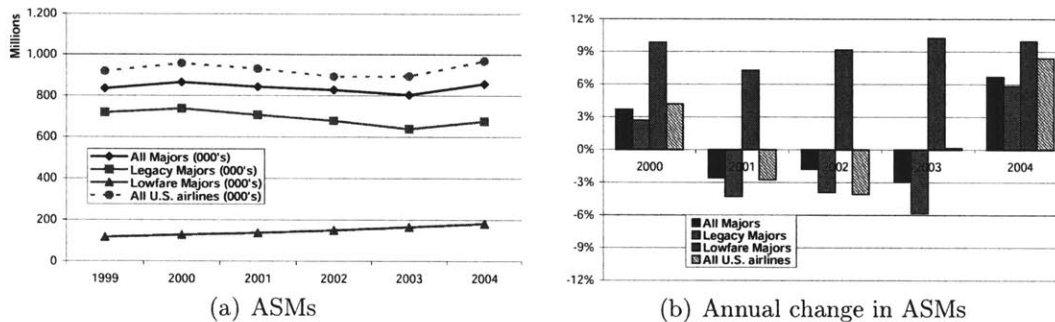


Figure 2-6: Available seat miles

Facing the challenges of the last few years, the two subsets of Majors used very different strategies. While legacy airlines cut capacity, lowfare carriers kept expanding. The data regarding annual change presented on Figure 2-6 show that in 2001, 2002 and 2003, Legacies reduced their capacity by approximately 5% each year. Therefore, even though they were back to expansion in 2004 (+5.8%), the resulting change in capacity for the period 2000-2004 is a 13.4% cut. An important point to notice is that capacity adjustments were delayed with respect to changes in traffic (see Figure 2-7).

During the same period of time, the Lowfares never stopped expanding. One can hardly notice a deterioration in the rate of growth of their capacity immediately after the terrorist attacks with +7.3% and +9.2% in 2001 and 2002 instead of about +10% in 2000, 2003 and 2004.

When compared to the changes for the whole industry during the same period of time (see Figure 2-6(b)), the Legacies were below the total average. Legacies' passenger capacity did not grow as fast as the whole industry and, during the crisis, it declined more.

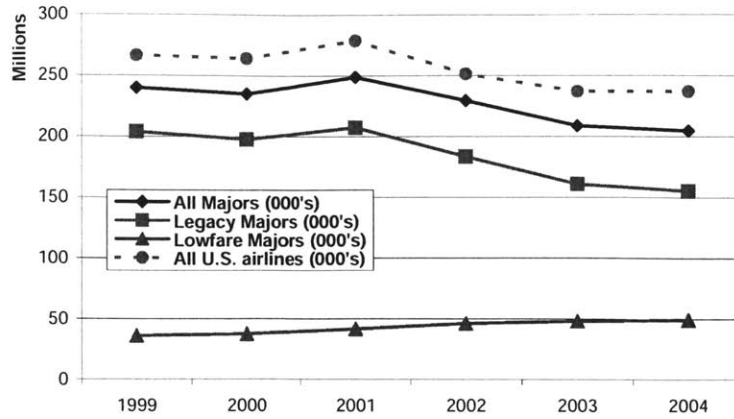


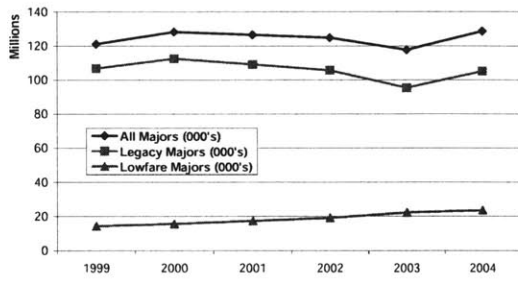
Figure 2-7: Extra capacity (ASMs-RPMs), by group

Figure 2-7 illustrates the delay between demand reduction (RPMs) and capacity adjustments (ASMs) for the whole industry as well as for the group of Majors and the subset of Legacies. In 2001, most airlines were not able to reduce their passenger capacity fast enough to match the drop in demand. Therefore, extra capacity – as measured by the gap between ASMs and RPMs – peaked in 2001 for these airlines. Since then, extra capacity has been reduced below 2000 levels. Concerning the Lowfares, Figure 2-7 shows that the growth of their capacity was stronger than the gain in the demand they experienced. As a result, extra capacity in nominal value, *i.e.* in passenger-miles, increased. Note however that in Section 2.3.1 it is shown that extra capacity as measured in percentage of capacity actually decreased between 1999 and 2004.

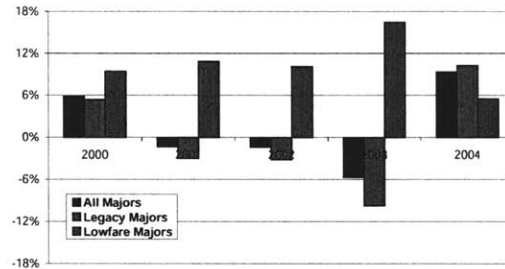
## 2.2.2 Total Capacity

To take into account the whole capacity – *i.e.* not only the passenger capacity but also the cargo capacity – a very commonly metric one can look at is the number of *Available Ton Miles* (or *ATMs*). An available ton-mile is defined as one aircraft ton flown one mile. Similarly to the ASMs that are the counterpart of the RPMs, the ATMs are the counterpart of the RTMs previously defined.

Figure 2-8 does not differ much from Figure 2-6 in terms of variation trends. This is only logical to the extent that the Majors are essentially passenger airlines, not cargo airlines. Thus, any change in ATMs is closely related to a similar change in ASMs.



(a) ATMs



(b) Annual change in ATMs

Figure 2-8: Available ton miles

## 2.3 Characteristics of the Traffic

By looking beyond the figures reported in the DOT Form 41 and combining them, a lot of information regarding the traffic can be extracted. This information is really valuable in the sense that it helps to better understand the characteristics of the traffic and answer some key questions such as:

- What type of assets are used to create the supply?
- How well does the airline match its supply with the demand?
- What are the characteristics of the routes operated by the airline?

### 2.3.1 Average Load Factor

The most widely used way of comparing the demand and the supply for an airline is to look at the *Average Load Factor*. The average load factor is simply defined as the ratio of what is really used (the traffic) over what is available (the capacity). In other words, the load factor is the portion of the supply that effectively generates revenues. By providing useful information regarding how much the aircraft are filled, the average load factor can help an airline to answer a fundamental question: how well does my supply match with the market demand?

A load factor can be defined for the passenger side of the traffic. This metric is usually called the *Average Passenger Load Factor* and shortened to *ALF*. The system-wide average load factor is simply computed by dividing the RPMs by the ASMs. From the aircraft point of view, the passenger load factor is simply the percentage of seats filled<sup>4</sup>.

At this point, it may be relevant to emphasize that one should be really cautious when interpreting figures regarding the load factor. Yes, everything else being equal, a high load factor is a good performance. But the load factor in itself does not provide many insights into how well an airline is doing to the extent that an airline can easily fill its aircraft and virtually boost its load factor by selling tickets at extremely low fares. As an example, one could think of a leisure route – *i.e.* a route on which a vast majority of the demand is created by passengers traveling for leisure – with a 90% load factor “competing” with a business route – *i.e.* a route on which the demand from business travelers is substantial – with a much lower load factor, say 60%. Since business travelers usually pay much higher fares than leisure travelers because they do not buy exactly the same product (more amenities, more flexibility to change dates, last-time ticket . . .), the second route may actually be more profitable for this airline even though it has a much lower load factor<sup>5</sup>.

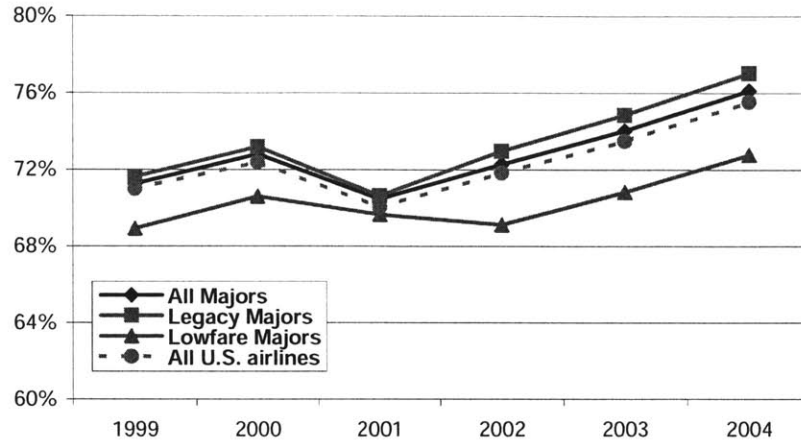
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<sup>4</sup>Note that for the total traffic – passenger and cargo – one can define a load factor from RTMs and ATMs.

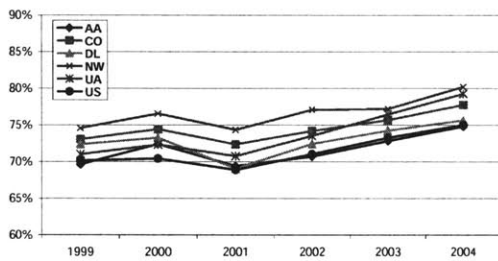
<sup>5</sup>Because of the complexity of airlines’ network, it is actually really difficult, if not impossible, to



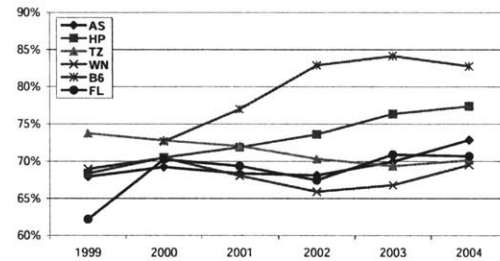
The changes in passenger load factor along the period 1999-2004 is depicted on Figure 2-9 for the different groups of airlines and for the whole US industry (Figure 2-9(a)) but also for each airline individually (Figures 2-9(b) and 2-9(c)). Individual data are useful to point out the differences that may exist within the groups.



(a) By group



(b) Legacy carriers



(c) Lowfare carriers

Figure 2-9: Average passenger load factor, by group and by airline

The overall trend is an increasing load factor. This was true before 2001 – the figure does not show any result before 1999 but data from [6] support this claim – and from 2002. An interruption of this escalation can be observed in 2001. As a matter of fact, after 9/11 events, airlines were not able to cut capacity fast enough to follow the steep decrease in demand. Yet, the passenger load factor gained about 10 percentage points during the last decade, including 5 percentage points for the period 1999-2004. Figure 2-9(a) reveals that from a load factor point of view, the 12 Majors represented very well the whole industry. The main reason is probably that the passenger load factor is computed from two metrics (ASMs and RPMs) that are passenger specific. Therefore, the performance of the cargo airlines does not impact the passenger load factor for the whole industry. Actually, since legacy carriers were one order of magnitude bigger than Lowfares (see Section 2.1.1), this claim is still true when looking only at the subset of the Legacies. Even though the Legacies' passenger load factor was slightly above the average for the whole industry, its variations were

compute the real marginal profitability of a given route.

really similar. Note that the variations for the lowfare subsets are slightly different, with 2 consecutive years of decline.

Concerning more specifically the network carriers, it is worth noticing that the reasons of the growth in passenger load factor have not always been the same. Before the terrorist attacks, the load factor raised because RPMs were increasing faster than ASMs. On the contrary, in 2002 and 2003 (in 2004, pre-2001 situation is back), the gain in load factor must be attributed to a higher annual decrease rate for ASMs than for RPMs (see Figures 2-2(b) and 2-6(b)).

As regards the difference between the two subsets of Majors, one can notice that, on average, Lowfares' aircraft were less filled than those of Legacies. Yet, this is only true on average, since individual results show that the passenger load factor was very different among the Lowfares (see Figure 2-9(c)). Whereas all legacy carriers laid in a 5% range, the gap between the extremes within the lowfare group was 13% in 2004 and it even peaked up to 17% in 2003.

It is also interesting to see how results presented on Figure 2-9(c) support the previous claim concerning the "insignificance" of load factor in itself. Indeed, JetBlue and Southwest were the most profitable airlines (see Section 4.2) and yet, they had very different load factor (actually they are the airlines above-mentioned, those at the extremes of the lowfare subset).

Pushing the analysis a bit further may help to understand some consequences of the 10 percentage point increase that has occurred during the last decade. From airlines point of view, such a gain is a decisive progress to the extent that, to generate the same amount of RPMs, airlines do not need as many aircraft as they used to. Basically airlines can reduce their fleet by about 9% and still satisfy the same demand (RPMs). If one assumes an unchanged average fare – which is not a weak assumption – carrying as much RPMs should generate as much revenues. On the cost side, a 9% reduction in fleet immediately translates, at least theoretically, into a 9% reduction in *Direct Operating Costs (DOC)*<sup>6</sup>. Decreasing ASMs is a very basic way of improving profitability by cutting the costs without changing too much the revenues. It is all about improving aircraft related productivity. In that sense, this section regarding the load factor could have been a part of the productivity section (Section 3.3). But, since the load factor is the best metric to compare traffic and capacity, analyzing it at this point of the study is also fully relevant. Many reasons can explain the gain in passenger load factor.

- Improvements in the demand forecasts may have helped the airlines to optimize route planning and schedule development<sup>7</sup>.

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<sup>6</sup>The DOC are all the costs related to the flight in itself such as flying operations costs, aircraft and traffic servicing costs, maintenance (see Chapter 3 for more details).

<sup>7</sup>Route planning concerns the choice of the routes to be operated, whereas schedule development includes frequency planning, timetable development, fleet assignment and aircraft rotations.

- More efficient differential pricing and revenue management may also have contributed to that trend.
- More accurate overbooking is another possible explanation.

### 2.3.2 Average Seating Capacity

The *Average Seating Capacity* is defined as the average number of seats by aircraft departure and is computed from the data of Form 41 by dividing the number of ASMs by the number of miles flown by aircraft. It could be observed that multiplying the average seating capacity by the load factor yields the average number of passengers per departure.

The changes in seating capacity for the 12 Majors are illustrated on Figure 2-10. Note that the performance for the whole industry does not appear on this figure since computing the average seating capacity for the whole industry would not have been fully relevant. As a matter of fact, aircraft miles are generated by both passenger airlines and all-cargo airlines, whereas only passenger airlines produce ASMs. Therefore, comparing these two measures for a group composed of both types of airlines does not make much sense.

Among the Majors, the average seating capacity did not change significantly over the period under concern. The most important information provided by this graph is the difference between the two groups of Majors. On average, the Legacies operated aircraft 20% bigger – in terms of seat capacity – than the Lowfares. Part of the explanation lies in the fact that the Majors, and particularly the Legacies, do not operate many regional routes. They usually offer service on short and medium haul routes to their customers under codeshare agreements with regional airlines<sup>8</sup>. Another explanation has to do with the international routes and more particularly the transoceanic ones that require larger aircraft to be flown. Indeed, all the legacy airlines offer international routes, with transoceanic flights. In contrast, none of the 6 lowfare Majors fly such long flights. Their international routes are often limited to Central America.

Note that for a given type of aircraft, lowfare carriers usually operate with higher seating capacity since they generally do not offer first class seats that require more room than coach seats. Thus, the difference between the two groups of airlines is very likely to be even bigger in term of real aircraft size<sup>9</sup> than what can be observed in term of seating capacity.

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<sup>8</sup>In 2003, 99% of regional airline passengers traveled on flights that were codeshared with a major carrier[15].

<sup>9</sup>The average aircraft size can be estimated by dividing the total capacity (ATMs) by the total number of aircraft-miles.

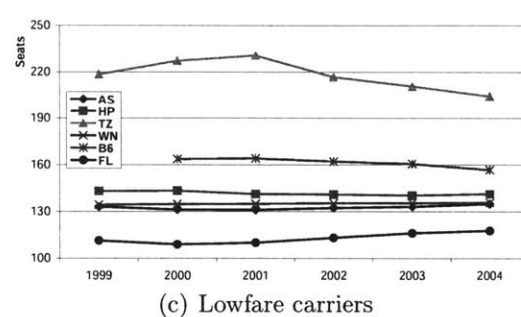
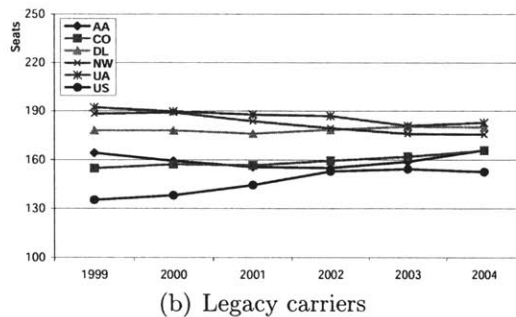
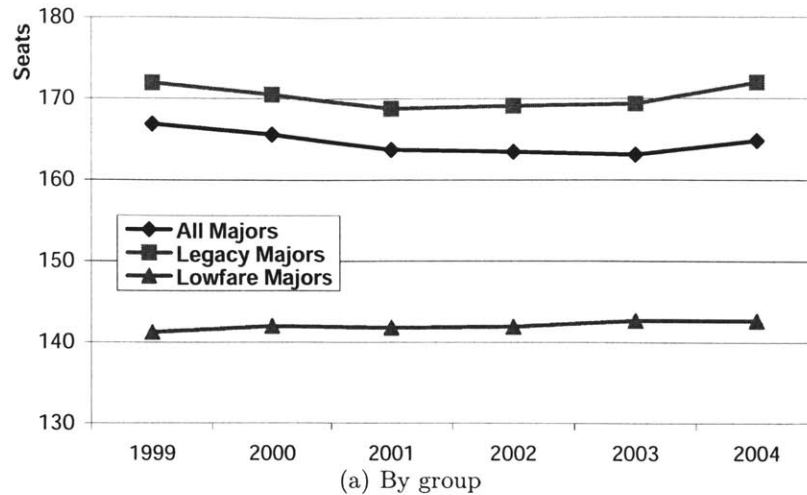


Figure 2-10: Average seating capacity size, by group and by airline

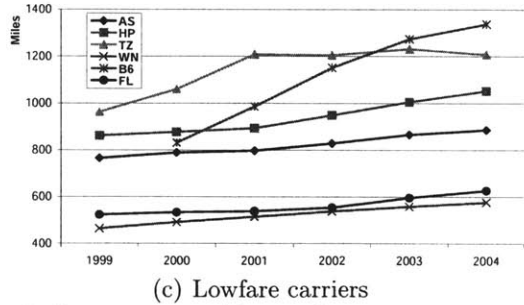
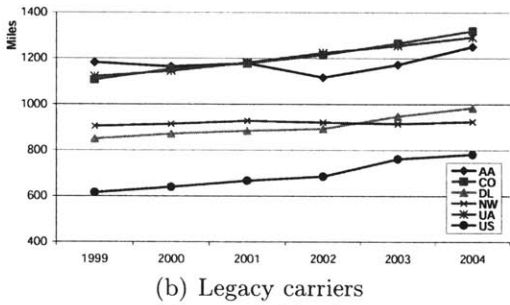
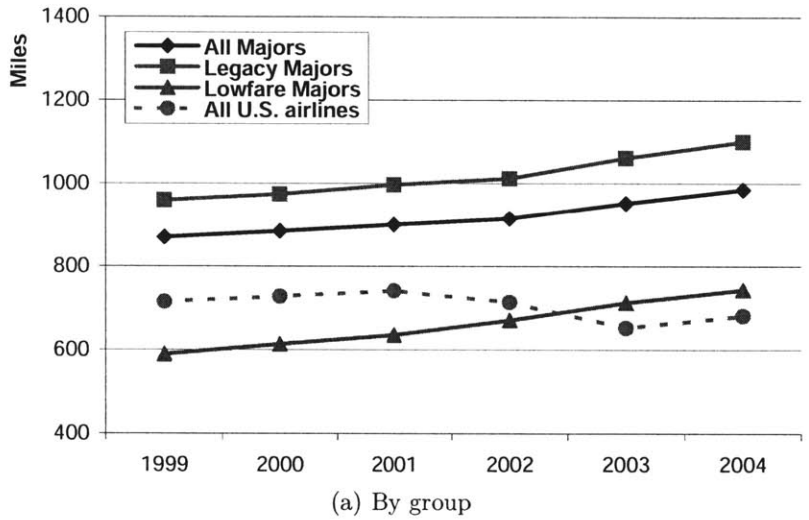
### 2.3.3 Average Stage Length

The stage length is the distance traveled by an aircraft from takeoff to landing. Therefore, the *Average Stage Length (ASL)* is computed from the data of Form 41 by dividing the total number of miles flown by aircraft by the total number of departures.

This metric is of first importance in the airline industry since the ASL may largely influence financial and operational (productivity) results. Therefore, the influence of the average stage length on airlines' results is discussed more in depth in the remainder of this thesis. For instance, concerning the interaction between ASL and unit cost, some economic basics help to understand why flying further may be a good way to lower the unit cost. In the airline industry, operating costs include substantial fixed costs (such as servicing costs and landing fees) that do not really depend on the distance flown. The longer the stage length, the more these costs are spread over the flight and thus, the smaller the unit cost. Note that in practice, facts do not always support this.

Even though it is an important characteristic of an airline's operations, the ASL

is a poor indicator of an airline's profitability. In other words, there is not an optimal stage length that can ensure an airline to be profitable. A comparison of CO and NW's situations supports quite well this claim. While CO and NW are the Legacies that were the least unprofitable between 1999 and 2004 (see Section 4.2), they almost ranked at the extremes of the legacy group when dealing with the ASL (while CO quite led the way between 1999 and 2004, NW were 4<sup>th</sup> until 2002 and then retrograded at the 5<sup>th</sup> rank). A similar statement can be made regarding the lowfare airlines. In 2004, B6 and WN were the airlines with respectively the longest and the shortest ASL among the 12 Majors. However, they were also the two most profitable lowfare carriers.



(b) Legacy carriers (c) Lowfare carriers  
 Figure 2-11: Average stage length, by group and by airline

Among the Majors, the trend was to fly longer stage. This was true for each one of the 12 Majors. All of them operated longer flights in 2004 than in 2000. And the gain was substantial, with on average +12.9% for the network carriers and +21.2% for the lowfare carriers. Despite a faster growth for the lowfare Majors – probably due to a 60% increase from B6 – the Legacies still operated longer flights than their lowfare competitors in 2004 (about 50% longer). This is mainly due to the transoceanic flights operated by the Legacies.

As explained above, airlines' wish to increase stage length is easily understandable in the sense that increasing stage length is a quite straightforward way of lowering the unit cost. That is why following 9/11, many Majors turned over shorter routes and contracted with regional airlines for the operations of these routes.

In contrast to what happened for the Majors, the whole industry experienced a 6.5% drop between 2000 and 2004 (from 728 to 681 miles). Indeed, the 12% decrease in 2002 and 2003 was partially offset by a slight growth in 2004. The rationale for this decreasing ASL may be the tremendous growth experienced by regional jets in the US. Registration data from FAA show that about 1,100 regional jets were registered in 1999 *versus* more than 4500 in 2003<sup>10</sup> [14]. These regional jets are on average smaller than jets operated by the Majors. And also, their range is much lower – *i.e.* they are not able to fly as far – and thus, they are operated on shorter segments.

### 2.3.4 Average Length of Passenger Haul

The *Average Length of Passenger Haul (ALH)* or *Average Length of Passenger Segment Trip* is the distance traveled by a passenger on a single flight number, *i.e.* with one coupon. Its average is computed from the data of Form 41 by dividing the RPMs flown by aircraft by the total number of enplanements. The variations in ALH for the Majors are set out on Figure 2-12. Note that there is no curve for the whole industry to the extent that computing the ALH for the whole industry is not fully relevant (see Section 2.3.2 for more detailed explanation).

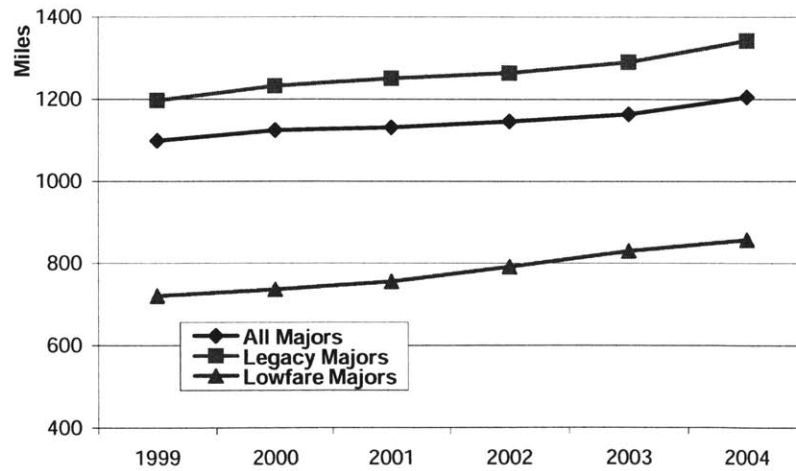


Figure 2-12: Average length of passenger haul, by group

<sup>10</sup>The regional jets considered to compile these data are: the Bombardier CRJ100, CRJ200, CRJ700 and CRJ900, the Embraer EMB135 and EMB145, and finally the BAE145 of British Aerospace.

The results for the average length of passenger haul (Figure 2-12) look like those for the average stage length (Figure 2-11). One can observe very similar variations – in direction as well as in amplitude – and the same ranking – legacy Majors had the longest passenger trip segment, then came the group of Majors and finally the Lowfares. One can also notice that each group of airlines had a higher ALH than its ASL. This is only logical when recalling that a passenger haul (defined by a single coupon) may be composed with multiple stages.

Note: From the two previous metrics, the *Average Number of Legs per Passenger Haul* can be computed by dividing the average length of passenger haul by the average stage length. It should be underlined that this measure, though interesting, does not provide as many insights as another metric that cannot be easily computed using data from Form 41, namely the *Average Number of Legs per Passenger Trip*<sup>11</sup>.

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<sup>11</sup>This metric may be helpful to better understand an airline's route structure and its operating model: *point-to-point* networks *vs.* *hub-and-spoke* networks.

## 2.4 Chapter Summary

After a drop in 2001, the total US passenger traffic remained at these low levels in 2002 and then rebounded as soon as 2003, partly because of the growth in regional traffic. Regarding the passenger traffic carried by the subset of Majors, it did not rebound as early and was back to growth only in 2004. During the same period of time, the traffic carried by the Lowfares increased substantially and therefore the Lowfares gained significant traffic share. Regarding the cargo traffic, its rebound occurred even earlier. But the Legacies did not really benefit from this fast recovery and lost about 15 percentage point of cargo traffic share. During the same period of time, Lowfares slightly expanded their cargo business but, even in 2004, their traffic share remained quite insignificant.

Faced with an overall depressed demand, the two subsets of Majors used very different strategies. While the Lowfares kept expanding their capacity, the Legacies first reduced their capacity, with some delays though, to better match the depressed demand. In 2004 however, Legacies started increasing their capacity in response to the rebound in demand.

Some interesting trend can be noted concerning the characteristics of the traffic. The passenger load factor increased for almost every Major between 2000 and 2004, peaking at 77% on average for the Legacies in 2004, and 73% for the Lowfares. Whereas the average aircraft size did not change significantly, the length of the average stage flown by the Majors increased substantially since it gained about 150 miles between 1999 and 2004 for both types of airlines. It is also worth highlighting that on average, Legacies operated bigger aircraft, on longer distance. On the contrary to what happened for the subset of Majors, the average stage length decreased for the whole industry, because of the tremendous growth of regional jets in the US.



# Chapter 3

## Costs & Productivity

In this chapter operating costs incurred by carriers are described. Those cost items are the expenses that are directly associated with the operations of an airline's air services. *Operating Costs* (or *Operating Expenses*) are only a part of the total costs incurred by airlines since total expenses also include non-operating expenses. For some airlines, non-operating expenses may have a major impact on their financial results but the nature of these items is very particular for each airline. As a result, inter-airline comparisons of net profits – in contrast to operating profits – or of total costs are of little value. That is why the analysis of this chapter is exclusively focused on operating expenses.

Faced with an unprecedented set of challenges since 2001 – decline in business travel, terrorist attacks of 9/11, the Severe Acute Respiratory Syndrome (SARS) epidemic in early 2003, and rising fuel prices – airlines, and more particularly network airlines, have been forced to initiate cost-cutting measures to balance the significant loss of operating revenues.

In the first section, it is shown that, as a group, the legacy airlines reacted to this increasing pressure by cutting their total operating costs by almost 9% between 2001 and 2003. During the same period, lowfare airlines' operating expenses increased due to the growth of their capacity. To allow for airline-by-airline comparisons, analyses based on the unit cost are also incorporated into this section.

In the second section, these expenses are broken down so as to emphasize cost structure differences between airlines. This categorization shows for instance that cost-cutting efforts introduced by legacy airlines were particularly focused on commission costs. Another important result is that between 1999 and 2004, the Legacies incurred higher unit costs in almost every facet of their operations – if not all of them.

The data used in this analysis are extracted from the Form 41 reports and more

precisely from the Schedules P-1.2, P-5.2, P-6.0 and P-7.0 respectively entitled *Statement of Operations*, *Aircraft Operating Expenses*, *Operating Expenses by Objective Grouping* and *Operating Expenses*. In theory, since the DOT imposes a standard system of accounts for the Form 41, data should be fully comparable over airlines as well as over the time. In practice, financial data are less “uniform” than data related to traffic since different accounting methods and cost allocation schemes are employed by the airlines. This contributes to make inter-airline comparisons sometimes not fully accurate.

The last section deals with productivity among the Majors. Productivity issues are investigated from three angles. Since labor costs represent the single largest operating costs, labor productivity is first analyzed. The analysis is then focused on airplane productivity. And finally, the changes in fuel efficiency are inspected. The results presented in this section show that on average, airlines did improve the way they used their assets.

### 3.1 Operating Costs

As suggested by the designation, *Operating Costs* are the part of total expenses that can be directly ascribed to the operations of an airline's air transportation services. In the first part of this section, the trends for these expenses are investigated. The *Unit Cost* is then investigated so as to better appreciate to what extent the variations in expenses are the result of variations in capacity,

#### 3.1.1 Total Operating Costs

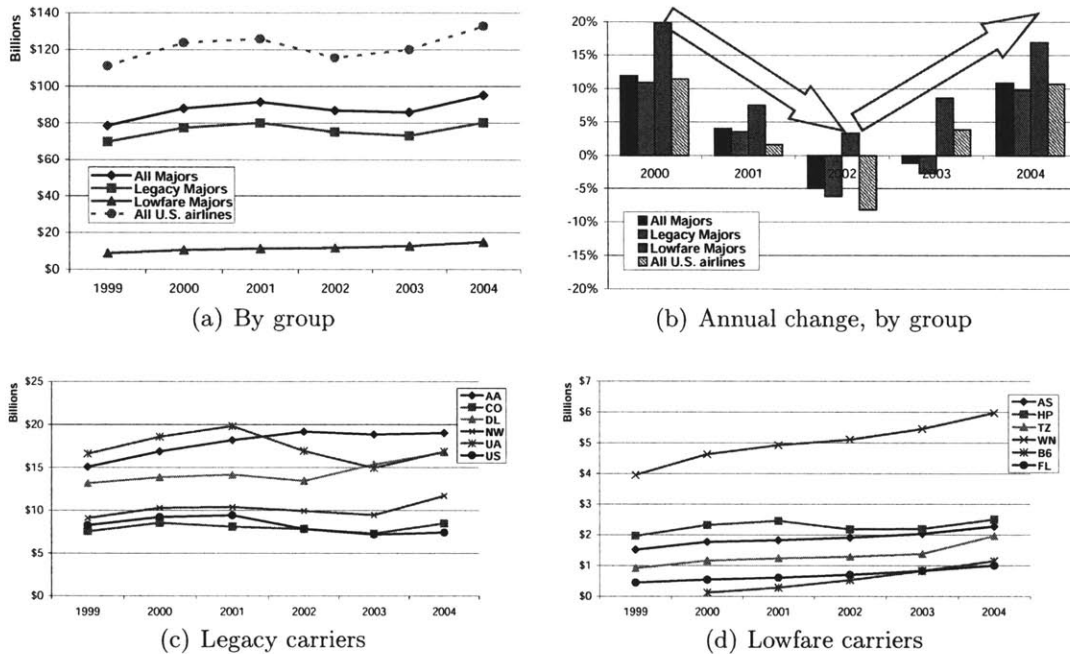


Figure 3-1: Total operating expenses, by group and by airline

During the two years that followed the terrorist attacks of 2001, the legacy airlines did reduce their operating costs, resulting in a 8.8% drop between 2001 and 2003. But they were not able to sustain their efforts enough to keep operating expenses decreasing in 2004. Indeed, in 2004, the Legacies as a group spent about as much money in operations as in 2001. Yet it may be emphasized that among the Legacies, the variations were quite different. Figure 3-1(c) illustrates the disparity among this group. While UA severely cut its operating expenses in 2002 and 2003, AA kept expanding its operating costs in 2002 and then, stabilized them. On the lower side, CO's operating costs did not change much between 1999 and 2004.

On the contrary, the costs for their lowfare competitors had never stopped escalating for the period under concern resulting in a 41% increase between 2000 and

2004. Such an increase is hardly surprising given the capacity growth experienced by the lowfare airlines (see Chapter 2). One can however notice that the growth slowed down during the peak of the crisis, *i.e.* in 2001, 2002 and 2003, with annual growth rate below 9%.

The two big arrows on Figure 3-1(b) illustrate the similarity in the variations experienced by all the groups. For each group (Majors, legacy Majors, lowfare Majors or the whole US airline industry), operating expenses rate of growth decreased in 2001 and 2002 – and eventually became negative for all groups but the lowfare one – and then, increased again in 2003 and 2004 to recover 2000 levels.

### 3.1.2 Unit Cost

The above analysis does not say much concerning the performance of the airlines to the extent that increasing expenses may result from an increase in production – *i.e.* capacity in the case of an airline – or from an inability to control the costs. Similarly, costs reductions may be explained by real savings – for instance because the productivity is improved – or by cuts in capacity. Consequently, it is important to compare the changes in operating expenses to the changes in the quantity of output that has been created using these costs. To do this, a commonly used metric is the *Unit Cost* that is defined, for the airline industry, as the ratio of the total operating costs and the ASMs<sup>1</sup>. Unit cost is often shortened to *CASM*, that stands for Cost per ASM.

Figure 3-2 and Table 3.1 illustrate the trend for the CASM from 1999 to 2004. Note that the performance of the whole industry is not presented because computing an average unit cost for all US airlines would not have made sense. Indeed, unit cost is built from a combination of a passenger airlines related metric (ASMs) and a general metric (operating costs) that takes into account both the passenger airlines and the all-cargo airlines (see Section 2.3.2 for more explanations).

Figure 3-2 reveals several important trends. The main observation is that the variations in unit cost did not match exactly the changes in operating costs, which is only logical since capacity evolved during this period. Regarding the legacy group, while operating costs annual growth decreased between 2000 and 2001 (from about 11% to less than 4%), CASM annual growth did not really change (about 8% both for 2000 and 2001). The difference is due to cuts in capacity that did not immediately translate into cuts in costs because of fixed costs. In 2002, Legacies did finally succeed in contracting their operating expenses and, because this contraction was stronger (in percentage) than that in capacity, it translated into a decline of the unit cost

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<sup>1</sup>This new metric is built from the operating costs. Therefore it would have been more accurate to call it *Unit Operating Cost* but, for the sake of simplicity, the shorter designation is used in this document.

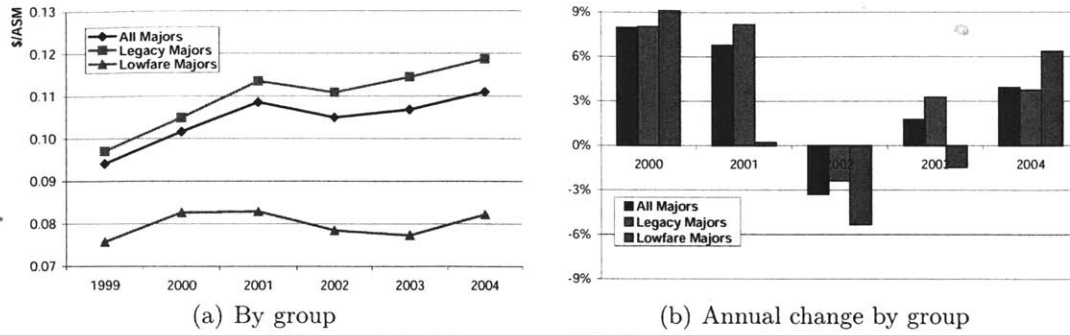


Figure 3-2: Unit cost (CASM) by group

(about  $-2.4\%$  on average for the legacy group). But the decrease did not last and in 2003 the CASM was back to growth. Concerning the Lowfares, as detailed previously, their capacity has never stopped expanding, and in turn their operating expenses. But while maintaining an approximate 10% annual growth rate for capacity, they were able to reduce the annual increase in operating expenses from 20% in 2000, to slightly less than 3.5% in 2002, and back to 17% in 2004 (see the big arrows on Figure 3-1(b)). Thus, their CASM did not change significantly between 2000 and 2001, then decreased between 2001 and 2003 ( $-10\%$ ) and started to grow again in 2004. When looking at the whole period 2000-2004, the variation in CASM is slightly negative ( $-0.6\%$ ) for the Lowfares.

Another point that is worth noticing is that the airlines referred to as the lowfare carriers had, on average, a lower unit cost than the network carriers. This observation supports a claim that was made in the introduction of this thesis: lowfare airlines do have lower costs. More importantly, because lowfare airlines were more successful in controlling their costs than their legacy competitors, the CASM gap widened between 1999 and 2004. From  $2.1\text{¢}/\text{ASM}$  in 1999, it reached  $3.6\text{¢}/\text{ASM}$  in 2004 (or from 22% to 30% in percentage of the Legacies' CASM). This divergence of unit cost is a really bad news for the Legacies. Indeed, because of a depressed demand, airlines had found extremely difficult to increase their revenues (see Chapter 4). Therefore unit cost competitiveness was key to profitability. Note however that the size of the gap may be somewhat overstated because a part of the increase of Legacies' unit cost since 2003 is due to the capacity purchased from regional airlines that translates into an increase in operating expenses without the corresponding increase in capacity (for more precisions, see Section 3.2 the paragraph concerning *Transport Related expenses*).

The results presented in Table 3.1 allow unit cost comparisons between airlines. From a general point of view, the first point to notice is that any Legacy has a higher CASM than any Lowfare. This is true with the exception of Alaska Airlines whose CASM is sometimes above those of the lowest legacy airlines. For instance, in 2000, AS's unit cost was  $10.2\text{¢}/\text{ASM}$  while it was below  $10.0\text{¢}/\text{ASM}$  for both DL and NW.

Table 3.1: Unit cost (in ¢/ASM), by airline

	1999	2000	2001	2002	2003	2004
<b>AA</b>	9.5	10.5	11.9	11.1	11.4	10.9
<b>CO</b>	9.5	10.2	10.0	10.1	9.6	10.1
<b>DL</b>	9.1	9.4	10.0	10.3	12.8	12.9
<b>NW</b>	9.1	9.9	10.5	10.6	10.6	12.8
<b>UA</b>	9.4	10.6	12.0	11.4	10.9	11.6
<b>US</b>	13.9	13.8	14.1	13.9	13.9	13.7
<b>AS</b>	8.8	10.2	10.2	9.9	9.8	10.2
<b>HP</b>	7.6	8.6	9.3	8.1	7.9	8.3
<b>TZ</b>	6.4	7.3	7.7	7.4	6.8	9.5
<b>WN</b>	7.5	7.7	7.5	7.4	7.6	7.8
<b>B6</b>		8.8	6.7	6.4	6.1	6.1
<b>FL</b>	7.8	9.2	9.2	8.5	8.2	8.4

US's results are also worth detailing. US was able to keep its unit cost pretty much unchanged, making the airline an exception within the legacy group. This could be an excellent performance if the airline did not start the race with a 4.5¢/ASM handicap over its fellow Legacies in 1999. As a result, in 2004 the airline still had by far the highest CASM but it closed most of the gap with other Legacies. In particular, DL's and NW's unit cost, that surged respectively in 2003 and in 2004, were getting closer to US's one.

As concerns the lowfare carriers, all of them but ATA succeeded in preventing their unit cost from escalating. With the exception of ATA, every single Lowfare was able to keep its unit cost unchanged, or even to contract it, between 2000 and 2004. Unquestionably, the best performance must be awarded to JetBlue. Starting its operation with a 8.8¢/ASM unit cost in 1999, the airline reported a unit cost down to 6.1¢/ASM in 2004 – the lowest CASM among the 12 Majors. ATA's case is by far different. Between 2003 and 2004, ATA's CASM jumped from 6.8¢/ASM – the second best result among the Majors – to 9.5¢/ASM, which represents a 40% jump. This may be understood when recalling that ATA filed for Chapter 11 bankruptcy on October 2004 and that the way airlines report their expenses the year they file for bankruptcy protection is usually altered so that they can initiate their restructuring on a better basis. Consequently, ATA's CASM results for 2004 should not be considered as accurate.

As useful as it may be, the unit cost metric is actually not sufficient to understand the differences between airlines. Indeed, for a wide variety of reasons, unit cost declines dramatically when the stage length increases. Thus taking this effect into account is a *sine qua none* for the comparison among carriers.

On Figure 3-3, unit cost is plotted against the average stage length for each one of the 12 Majors, both for the years 2000 and 2004. For each airline, an arrow indicates

the direction of variation (from 2000 to 2004). By taking into account the stage length, this figure makes comparisons between airlines relevant.

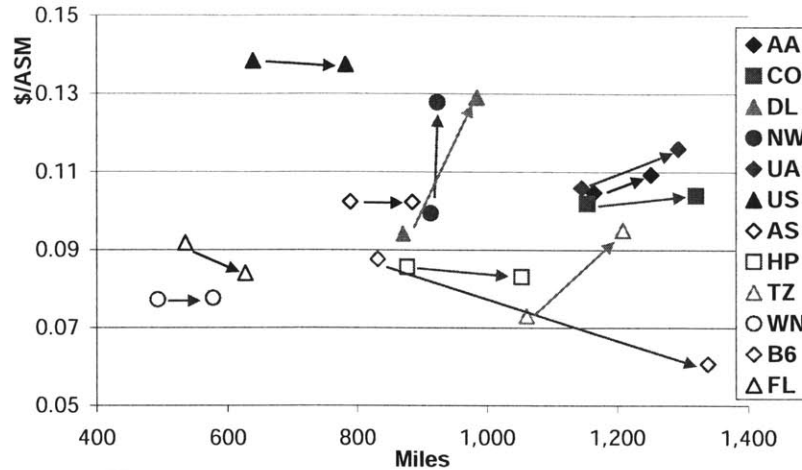


Figure 3-3: Changes in unit cost and average stage length, 2000 vs. 2004

Figure 3-3 illustrates very well two of the most important changes that have occurred over the last few years in the airline industry. Those trends, that were already analyzed in this thesis, are the following. First, aircraft flew on average a longer stage in 2004 than in 2000. And for the same period of time, unit cost went upward for the Legacies and downward – or at least remained constant – for the Lowfares (with the exception of TZ). Individual analyses reveal some divergences between airlines. The most striking change involves B6 on one side, and DL and NW on the opposite side. Between 2000 and 2004, B6’s unit cost dropped from 8.8¢/ASM to 6.1¢/ASM, which can be explained, at least partially, by a tremendous increase of its stage length, from 831 to 1,338 miles. DL’s and NW’s performances are far from being as encouraging, especially for DL. Both the airlines have seen their average stage length increase slightly but neither of them was able to control its unit cost (from 9.9¢/ASM to 12.8¢/ASM for NW and from 9.4¢/ASM to 12.9¢/ASM for DL). Thus, it is hardly surprising that both the Legacies filed for bankruptcy protection on September 2005.

As explained above, all expenses related to capacity purchase from regional airlines are taken into account to compute the operating expenses<sup>2</sup> but the corresponding capacity is ignored when evaluating the ASMs [11]. This may bias comparisons between airlines, and especially between the two groups of airlines (legacy airlines are much more likely to purchase regional capacity than lowfare airlines). Therefore, an analysis based on CASM ex-Transport Related expenses may be more relevant. Figure 3-4 is the equivalent of Figure 3-3 for CASM ex-Transport Related expenses.

The differences between Figures 3-3 and 3-4 are not very significant for airlines

<sup>2</sup>These expenses are accounted in the item called *Transport Related expenses*. See Section 3.2 for more details.

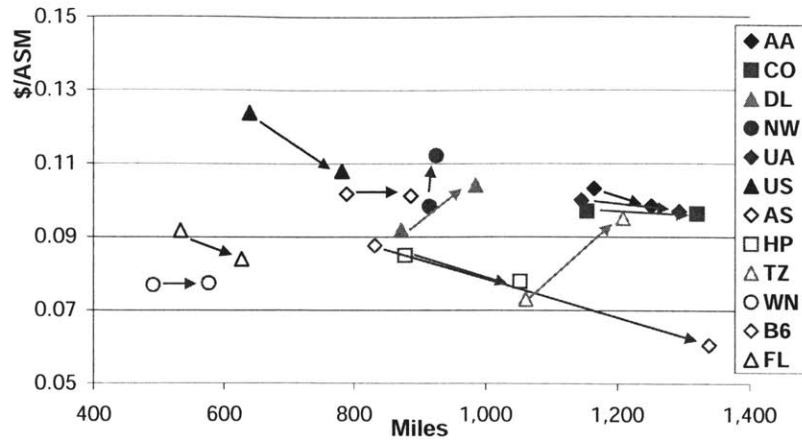


Figure 3-4: Changes in unit cost ex-Transport Related expenses and average stage length, 2000 *vs.* 2004

from the lowfare group but they are substantial for their legacy competitors. Figure 3-4 shows that most Legacies did actually reduce their unit cost ex-Transport Related expenses (US's performance is particularly worth noticing) with the exception of DL and NW. Regarding these two airlines, Figure 3-4 shows that the increase in unit cost is highly reduced when removing the bias of Transport Related expenses.



## 3.2 Breakdown of Operating Expenses

From the previous section, it is now obvious that the Legacies have a higher unit cost than the Lowfares. This said, it could be interesting to discover the origin of this extra cost. A good way to explore this issue is to break down and categorize costs. There are many ways airlines' operating costs can be categorized, depending on the purpose of the analysis. In this section, it was decided to categorize costs according to the functional cost categorization from the Schedule P-1.2 of DOT Form 41.

A brief explanation of each one of the 8 items of this classification is given below. This explanation is based on definitions found in [1, 6, 3]. The way these items varied is then analyzed, first from a general point of view (*i.e.* as a percentage of the total operating cost), and then on an individual basis.

**Flying Operations:** This function includes “expenses incurred directly in the in-flight operation of aircraft and expenses attaching to the holding of aircraft and aircraft operational personnel in readiness for assignment to an in-flight status” [1]. This element includes all costs associated with flight crew, fuel costs as well as airport and en-route charges.

**Maintenance:** Maintenance expenses are “all expenses, both direct and indirect, specifically identifiable with the repair and upkeep of property and equipment as may be required to meet operating and safety standards” [1]. It then follows that this element covers both routine maintenance and more extensive major checks. The two major cost areas encompassed by this item are the very extensive use of labor and the consumption of spare parts.

**Passenger Service:** The costs of this function are the costs of “activities contributing to comfort, safety and convenience of passengers while on flight and when flights are interrupted” [1]. This includes salaries and expenses of flight attendants and passenger food expenses (either on board or on ground, when the flight is delayed or canceled).

**Aircraft & Traffic Servicing:** This function includes “the compensation of ground personnel and other expenses incurred on the ground incident to

- the protection and control of the in-flight movement of aircraft,
- scheduling and preparing aircraft operational crews for flight assignment,
- handling and servicing aircraft while in line operation,
- servicing and handling traffic on the ground subsequent to the issuance of documents establishing the air carrier's responsibility to provide air transportation,
- and in-flight expenses of handling and protecting all non-passenger traffic including passenger baggage” [1].

**Promotion & Sales:** The expenses accounted in this function are those incurred in “promoting the use of air transportation generally and creating a public

preference for the services of particular air carriers – this includes the functions of selling, advertising and publicity, space reservations, and developing tariffs and flight schedules for publication” [1].

**General & Administration:** Costs allocated in this function are those that are truly general to the airline or those that cannot be associated to a particular activity.

**Depreciation & Amortization:** The expenses accounted in this function are “all charges to expense to record losses suffered through current exhaustion of the serviceability of property and equipment due to wear and tear from use and the action of time and the elements, which are not replaced by current repairs, as well as losses in serviceability caused by obsolescence, super-session, discoveries, change in demand or actions by public authority. It shall also include charges for the amortization of capitalized developmental and pre-operating costs, leased property under capital leases and other intangible assets applicable to the performance of air transportation” [1]. This function aims at spreading the cost of an asset – mainly an aircraft – over its lifetime. But this item also allows money out of each year’s revenues to be put into a general reserve fund. These monies can be used to pay back the loans with which the aircraft was bought.

**Transported Related:** Expense items accounted in this function are “all expense items applicable to the generation of transport-related revenues” [1]. They include, but are not limited to, fees paid to regional airlines partners for providing regional air service, extra baggage expenses, and other miscellaneous overhead. Note that since 2003, DOT has required airlines to report the amount they spent on capacity purchases from regional airlines as a transport-related costs but has not require airlines to report the corresponding amount of seat-miles that have been purchased [11].

Table 3.2 details the cost breakdown for each one of the 12 Majors, according to the categorization above presented while Figure 3-5 illustrates for each function the change in percentage of the total operating expenses between 2000 and 2004. The results presented on this figure are an average over the 12 Majors.

Note regarding Table 3.2: For TZ the data related to the Transport Related expenses are not available. Therefore TZ’s percentage are computed from the total operating costs ex-Transport Related expenses. It should yet be mentioned that since the Transport Related expenses account for a very small part of the total operating expenses of the Lowfares (less than 1% except for HP), the results should not be affected much by this approximation.

The results in Figure 3-5 as well as those in Table 3.2 must be analyzed as a whole, and should not be used to draw conclusions concerning one particular item. Indeed, a higher percentage for one particular category can be attributed either to

Table 3.2: Operating costs breakdown (in percentage), for 2000 and 2004

2000	2004	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004
------	------	------	------	------	------	------	------	------	------	------	------

Legacy Majors

	<i>AA</i>		<i>CO</i>		<i>DL</i>		<i>NW</i>		<i>UA</i>		<i>US</i>	
<b>Total Expenses (\$10<sup>9</sup>)</b>	16.87	19.03	8.54	8.48	13.86	16.77	10.29	11.70	18.59	16.87	9.23	7.42
<b>Flying Operations</b>	30.2%	33.0%	35.0%	35.5%	30.8%	31.8%	33.2%	33.3%	29.7%	29.0%	30.7%	29.2%
<b>Maintenance</b>	13.1%	10.2%	10.4%	9.3%	10.9%	7.3%	12.0%	8.0%	12.6%	10.8%	11.7%	9.9%
<b>Passenger Service</b>	13.1%	11.0%	10.0%	9.8%	12.1%	8.4%	9.9%	8.5%	12.2%	9.8%	9.2%	7.1%
<b>Aircraft &amp; Traffic Servicing</b>	17.5%	16.3%	17.7%	18.5%	18.2%	14.2%	20.2%	19.3%	15.5%	14.6%	16.7%	16.1%
<b>Promotion &amp; Sales</b>	14.3%	8.5%	13.4%	6.9%	12.0%	7.2%	14.4%	9.4%	13.9%	9.1%	11.7%	8.0%
<b>General &amp; Administration</b>	4.0%	5.2%	4.3%	7.9%	5.7%	5.3%	4.2%	3.5%	5.2%	5.2%	5.6%	5.4%
<b>Depreciation &amp; Amortization</b>	6.3%	5.9%	4.3%	4.7%	7.8%	6.5%	4.9%	5.6%	5.3%	5.1%	3.9%	2.9%
<b>Transport Related</b>	1.5%	10.0%	4.9%	7.4%	2.5%	19.3%	1.1%	12.2%	5.6%	16.4%	10.5%	21.4%

Lowfare Majors

	<i>AS</i>		<i>HP</i>		<i>TZ</i>		<i>WN</i>		<i>B6</i>		<i>FL</i>	
<b>Total Expenses (\$10<sup>9</sup>)</b>	1.77	2.28	2.32	2.51	1.16	1.97	4.63	5.98	.12	1.15	.54	1.00
<b>Flying Operations</b>	37.4%	39.8%	41.2%	46.1%	39.0%	40.5%	32.3%	35.6%	33.1%	40.2%	37.8%	53.5%
<b>Maintenance</b>	11.5%	10.5%	15.0%	12.1%	14.1%	6.4%	11.2%	11.7%	4.8%	8.9%	17.5%	9.3%
<b>Passenger Service</b>	8.8%	8.8%	7.9%	6.7%	11.7%	6.1%	6.4%	8.7%	6.3%	8.8%	4.8%	4.6%
<b>Aircraft &amp; Traffic Servicing</b>	17.0%	19.5%	12.9%	17.0%	12.0%	8.4%	16.5%	19.9%	19.3%	19.6%	16.4%	14.7%
<b>Promotion &amp; Sales</b>	14.0%	9.0%	14.4%	6.4%	7.4%	5.3%	14.1%	9.7%	19.1%	8.6%	13.7%	9.8%
<b>General &amp; Administration</b>	5.9%	5.7%	4.5%	3.3%	5.5%	30.2%	13.0%	6.8%	14.1%	7.0%	5.6%	6.6%
<b>Depreciation &amp; Amortization</b>	4.7%	5.6%	3.2%	2.2%	10.3%	3.1%	6.1%	7.3%	3.3%	6.6%	4.3%	1.5%
<b>Transport Related</b>	.6%	1.1%	.8%	6.3%	NA	NA	.4%	.2%	0%	.2%	0%	0%

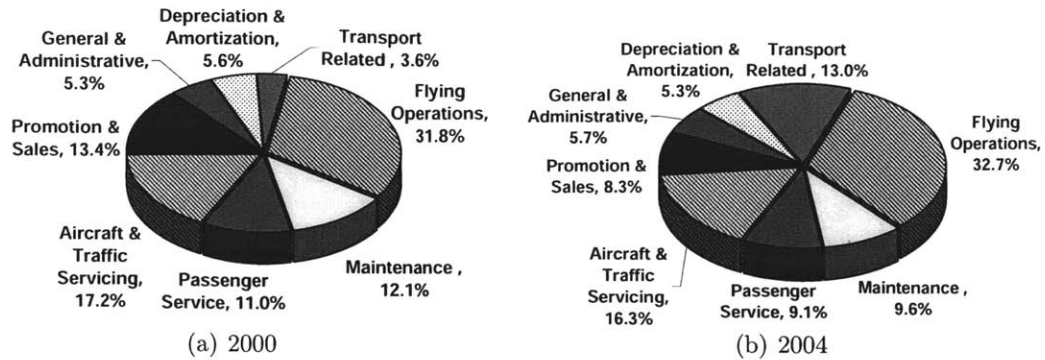


Figure 3-5: Operating costs breakdown for the 12 Majors in 2000 and 2004

a real increase of the absolute value of this item, or to a decrease of another item’s proportion. Therefore, any individual conclusion will be meaningless.

Figure 3-5 shows that between 2000 and 2004, several changes appeared in the cost breakdown in percentage terms. The main change was the substantial increase incurred on the Transport Related costs, from 3.6% to 13.0%. A more precise analysis shows that this trend was actually limited to the legacy Majors, with the exception of America West whose Transport Related costs jumped from less than 1% to more than 6%. This can easily be understood when recalling that since 2003, DOT has required airlines to report the amount they spent on capacity purchases from regional airlines as Transport Related costs. The Lowfares usually do not purchase much capacity from the regional carriers, and thus, they were less affected by this modification in accounting methods. This analysis is fully supported by year-to-year data (not presented in this thesis) that show that the portion of the costs accounted in the item called “Transport Related expenses” suddenly jumped between 2002 and 2003.

The second most noticeable change was the large drop for the Promotion & Sales costs, from 13.4% to 8.3% on average. Even more important is the fact that this trend was true for each one of the 12 Majors – with some differences in the magnitude of the decrease though. Since this diminution for the Passenger & Sales costs is also true when dealing with unit cost, it will be further explained in the section dedicated to this particular function.

Two other items, namely Maintenance and Passenger Service, followed quite the same trend. For most Majors, these items became less important, *i.e.* their percentage of the total operating costs contracted. The only Majors that differed from this trend are Southwest and JetBlue. For JetBlue’s maintenance costs, the increase probably comes from a fleet that was getting older. Indeed, when JetBlue started operations in 2000, its brand-new aircraft required only very little maintenance.

As for the remaining items – Flying Operations, Depreciation & Amortization, General & Administrative, and Aircraft & Traffic Servicing – their fraction in the

cost structure did not change significantly.

Figure 3-6 and Table 3.3 describe the changes in the unit cost breakdown for each group, between 2000 and 2004.

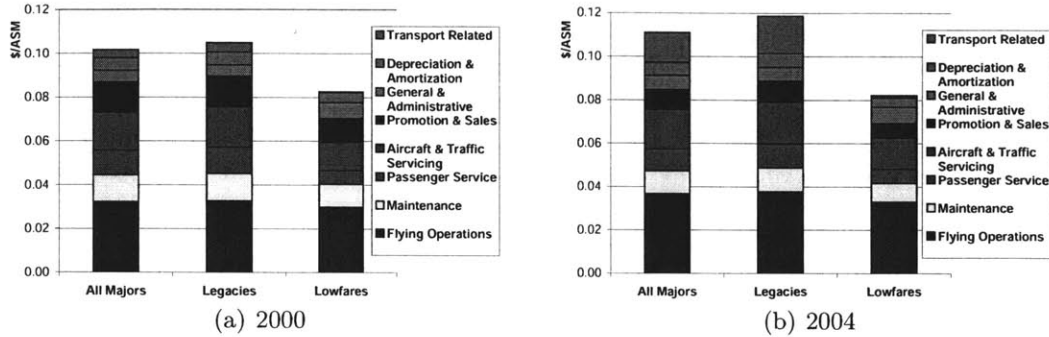


Figure 3-6: CASM breakdown, 2000 vs. 2004

Table 3.3: Unit cost breakdown in 2004 and variation for 2000-2004 (in  $\text{¢}/\text{ASM}$ )

	All Majors	Legacies	Lowfares
<b>Flying Operations</b>	3.7 (+0.5)	3.8 (+0.5)	3.3 (+0.3)
<b>Maintenance</b>	1.1 (-0.2)	1.1 (-0.2)	0.9 (-0.2)
<b>Passenger Service</b>	1.0 (-0.1)	1.1 (-0.1)	0.6 (=)
<b>Aircraft &amp; Traffic Servicing</b>	1.8 (+0.1)	1.9 (+0.1)	1.4 (+0.2)
<b>Promotion &amp; Sales</b>	0.9 (-0.4)	1.0 (-0.4)	0.7 (-0.4)
<b>General &amp; Administration</b>	0.7 (+0.1)	0.6 (+0.1)	0.8 (=)
<b>Depreciation &amp; Amortization</b>	0.6 (=)	0.6 (+0.1)	0.4 (=)
<b>Transport Related</b>	1.4 (+1.0)	1.7 (+1.3)	0.1 (+0.1)
<b>Total (CASM)</b>	11.1 (+0.9)	11.9 (+1.4)	8.2 (=)

When looking both at Figure 3-6 and Table 3.3, the most striking result is that, Legacies' costs were higher than Lowfares' in every single category. In other words, the legacy carriers incurred higher unit costs in every facet of their operations. This observation illustrates very well the fact that in 2004, the gap from a cost point of view that separated legacy and lowfare airlines was far from being bridged.

In the next paragraphs, the variations for each one of the 8 items are analyzed individually. For each category, the focus is directed towards the trend in unit cost based on results presented on Figure 3-6 and Table 3.3. Moreover, for the sake of the analysis, most functions are allocated against the most relevant output metric. The output metrics generally used are the RPMs, the block-hours<sup>3</sup>, or the enplanements).

<sup>3</sup>A *Block-Hour*, often shortened to *BH* and also referred to as a *Revenue Aircraft Hour* is one aircraft operated in revenue service for one hour. It includes all time spent taxiing as well as time in flight

### 3.2.1 Flying Operations

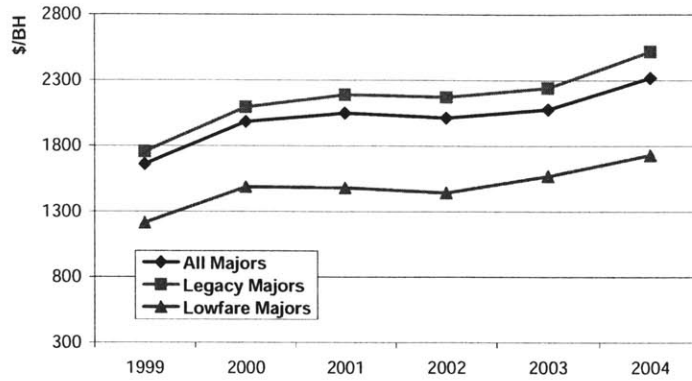
The operating cost breakdown presented in Table 3.2 shows that, on average, the lowfare carriers spend a greater percentage of their expenses for Flying Operations than the Legacies. Moreover the fraction of this function within the whole cost structure did not grow much between 2000 and 2004 in spite of peaking fuel prices (see Section 3.3.3). Actually, the growth was more substantial for the lowfare carriers than for their legacy competitors. Both these observations can be explained by some savings in other areas. Indeed, since the Lowfares spent relatively less money on other items, the fraction of their expenses dedicated to Flying Operations was more exposed to fuel price.

From a unit cost point of view, the first thing to notice is that Flying Operations is the item that had the largest growth between 2000 and 2004 (this is true with the exception of Transport Related expenses whose growth is due to a change of accounting method). This increase was shared by almost every Major. Only US and B6 succeeded in contracting their Flying Operations unit cost (respectively from 4.3 to 4.0¢/ASM and from 2.5 to 2.4¢/ASM).

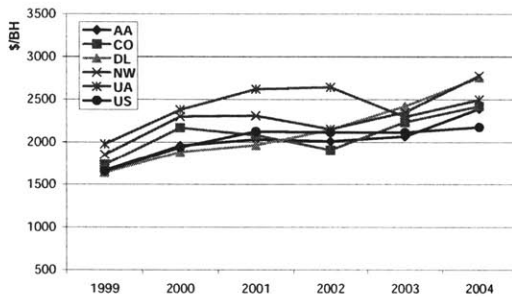
Since the expenses categorized in this function are incurred during the flight, they are best allocated against block-hours. The way this new metric – Flying Operations expenses per block-hour – changed between 1999 and 2004 is illustrated on Figure 3-7 for each group of airlines as well as for each one of the 12 Majors.

From a group point of view (see Figure 3-7(a)), the increasing trend is quite obvious. Flying Operations expenses per block-hour rose for the period under concern no matter the type of airline. Between 1999 and 2004, it increased by about 40%. For such a short period of time, this is really a significant. This cost increase was all the more painful for the airlines given that Flying Operations expenses accounted for about one third of their operating costs. For both types of airline, the steepest increase occurred in 2000 – with a jump of about 20% – and in 2004 – with a jump of about 10%.

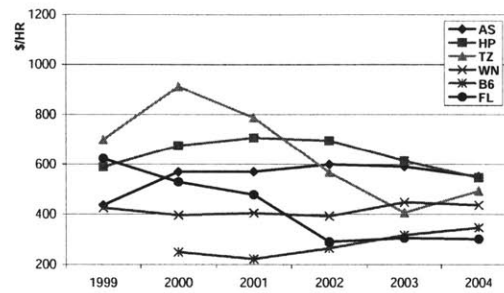
From an individual point of view, all the Legacies were clustered in a relatively narrow band. With the exception of UA, all legacy Majors stand in a 500\$/BH range for the period from 1999 to 2004. A more specific analysis of UA's performance shows that the airline's Flying Operations expenses considerably increased until 2001 and then, the airline succeeded in cutting them by about 13% between 2002 and 2003. This cut was made easier by the airline's filing under bankruptcy protection in 2002 to the extent that Chapter 11 protection allowed it to renegotiate pilots and flight attendants contracts. A quite similar observation can be made regarding US who filed for Chapter 11 protection in August 2002. Even though the airline did not reduce its Flying Operations expenses, at least it was able to keep them at the same level between 2001 and 2004 while the average among the Legacies was a 15%



(a) By group



(b) Legacy carriers



(c) Lowfare carriers

Figure 3-7: Flying operating expenses per block-hour, by group and by airline

increase for the same 3-year period of time. As for bankruptcy, a few additional interesting observations can be made, for both the legacy group and the lowfare group. In 2004, DL and NW had the highest Flying Operations expenses per block-hour among the Legacies. And both these airlines filed under Chapter 11 protection on September 2005. The same comment can be made regarding TZ who has operated under bankruptcy protection since August 2004. In 2004, TZ had the highest Flying Operations expenses over the 12 Majors and it spent at least 1.5 times more money per block-hour for this item than any other lowfare Major. Among the lowfare group, B6's performance is quite remarkable in the sense that it is the only major airline whose Flying Operations costs per block-hour shrank between 2000 and 2004 ( $-9.3\%$ ). B6's longer average stage length may explain, at least partially, this good performance.

### 3.2.2 Maintenance

Over the last years, there has been a trend to outsourcing of aircraft maintenance. This phenomenon is mainly due to cost pressures and the rise of effective alternatives. The trend has been particularly true for the big networks carriers because of their significant infrastructures and onerous work rules. On the contrary, some lowfare

airlines have been doing the reverse by developing their own maintenance facilities, like JetBlue in New York or AirTran in Atlanta. Overall the proportion of maintenance and unit maintenance costs decreased between 2000 and 2004, both for the legacy group and for the lowfare group.

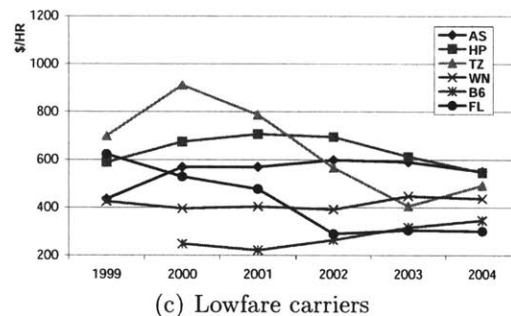
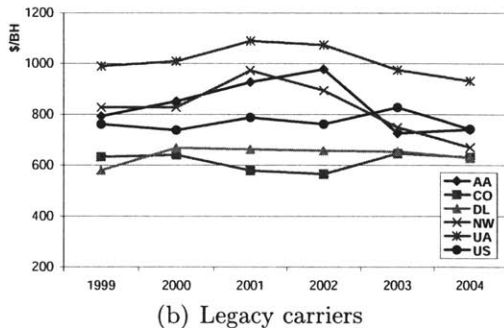
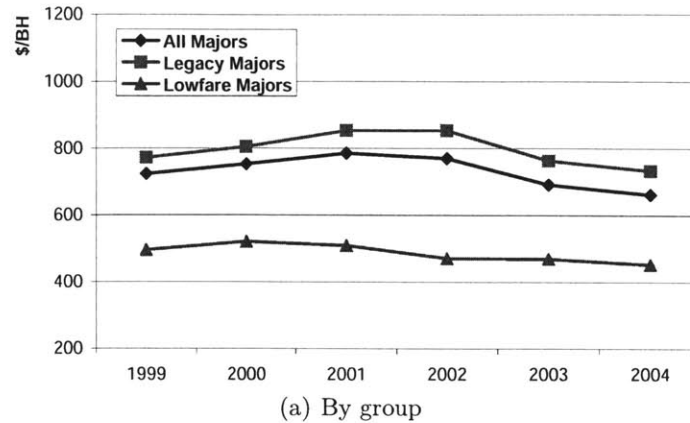


Figure 3-8: Maintenance expenses per block-hour, by group and by airline

Figure 3-8 describes graphically the inter-airline differences in maintenance costs per block-hour. Figure 3-8(a) does very well at illustrating the gap between the two types of Majors. Between 2000 and 2004, legacy Majors spent about 60% more (even peaking at 80% in 2002) for maintenance expenses per block-hour than their lowfare competitors. More precisely, it is noticeable that in 2003 as well as in 2004, every single legacy Major spent more money per hour flown in maintaining its aircraft in service than any lowfare Major.

One of the reason why lowfare airlines usually have lower maintenance unit cost is that their fleet is usually younger than that of the Legacies (see Table 3.4).

Indeed, new generation equipments are usually easier to maintain than older – ease of maintenance is more taken into account when designing new airplanes – and required maintenance intervals are growing longer than they used to be. In order to investigate the impact of fleet age on unit cost, maintenance costs per block-hour was plotted against average fleet age on Figure 3-9.



Table 3.4: Average fleet age (in years) as of 12/31/2004, by airline

Airline	Age	Airline	Age
AA	10.3	AS	7.7
CO	7.7	HP	10.7
UA	9.7	TZ	7.8
DL	13.8	WN	9.8
NW	10.2	B6	2.2
US	9.7	FL	2.5

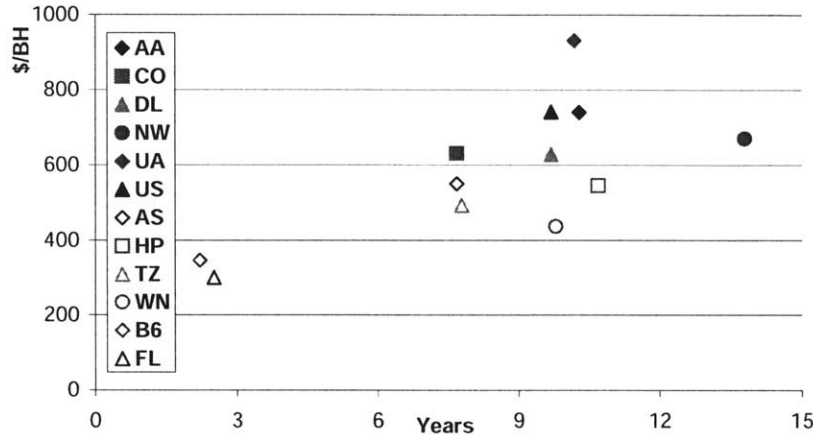


Figure 3-9: Maintenance cost per block-hour *vs.* average fleet in 2004

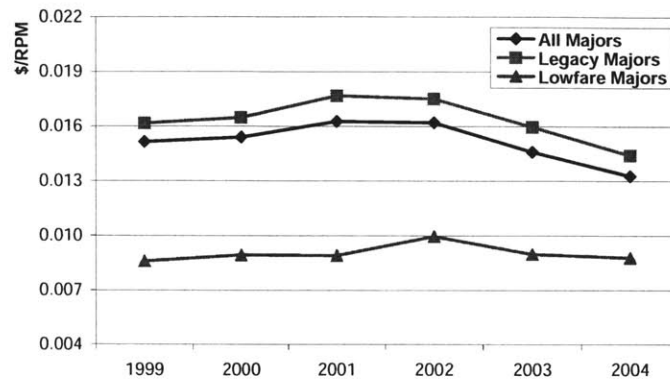
When looking at Figure 3-9 with B6 and FL in the plot, a correlation between the two variables seems quite obvious: the older the fleet, the more expensive its maintenance. But if one does not take into account the two lowfare airlines, the correlation is much less obvious. Many other factors can contribute to high maintenance cost among them fleet diversity and labor costs associated with technicians. In addition, in contrast to what has happened with airframe, maintenance of new engines may be more expensive as airlines are shifting to greater power and high-efficiency engines that use more exotic alloys and are run hotter.

### 3.2.3 Passenger Service

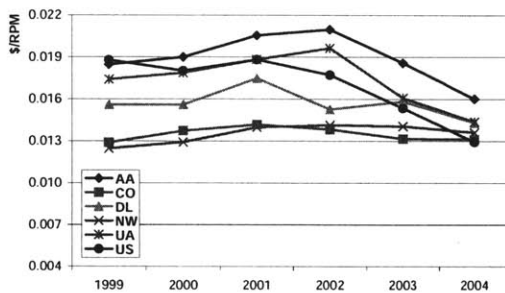
In terms of unit cost, this item showed the largest difference between the Legacies and the Lowfares. The network carriers spent on average almost two times more per ASM for Passenger Service than their lowfare competitors (1.1¢/ASM *vs.* .6¢/ASM). But this gap slightly contracted between 2000 and 2004. Traditionally, lowfare carriers offered much less (if not no) amenities during the flight, only the necessities were provided. But today, while many legacy airlines are trying to cut Passenger Service costs because they are pressed from the cost side and because this item is quite easy to cut, some lowfare airlines provide lots of in-flight services. Thus, if it used to be

true that lowfare was synonym of low quality services, this claim does not really hold anymore.

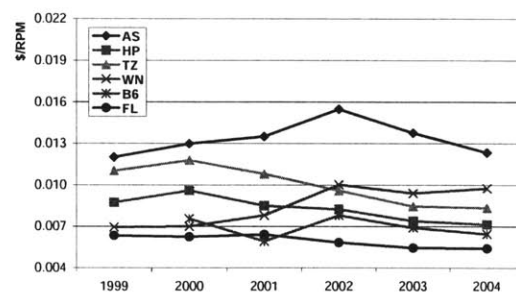
Since Passenger Service expenses are mainly variable costs that depend on how many people are on the aircraft and how far they are flying<sup>4</sup>, the best output metric to allocate this function against is RPM. The changes occurred in Passenger Service expenses per RPM are depicted on Figure 3-10.



(a) By group



(b) Legacy carriers



(c) Lowfare carriers

Figure 3-10: Passenger Service expenses per RPM, by group and by airline

Legacies' efforts to cut costs after 9/11 are very well illustrated on Figure 3-10. Indeed, Passenger Service expenses are an easy target for cost-cutting measure and thus, network airlines cut them by about 12.5% between 2000 and 2004. Actually, all the Legacies did reduce their expenses associated with passenger services after 2001 (*i.e.* between 2001 and 2004). For the Lowfares, it was much harder to cut these expenses because they were already quite low. As a result, these expenses did not change significantly between 2000 and 2004 for the the airlines from the lowfare group (-1.7%).

<sup>4</sup>This is not completely true to the extent that the number of flight attendants for instance is not directly proportional to the length of the flight

### 3.2.4 Aircraft & Traffic Servicing

For the airlines under concern, this item accounted for 15 to 20% of the total operating expenses. There is no clear trend about how this fraction varied between 2000 and 2004. Yet, on Figure 3-6 and Table 3.3, the growth of Aircraft & Traffic Servicing unit cost during the same period of time is clear, with a gain of .1¢/ASM for the Legacies and .2¢/ASM for the Lowfares. Part of this rise may come from the increase of security related expenses both for passengers and baggage than have rapidly grown after 9/11. But there should be other reasons to explain this trend since the increase started back to 2000, before 9/11 (the data that support this claim are not presented in this document). The expansion in this category of expenses also results from a rise in landing and navigation fees.

Although it is relevant to analyze Aircraft Servicing expenses per enplanement and Traffic Servicing expenses per aircraft departure, it is harder to extract relevant information from the variations of Aircraft & Traffic Servicing expenses per aircraft departure or per enplaned passenger. Data from Schedule P-7.0 allow to disaggregate this item into its two basic components and to allocate each one against the output metric that fits it the best. The results of this analysis are presented in Tables 3.5 and 3.6. In both tables a dash is used when the data were not available in the Form 41.

Table 3.5: Aircraft Servicing expenses (in \$/departure), by airline

	1999	2000	2001	2002	2003	2004
<b>AA</b>	1,102	1,131	1,241	1,121	1,019	1,106
<b>CO</b>	854	853	926	1,022	1,048	1,217
<b>DL</b>	804	830	881	960	1,045	1,017
<b>NW</b>	1,373	1,421	1,611	1,644	1,732	1,731
<b>UA</b>	1,402	1,425	1,613	1,770	1,669	1,629
<b>US</b>	949	1,014	1,130	1,218	1,313	1,212
<b>AS</b>	562	678	794	778	879	894
<b>HP</b>	441	475	489	514	537	566
<b>TZ</b>	-	1,660	1,813	1,710	1,503	1,447
<b>WN</b>	369	440	490	530	591	624
<b>B6</b>	-	-	-	-	-	-
<b>FL</b>	-	-	-	-	-	-

Even though data for some lowfare airlines are missing, it is noticeable that on average, legacy Majors had higher Aircraft Servicing expenses per departure than their lowfare competitors. Among the reasons that can explain this trend, one is related to the landing fees. Most lowfare carriers set up their hubs in secondary airports that have lower fees. In addition to that, since the landing fees depend on the weight of the aircraft and since Lowfares usually operates smaller aircraft, their average landing fees may be lower. Another justification to this trend concerns the average stage length. Indeed, Aircraft Servicing expenses include expenses “incident

to the protection and control of the in-flight movement of aircraft” [1]. Therefore, it is only logical that the Legacies that fly further, and consequently that require more control work, pay higher control fees.

Table 3.6: Traffic Servicing expenses (in \$/enplanement), by airline

	1999	2000	2001	2002	2003	2004
<b>AA</b>	21.8	22.7	25.3	24.5	25.6	23.8
<b>CO</b>	22.2	24.7	25.0	26.2	29.2	27.4
<b>DL</b>	15.7	16.6	19.3	18.6	19.0	18.9
<b>NW</b>	20.4	21.6	23.8	24.2	24.0	23.1
<b>UA</b>	20.2	20.7	22.9	25.8	23.9	20.6
<b>US</b>	13.0	12.9	13.7	15.0	16.1	15.3
<b>AS</b>	12.5	13.9	15.2	17.0	16.3	17.1
<b>HP</b>	8.5	10.1	14.1	14.8	14.2	14.8
<b>TZ</b>	-	4.0	4.4	4.0	3.9	4.2
<b>WN</b>	4.7	5.0	6.0	7.0	7.3	7.1
<b>B6</b>	-	-	-	-	-	-
<b>FL</b>	-	-	-	-	-	-

Similarly to what can be observed for the Aircraft Servicing expenses, the Legacies experienced a cost disadvantage regarding the Traffic Servicing expenses. A part of this disadvantage may be due to the international flights that require more services. It should be emphasized that higher Traffic Servicing costs are all the more a burden that their network structure – hub-and-spoke model with many connecting services – often requires additional processing at intermediate points.

Note that, even though it is less obvious than for other cost items, passenger handling cost per enplanement (Table 3.6) does depend on the flight length – more precisely on the passenger trip length. Indeed, a longer trip usually means more luggage per passenger, more boarding passes, and more premium class passengers – this type of passengers requires additional services.

### 3.2.5 Promotion & Sales

Promotion & Sales expenses have been falling rapidly over the years 2000-2004. This is true when considering this function as a percentage of the total operating costs, as well as when thinking in term of unit cost. For any group of Majors (the legacy subset, the lowfare subset or the whole group), Promotion & Sales unit cost shrank by about .4¢/ASM. More important is the fact that this decrease is shared by the 12 Majors without exception. With the development of e-commerce through electronic ticketing and the use of the Internet to distribute and advertise products, the industry has been able to reduce drastically marketing and distribution costs. A non negligible part of this drop is due to a decrease in sale commissions and bonuses paid to travel agencies.

The online buying trend is an important breakthrough in air travel in the sense that it is satisfying from both points of view. Indeed, for the airline this trend can be translated into reduced or non-existent distribution costs. And from the passengers point of view, buying online gives them the freedom to compare prices and book a flight through the Internet.

This function is best allocated against the number of enplaned passengers<sup>5</sup>. The results are presented on Figure 3-11.

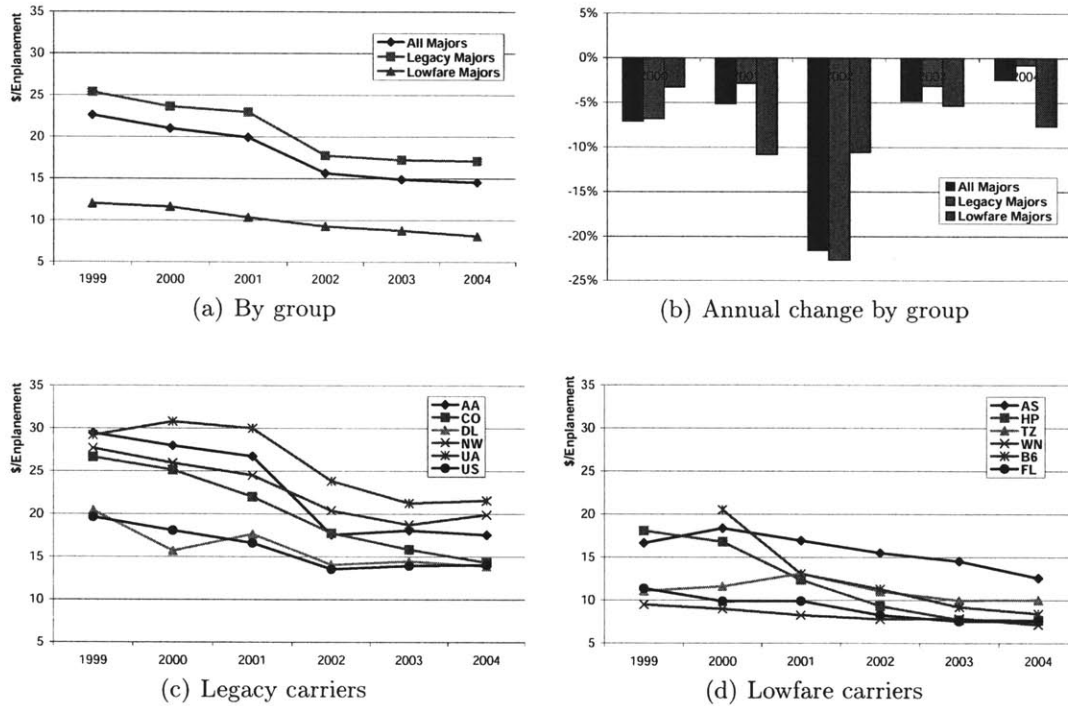


Figure 3-11: Promotion & Sales expenses per enplanement, by group and by airline

The results on Figure 3-11 show that each one of the 12 Majors spent less money per enplanement in promoting its activities and selling tickets in 2004 than what it did in 2000. An interesting point is that this decreasing trend was already in place before September 11<sup>th</sup>, both for the Legacies and for the Lowfares. Yet the terrorist attacks did probably help incentivize airlines to speed up the process (see on Figure 3-11(b) the more than 20% drop for the legacy Majors between 2001 and 2002). JetBlue's case presented on Figure 3-11(d) is quite appealing. Between 2000 and 2001, the airline reduced its Promotion & Sales costs per enplanement by about 36%, much more than any other airline. This is easily understandable when recalling that JetBlue started operations in 2000 and that a company usually spends much money the first year of operations in advertising its products.

<sup>5</sup>Note that this function is also sometimes allocated against RPM, or against dollar of revenues

### 3.2.6 General & Administrative

It should be made clear that inter-airline comparisons of these general costs are not fully relevant to the extent that airlines follow different accounting practices. While some airlines try to allocate as much as possible their central costs to a particular activity, others airlines do not hesitate to allocate their central costs to this function. And things are also complicated by the fact that any airline can modify its accounting policy from one year to the following. This is especially illustrated by ATA's case. The lowfare airline filed for Chapter 11 protection on October 2004. In the fourth quarter of year 2004, it reported General & Administrative expenses about 10 times above its usual levels, which explains the huge 30% for this item in 2004 in Table 3.2. In addition to issues of accounting practices that make comparisons of General & Administrative expenses an highly inexact science, it would not make much sense to allocate this function against any output metric. Thus, the trends for this category of expenses is not analyzed more in depth.

### 3.2.7 Depreciation & Amortization

This function is probably the one that changed the least. Between 2000 and 2004, Depreciation & Amortization unit cost increased by about .1¢/ASM for the Legacies and remained the same for the Lowfares, resulting in an unchanged value for the 12 Majors as a group<sup>6</sup>.

### 3.2.8 Transport Related

For this item, one can observe a huge gap between legacy and lowfare. Whereas for legacy Majors this item is the one that grew the most (in percentage of their total operating expenses as well as in unit cost), it has been kept at incredible low levels by the lowfare Majors. As a result, in 2004, Transport Related expenses accounted for a significant part of Legacies' operating expenses – between 7.4% for CO and 21.4% for US, while for all the lowfare Majors with the exception of HP, this item represented 1% or less of their total operating expenses. The increase for the Legacies can largely be explained by fees paid to regional airline partners for providing regional air service. After 9/11 the legacy airlines transferred some of the capacity over to the regional carriers in order to cut their capacity and costs on the regional routes.

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<sup>6</sup>The combination of an unchanged value for the Lowfares and of a slight increase for the Legacies may seem inconsistent with the unchanged value for the whole group of Majors but this has to do with rounding issues. Actually, Lowfares' Depreciation & Amortization unit cost decreased but since the variation is smaller than .05¢, it can not be captured by results presented in Table 3.3.

In terms of unit cost, the increase experienced by the Legacies in Transport Related expenses is the main reason of the increase of their CASM. As a matter of fact, while their CASM gained about 1.4¢/ASM between 2000 and 2004, this item solely increased by 1.3¢/ASM.

## 3.3 Productivity

“In economics, productivity is the amount of output created (in terms of goods produced or services rendered) per unit input used” [31]. Therefore, productivity is computed as the ratio of output over input.

From an airline point of view, outputs are best defined first by the capacity created – passengers as well as cargo – and then, by the revenues. Since the airlines under analysis are primarily passenger airlines, the output regarding capacity that is used in the analyses of this section is the number of ASMs. As concerns the resources (or inputs), the basic productive assets are airplanes and employees. But fuel can also be seen as a resource. Therefore, in the airline industry, any productivity study aims at determining how many ASMs or revenue can be created from one single unit of any of the three inputs. One could emphasize that using revenues instead of ASM as the output generally benefit the Legacies because of their higher yield. Indeed, for the same amount of ASMs, a Legacy would generally have higher revenues than a Lowfare.

### 3.3.1 Labor productivity

Back to the 70’s, labor related expenses accounted for about 40 to 45% of the total operating expenses for the passenger carriers. Since then their share has been reduced, especially after 2001. In 2005, they accounted for less than 30% of the total operating expenses [7]. Yet, labor costs still represent the single largest operating cost experienced by airlines. Therefore, many of them, especially among the Legacies, have focused on these expenses in their efforts to cut their operating costs.

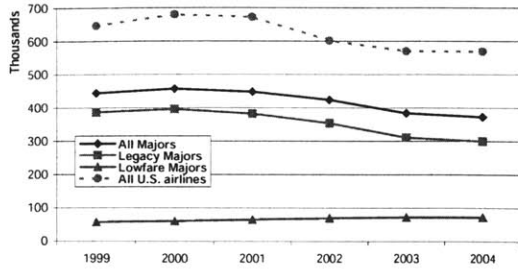
Figure 3-12 illustrates the variations in employment for each group of airlines. Figures 3-12(a) and 3-12(b) depict the changes in total employment – number of *Full Time Equivalent*, or *FTE* – whereas Figures 3-12(d) and 3-12(d) focus on pilots & copilots employment.

The variations were quite similar for the total employment and for the pilots & copilots. Yet, one could notice that, on the employment side, pilots & copilots had an advantage over other employees. In 2000, the number of pilots & copilots employed by the Majors grew by 4% while the total number of employees gained less than 3%. The pilots & copilots group also suffered less from the crisis. As a matter of fact, if for both categories of employees the number contracted dramatically between 2000 and 2004, FTE experienced a 18% cut while the number of pilots & copilots were reduced by “only” 13%<sup>7</sup>, *i.e.* about the same decline than for the ASMs. The

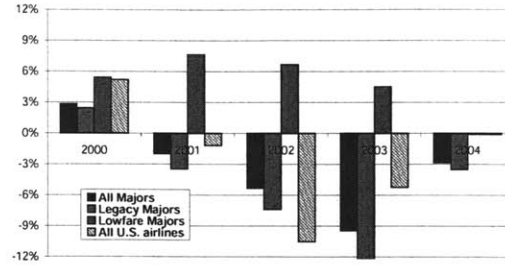
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<sup>7</sup>These results are the average for the Majors

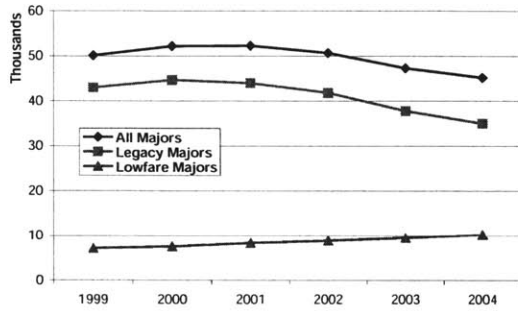




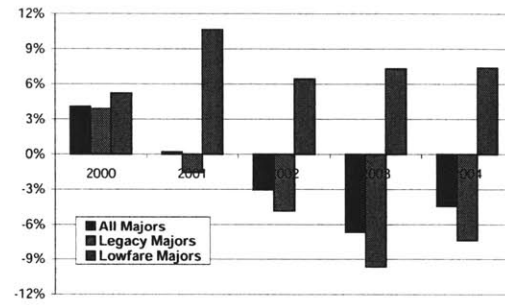
(a) Number of employees, by group



(b) Annual change in number of employees, by group



(c) Number of pilots & copilots, by group



(d) Annual change in number of pilots & copilots, by group

Figure 3-12: Employment, by group

explanation is that, to offer a given capacity, reducing the number of pilots & copilots is much more difficult than reducing the number of other employees. Even though an airline can ask its pilots to work more hours per month, not much more can be done. Another reason is that outsourcing is very uncommon for this category of employees. On the contrary, an airline can easily decide to outsource maintenance technicians, or baggage handlers.

Regarding the differences between the two subsets of Majors, Figure 3-12 shows that lowfare airlines did not cut their labor force for the period under analysis. They even increased it to support the growth in their capacity.

As for labor productivity, the question to be answered is: in such a crisis period, did airlines succeed in having their employees work more efficiently? A widely used metric to investigate labor productivity is defined as the ratio of ASMs and total number of employees. Basically, it gives the average number of ASMs produced per employee, no matter the type of employee. Note that, everything else being equal, the airlines that fly the longest stages should have a higher labor productivity because of significant fixed "labor needs". The results for this metric are plotted on Figure 3-13.

Labor productivity started improving rapidly after 9/11. On average for the Majors, it was quite constant between 1999 and 2001, and then, it gained more than

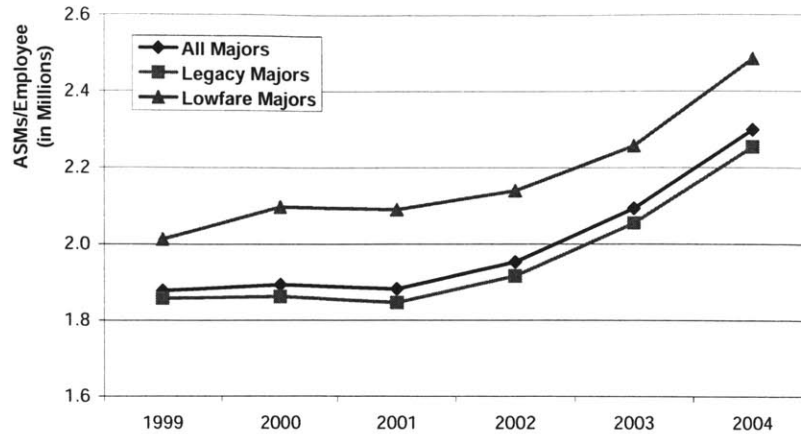


Figure 3-13: ASMs per employee, by group

22% in only 3 years. Regarding the differences between the two subsets of Majors, Lowfares' labor productivity was on average 10 to 15% higher. The performance is all the more impressive that the Lowfares flew shorter stages than their legacy competitors.

Individual results are presented on Figure 3-14, that depicts the variations in labor productivity and average stage length between 2000 and 2004 (the arrows indicate the direction of variation).

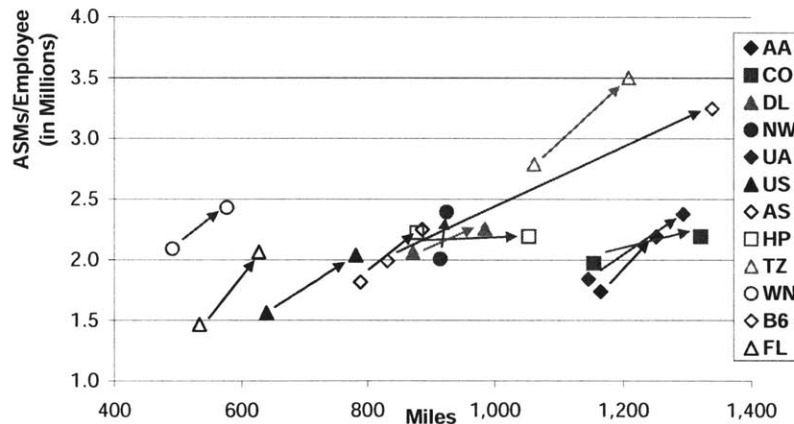


Figure 3-14: Change in ASMs per employee and average stage length, 2000 vs. 2004

This graph shows that, without exception, every Major increased its labor productivity. One could also notice that three legacy airlines – namely AA, CO and UA – were apart, on the right-bottom side of the graph, *i.e.* on the low productivity/long stage side. Without these airlines, the theoretical increasing relationship between employee productivity and average stage length is clear. But if one takes them into account, no clear correlation can be observed. On the individual side, the most impressive performance was that of TZ, B6 and to a lower extent WN, that did

pretty well given its extremely low average stage length.

Data regarding employment do not make any distinction regarding the types of employees. The next analysis examines in more details the productivity for the pilots & copilots group. This category of employees is interesting for inter-airline comparisons for many reasons. First, outsourcing is really uncommon when dealing with pilots & copilots. Therefore all the ASMs generated by an airline are generated by pilots that are accounted in the data regarding pilots & copilots employment. In addition, this pilots & copilots category is the only labor group for whom the functions are exactly the same at every airline. On the contrary, activities of other categories of employees may vary according to the airline they are working for. For instance, some airlines require their flight attendants to help cleaning the plane, so as to save money. Thus, for real like-to-like inter-airline comparisons, it may be more relevant to investigate pilot productivity.

The average number of block-hours produced per pilot is set out on Figure 3-15. Note that since this metric is computed by dividing the total number of block-hours by the number of pilots and copilots, the real number of block-hours produced by each cockpit crew is about twice as high<sup>8</sup>. Individual results for the whole period 1999-2004 are not depicted since within each subset, the variations for each airline are quite well represented by the overall trend of the subset. On Figure 3-15(b), Southwest Airlines is taken as a reference and the number of block-hours produced per pilot in each airline is expressed as a percentage of WN's result.

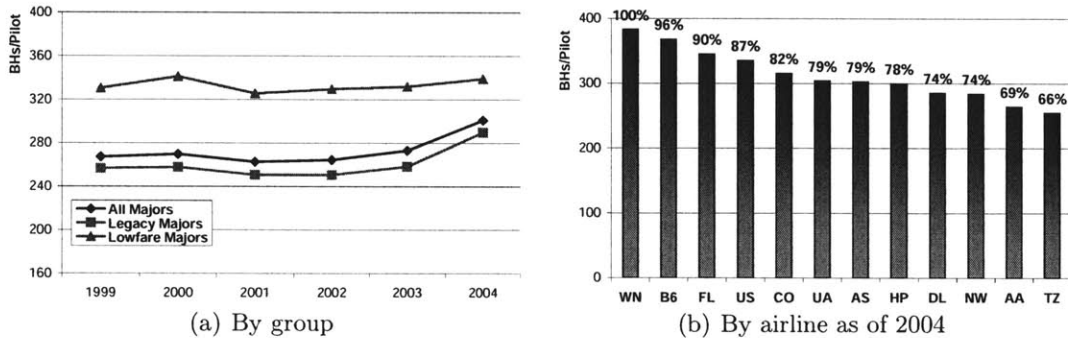


Figure 3-15: Block-hours per pilot, by group and by airline

Figure 3-15(a) reveals that until 2003, pilots from the lowfare airlines were on average about 30% “more productive” than those employed by their network competitors. In 2004, some efforts were made by the legacy carriers to improve the productivity of their pilots. The result is a 12% gain in block-hours per pilot in 2004. The reason of this improvement is that the Legacies were able to produce about as many block-hours in 2004 as in 2003 (+4%) with significantly less pilots and copilots (the number of pilots and copilots employed by the Legacies decreased by 7.5% between 2003 and

<sup>8</sup>A vast majority of the aircraft that are flown today by the US airlines required a 2-people cockpit crew.

2004). Since the lowfare airlines did not experience the same improvement, the gap in productivity between the two groups contracted down to 17% in 2004.

Figure 3-15(b) shows that in 2004, block-hours per pilot varied widely from a high of 383 hours at WN to the 255 hours per year of the average pilot at TZ. In other words, TZ's average pilot produced only 66% as many block-hours as the average pilot at WN. Note that on the contrary to the Legacies' performance that did improve during the period under analysis, WN's result slightly deteriorated. Therefore the gap between WN and the other airlines – and especially those from the legacy subset – was even wider in 1999. For instance, UA's average pilot produced scarcely more than half as many (54%) block-hours than WN's average pilot in 1999 *vs.* 79% in 2004.

### 3.3.2 Airplane productivity

Even though costs related to aircraft “ownership” – *i.e.* ownership costs or costs related to leasing aircraft – are far behind expenses related to employees or to those related to fuel, in 2004 they still accounted for about 5 to 6% on average among the Majors (Figure 3-5). Therefore, how efficiently these expensive assets are used is an important issue for the airlines.

When dealing with aircraft productivity, the most commonly used metric is *Aircraft Utilization*. Aircraft utilization is basically the average number of block-hours flown (or taxied) per aircraft and per day (or per aircraft-day). Turning the airplanes around between two flights is very time expensive – on the order of 20-30 minutes for WN and up to about 100 minutes or more for some airlines on international flights. Note that turn-around time does not depend proportionately on the length of stage. Therefore, flying longer haul is more efficient in terms of producing block-hours, at least theoretically. As a result, examining aircraft utilization without looking at average stage length is quite meaningless. On Figure 3-16, aircraft utilization is set out *versus* average stage length for each Major. The values for both 2000 and 2004 are plotted and an arrows between them indicate the direction of variation.

The first point to notice is that all airlines but JetBlue lied in a quite narrow range between 9 and 11 block-hours per aircraft-day, no matter their average stage length. This is quite unexpected. Another significant trend is that on average, the Lowfares were able to fly their airplanes more than the airlines from the legacy group. Since the lowfare Majors flew shorter stage on average, the difference between the two subsets of Majors becomes more significant if the results are adjusted for the stage length according to the theoretical increasing trend. As regards individual results, in 2000 as well as in 2004, JetBlue was the undisputed leader with respectively 12.0 and 13.6 block-hours per aircraft-day. The achievement is quite impressive. One could however argue that it will be hard for JetBlue to maintain such a high level of aircraft utilization with the addition of the 100-seat Embraers to its fleet – these smaller

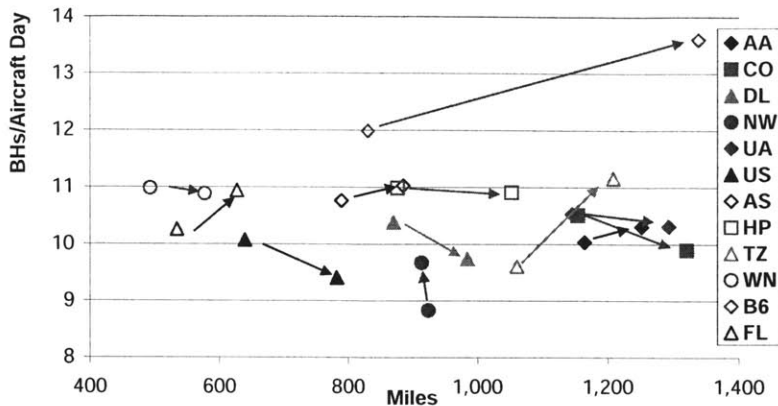


Figure 3-16: Change in aircraft utilization and average stage length, 2000 vs. 2004

aircraft cannot operate the red-eye transcontinental flights that boosted JetBlue's performance.

Though useful to better understand how the airlines use their flying assets, aircraft utilization as a metric does not really capture all aircraft productivity issues. As a matter of fact, productivity has to do with the input-output relation. But block-hours are not a real output. From an airline's point of view, block-hours are a mean to produce ASMs, not an end. Figure 3-17 is very similar to Figure 3-16, but ASMs per aircraft-day are plotted on the vertical axis instead of block-hours per aircraft-day. The main differences between block-hours and ASMs are the average seating capacity. Indeed, for a given number of block-hours, the bigger the airplanes, the more the ASMs produced<sup>9</sup>.

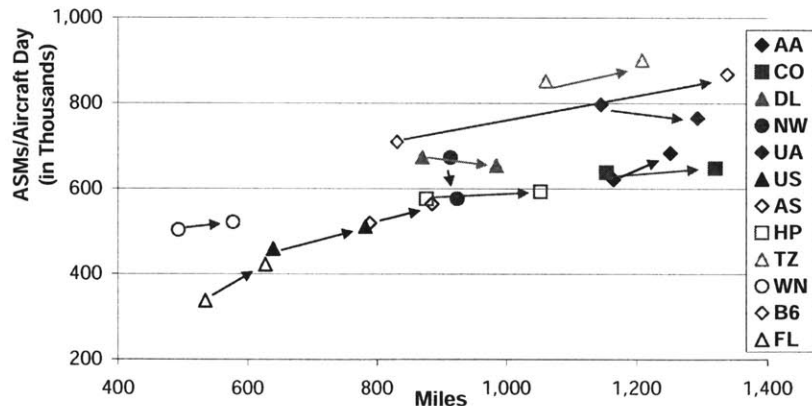


Figure 3-17: Change in ASMs per aircraft-day and average stage length, 2000 vs. 2004

<sup>9</sup>Note that other factors may also have an influence including the aircraft cruise speed (cruising at a lower speed means that less ASMs are created) and the airports that are flown (for less congested airports, taxiing time may be reduced and therefore, each block-hour is translated into more flight hours).

The results on Figure 3-17 differ substantially from those presented on Figure 3-16. First, JetBlue is no longer the leader. TZ, whose aircraft utilization was 18% lower than JetBlue's, took the lead in ASMs per aircraft-day thanks to its 30% advantage in average seating capacity (see Figure 2-10(c)). Then, it is no longer true that on average, the carriers from the legacy subset were not as productive as their lowfare fellows. Here again, the explanation lies in the size of the airplane. Indeed, on average, the Legacies operated bigger airplanes with higher seating capacity. And finally, it is worth noticing that the theoretical correlation – the longer the average stage, the more ASMs produced per aircraft-day – is much more obvious on this graph than on the previous one. Part of the explanation lies in the fact that for a given number of block-hour, a longer stage means more ASMs (an aircraft does not yield any ASM when taxiing, although the block-hours-counter is running). As a result, the airlines that flew a long average stage benefited more to move from a measure of BHs per aircraft-day to a measure of ASMs per aircraft-day than airlines that had a short average stage.

### 3.3.3 Fuel Efficiency

Historically, fuel has been the second largest operating costs, with 10 to 15% of the total operating expenses. But recently, because of soaring crude oil prices, the proportion of fuel costs in the total operating expenses has dramatically increased. In 2004, fuel expenses represented about 17% of the total operating expenses and in 2005, they accounted for more than 20% [7].

Figure 3-18 presents the variations in crude oil prices – measured in nominal dollars – between 1999 and 2004 (source: *Dow Jones & Company*).

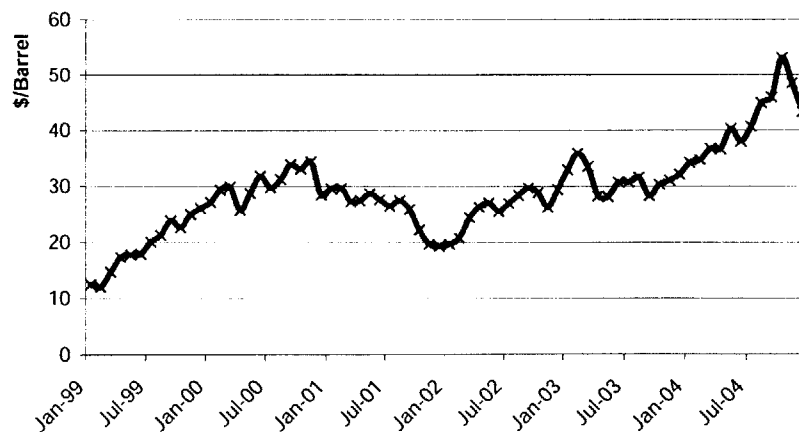


Figure 3-18: Crude Oil Prices

Figure 3-18 shows that, in nominal dollars, crude oil was about 4 times more expensive in late 2004 than it was in early 1999. Data for 2005 – with an average

price reported at about \$60 for the year 2005 – indicate that the increasing trend continued in 2005. Note that, when averaged yearly and expressed in constant dollars (see Figure 4-5(b) for data apropos the cost of living), the increase in fuel prices, though still significant, is much smaller. Figure 3-18 also illustrates very well the volatility of fuel prices.

Since every airline is suffering from peaking oil prices<sup>10</sup>, *Fuel Efficiency* has been a persistent concern among the airlines. Fuel efficiency is a measure of the ability of an airline to produce ASMs from a unit of fuel. Basically, this metric answers the question: how many ASMs can be flown with one gallon of fuel? The average fuel efficiency (right scale) and the fuel consumption (left scale) for the Majors as a group are depicted on Figure 3-19.

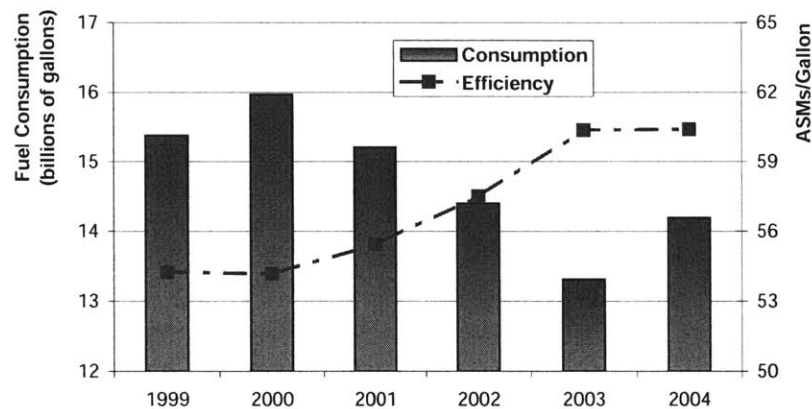


Figure 3-19: Fuel consumption and fuel efficiency for the Majors

Between 1999 and 2000, the fuel efficiency did not change much but the consumption increased by about 3.8% to support the 3.7% in capacity. Between 2000 and 2003, the Majors as a group reduced their consumption of fuel by about 16.6%. This reduction is the result of a combination of two phenomena. First a cut in capacity – 7.1% less ASMs were created in 2003 by the Majors. And then, significant improvements in fuel efficiency – in 2003, the Majors were able to produce 11.4% more ASMs from one unit of fuel than what they were able to do in 2000. Finally, the fuel efficiency remained constant in 2004, while the consumption increased due to a rebounding capacity.

There are many reasons that can make an airline more “fuel efficient” than another one but the main three are the stage length, the aircraft type and the seating density. Though very important, the last point – seating density – is not issued in this study for the sake of concision.

<sup>10</sup>Note that some airlines have abundantly used hedging to mitigate the impact of high fuel prices. In 2005, three Majors hedged 50% or more of their consumption: AS (50%), FL (75%) and WN (85%)[8]

## Fuel efficiency and average stage length

When dealing with fuel efficiency, the average stage length can make a significant difference to the extent that taking-off and landing an aircraft burn a lot of fuel, relatively more than when at cruise. Thus, what is dictated by theory is that the airlines that fly the longest stages should be more “fuel efficient”. Figure 3-20 illustrates the changes in fuel efficiency as well as in average stage length that occurred between 2000 and 2004 for each one of the 12 Majors.

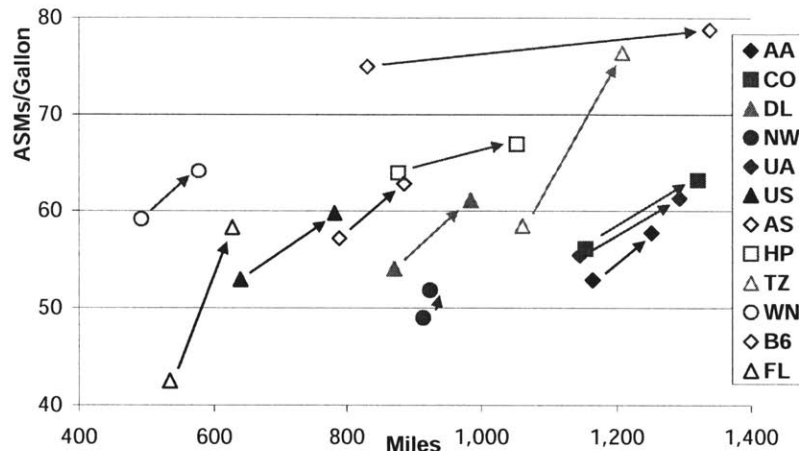


Figure 3-20: Change in fuel efficiency and average stage length, 2000 vs. 2004

Figure 3-20 illustrates pretty well the theoretical increasing trend. Indeed, on average, the carriers that had the lowest fuel efficiency lie on the left side of the graph, while those that were the most “fuel-efficient” lie on the right side. In 2004, the two leaders were again JetBlue and ATA. Even though they led the way by far, a part of their performance is due to their long average stage. Figure 3-20 also reveals that the improvements in fuel efficiency were shared by every single Major. Yet, these improvements were not as impressive for every airline. While Airtran or ATA experienced the strongest gain, JetBlue’s gain in fuel efficiency was much less impressive, especially if one takes into account the tremendous increase in JetBlue’s average stage length. Indeed, whereas its average stage length increased from 831 to 1,338 miles between 2000 and 2004, JetBlue became only 5% more fuel efficient. One could however argue that, starting at such a high level, it would have been very hard for JetBlue to increase significantly its fuel efficiency. At the opposite extreme lies Northwest whose performance for 2004 was by far the worst one. One of the reason that could justify at least partially this low result is the age of Northwest’s fleet.



## Fuel efficiency and fleet age

The type of aircraft operated by the airline is a critical factor in fuel efficiency. The main reason is that “old-generation” aircraft usually have higher associated fuel costs than “new-generation” aircraft because of older technologies. Figure 3-21, on which fuel efficiency was plotted against fleet age<sup>11</sup> for 2004 results, provides some elements to examine the relation between fuel efficiency and fleet age.

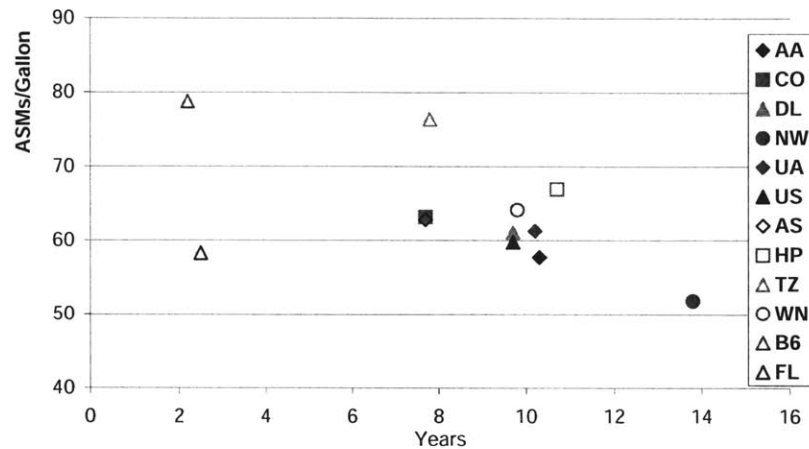


Figure 3-21: Fuel efficiency vs. average fleet age in 2004

On Figure 3-21, the negative slope for the relationship between fuel efficiency and fleet age is quite obvious. Note however that B6 and NW’s results, at both extremes of the range, play a key role in proving the conformity of the theoretical claim to facts. Without these airlines, the trendline is much more questionable.

From an individual point of view, the performance of some airlines is worth detailing. FL’s result on Figure 3-21 is quite unexpected. In 2004, despite one of the youngest fleets (its aircraft were, on average, about 2.5 years old), FL had the third worst fuel efficiency among the Majors (58.3 ASMs/Gallon) just behind AA (57.7 ASMs/Gallon), whose fleet was more than 4 times older. With a fleet about as young as FL’s, B6 was able to produce about 35% more ASMs. FL’s apparent “aberration” can be solved by looking at results presented on Figure 3-20. The explanation is that FL flew a much shorter average stage than B6 or AA – 627 miles compared to respectively 1,338 and 1,251 miles. Regarding B6, Figures 3-20 and 3-21 show that JetBlue led the way both for the average stage length and for the fleet age. Therefore, it is barely surprising that B6 also led the way for the fuel efficiency. Figure 3-21 also helps to understand the low performance of NW that was highlighted previously. In 2004, NW’s fleet was by far the oldest one – 13.8 years compared to 10.7 years for HP that had the second oldest fleet. Therefore, NW’s low fuel efficiency is quite legitimate.

<sup>11</sup>The data used for fleet age are those presented in Table 3.4.

### 3.4 Chapter Summary

Since costs mattered more than ever after 9/11, the airlines initiated cost-cutting measures. As a result, the Legacies' operating costs contracted in 2002 and 2003 before strongly rebounding in 2004, resulting in a positive (+4%) total variation for the period 2000-2004. Since during the same time the capacity offered by the Legacies significantly dropped, their average unit cost gained about 13% between 1999 and 2004 – with a small 2% decrease in 2002 though. For the Lowfares, the trend is significantly different. Their operating expenses increased every single year between 2000 and 2004 to support the increase in capacity. As a result, their unit cost did not change significantly. And therefore, the gap in unit cost between the Legacies and the Lowfares widened (up to 3.6¢/ASM on average in 2004).

A functional cost categorization reveals that the Legacies incurred higher unit cost in almost every facet of their operations. The greatest discrepancies concerned the Transport Related expenses as well as the Passenger Service expenses. Transport Related expenses accounted for the largest part of the gap in unit cost between the two subsets of Majors. Regarding Passenger Service, one could however notice that the Legacies made some efforts to converge to Lowfares' levels. This categorization also highlights that, on the contrary to Flying Operations expenses that increased for almost every airline – partly because of increasing fuel prices – Promotion & Sales expenses were largely reduced thanks to the development of electronic distribution channels.

Regarding productivity, data show that almost each one of the 12 Majors improved its labor and aircraft productivity as well as its fuel efficiency. Overall, the Lowfares are more “productive” than their legacy competitors, especially if the results are adjusted for the stage length. While the improvements in labor productivity, as measured in ASMs per employee, are the results of layoffs for the Legacies, they are due a faster growth in capacity than in employment for the Lowfares. As concerns aircraft utilization, Lowfares largely led the way. But when looking at ASMs per aircraft-day, there is no real difference between the two subsets of Majors. The only clear trend is that the higher the average stage length, the more ASMs per aircraft-day are produced. As concerns fuel efficiency, fuel prices that have dramatically increased incentivized the airlines to improve their fuel efficiency. The result is a 11% gain on average for the Majors between 1999 and 2004. The data also show that the average stage length and the average fleet age have a strong influence on fuel efficiency: the longer an airline flies or the younger its fleets, the more ASMs per gallon of fuel it produces.

# Chapter 4

## Revenues & Profitability

Operating costs and their variations were described in the previous chapter. In the first section of this chapter the highlight is given to the other side of financial results, namely the revenues. The results presented in this section point out how much pricing power has been lost by the airlines. Many reasons help explain this phenomenon. First, the competition from lowfare airlines has substantially contributed to the overall fare decline. Also, the new distribution channels have reduced the pricing authority through price transparency. Finally, overcapacity has certainly contributed to this trend. In addition to that phenomenon, a very basic breakdown of the revenues reveals that during the crisis, the Majors, especially those from the legacy subset, took some refuge in non-passenger business to lower their exposure to the strong decline of passenger traffic.

The second section completes the financial side of this study by discussing profits. The use of different metrics to measure the profitability of the airlines highlights the differences in financial health between airlines. The profitability analysis reveals that, on average, lowfare Majors were less affected by the crisis than their legacy competitors. The analysis also shows that the crisis peaked in 2001 and 2002 with tremendous losses. The airlines' efforts helped them to converge to the break-even point in 2003 and 2004.

Only operating items are taken into account in this chapter's analysis. The rationale for this was explained in the introduction of the previous chapter. The data used in this chapter are extracted from the Schedule P-1.2 (*Statement of Operations*) of Form 41 reports.

## 4.1 Total Operating Revenues

Operating revenues are the part of the total revenues that are yielded by the operation of an airline's air transportation service. The way operating revenues of each group of airlines varied between 1999 and 2004 is depicted on Figure 4-1. Information about how much Legacies and Lowfares contributed to the operating revenues of the whole industry is given in Table 4.1.

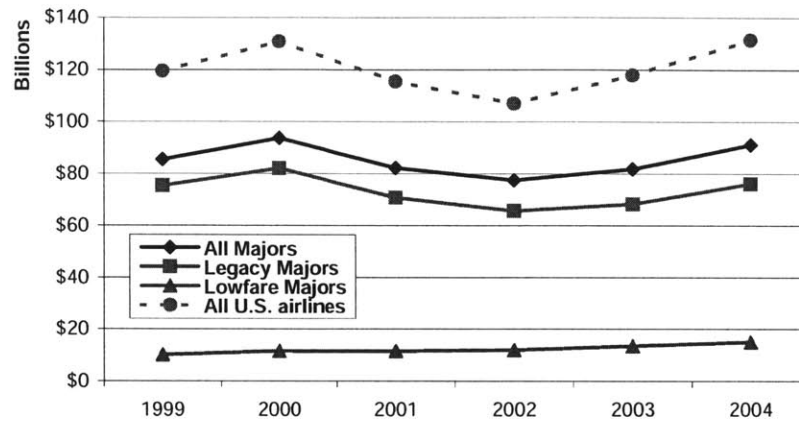


Figure 4-1: Total operating revenues, by group

Table 4.1: US industry operating revenues and revenue share for the two groups of Majors

	1999	2000	2001	2002	2003	2004
US industry operating revenues ( $\times 10^9$ \$)	119.4	130.8	115.5	107.0	117.9	131.5
Legacy Majors' share	63.0%	62.7%	61.2%	61.3%	57.9%	57.9%
Lowfare Majors' share	8.5%	8.9%	9.9%	11.1%	11.5%	11.4%

Note: In Tables 4.1 and 4.2, the revenue shares are computed based on the revenues of the whole US industry (first line of the table) which means that, for each subset of Majors, it is equal to the ratio of its revenues over the revenues of the whole US industry.

The airlines' performance presented on Figure 4-1 and in Table 4.1 gives rise to many comments. Firstly, one can observe that the 12 Majors together generated about 70% of the revenues generated by the whole industry. However, the contribution of each subset changed during the period under analysis. The 6 lowfare Majors yielded only 8.5% of the total revenues in 1999, but they increased their revenue share up to 11.4% in 2004. Paralleling these figures with those of traffic share presented in Sections 2.1.1 and 2.1.2 may provide useful insights. It may seem surprising that the Majors that carried about 90% of the traffic (as measured in RPMs) generated only 70% of the operating revenues. This can easily be explained by recalling that the

Majors under analysis are primarily passenger airlines, not all-cargo carriers. These all-cargo Majors generate a significant part of the operating revenues but do not yield any RPM. It would make more sense to parallel revenue share with total traffic (*i.e.* passenger and cargo) share.

Between 2000 and 2002, the 12 Majors experienced a significant decline of operating revenues (about  $-17\%$ ). Since then their operating revenues have rebounded and consequently, 2004 revenues are only slightly below 2000 revenues ( $-2.7\%$ ). The trend for the Legacies is really similar to the one for the 12 Majors except that the drop before 2002 was deeper ( $-20\%$ ) and the rebound post-2002 was not as strong, resulting in a 7% decrease between 2000 and 2004. During the same period of time, the lowfare group experienced a growth of its operating revenues. Even more importantly, the growth was shared by every airline within the group. B6 and FL led the movement with increases of  $+1105\%$  and  $+67\%$  respectively. The result of the last two observations – 2004 levels below 2000 levels for Legacies and increasing operating revenues for the Lowfares – is that the lowfare group gained about 4 percentage points of revenue share between 2000 and 2004. Despite this, lowfare airlines are still much smaller – when measured in revenues – than their legacy competitors.

#### 4.1.1 Passenger Revenues

In this section, the focus is on the passenger side of the operating revenues. For the 12 Majors, most operating revenues come from passenger transportation services. Other revenues that are a much smaller portion of total operating revenues (see Figures 4-9 and 4-10) are investigated in the next section. Figures 4-2(a) and 4-3 describe the variations in passenger revenues for the period 1999-2004.

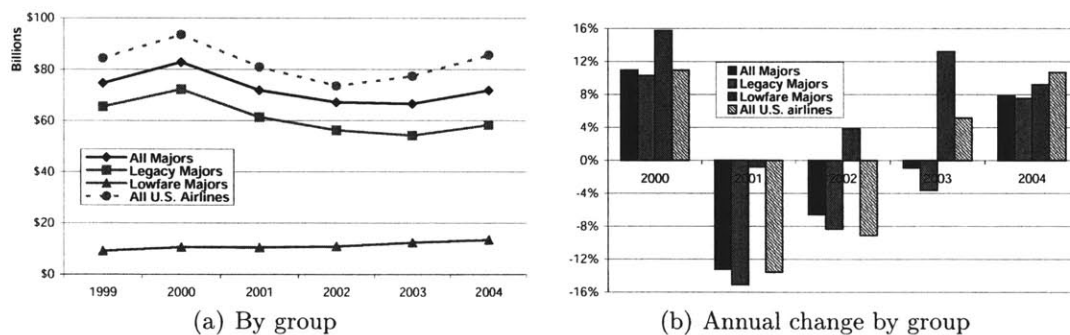


Figure 4-2: Passenger revenues, by group

The results depicted in these figures show that the trends are globally the same as for the total operating revenues – which is only logical since passenger revenues are by far the biggest part of operating revenues – but a few differences exist. Most importantly, the decline lasted until 2003 for the group of Majors and its legacy subset. Thus, in 2004, passenger revenues were still well below 2000 levels, with about  $-19\%$

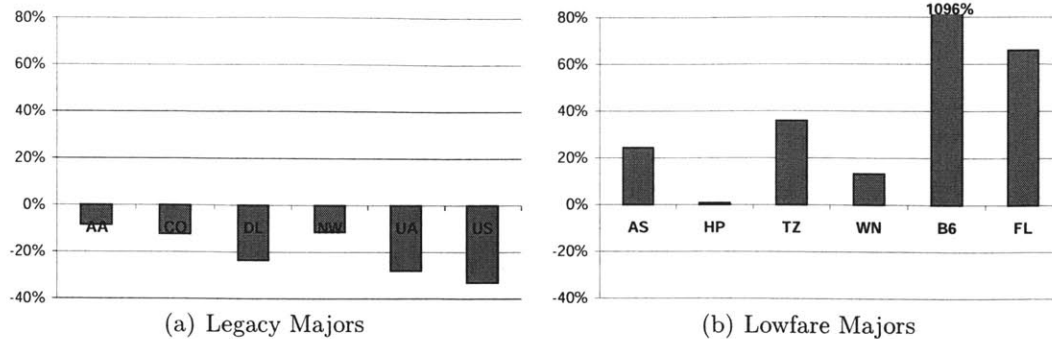


Figure 4-3: Change in passenger revenues between 2000 and 2004, by airline

for legacy carriers and  $-13\%$  for the entire group of Majors. Since the total revenues rebounded as early as 2002, the Legacies may have sought diversification in other types of revenues (see Section 4.1.2). Also, whereas all lowfare Majors succeeded in expanding their passenger revenues with an average increase of  $+27.4\%$  for the period 2000-2004, all legacy Majors experienced a drop of their passenger revenues for the same period of time. This last point is no longer true when dealing with the total operating revenues since two network carriers, namely AA and NW, were able to increase their operating revenues between 2000 and 2004.

Since the two subsets of Majors experienced opposite changes, their revenue share based on passenger revenues also changed. Data presented in Table 4.2 and on Figure 4-4 show the changes that occurred. While the former presents the variations in revenue share for each group of Majors, the latter details the situation in 2004.

Table 4.2: US industry passenger revenues and revenue share for the two groups of airlines

	1999	2000	2001	2002	2003	2004
<b>US industry passenger revenues (<math>\times 10^9</math> \$)</b>	84.4	93.6	80.9	73.6	77.4	85.7
<b>Legacy Majors' share</b>	77.6%	77.2%	75.8%	76.5%	70.1%	68.1%
<b>Lowfare Majors' share</b>	10.9%	11.3%	13.0%	14.9%	16.0%	15.8%

In 2004, the 12 Majors generated about 84% of the passenger revenues generated by all the US airlines. This revenue share, that was about 4 or 5 percentage points higher 5 years before, is higher than the corresponding one for the total operating revenues since the 12 Majors under analysis in this study are primarily passenger airlines. As expected, these revenue shares based on passenger revenues are much more consistent with the traffic share from Section 2.1.1 than the revenue shares based on operating revenues. The 12 Majors carried about 90% of the passenger traffic which yielded about 85% of the passenger revenues – more precisely, between 84% and 88.5%.

Similar to what is observable when assessing the share issue with other metrics –

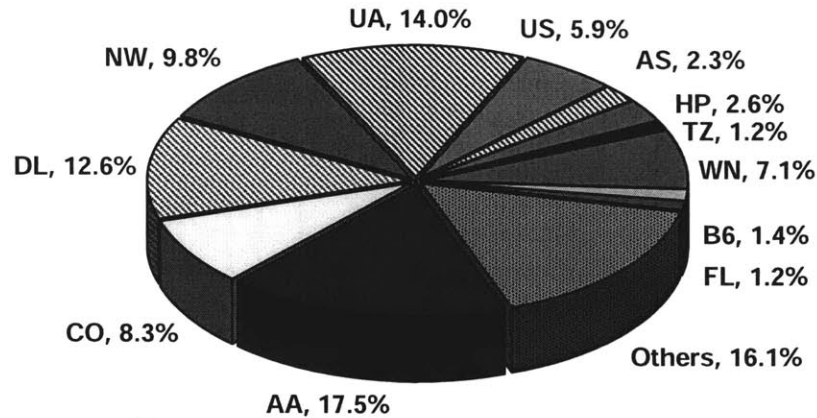


Figure 4-4: Passenger revenue share in 2004

such as traffic or operating revenues – lowfare Majors’ revenue share increased in an impressive manner. It gained about 6 percentage points between 2000 and 2004. But, despite their expansion, lowfare carriers were still very small when compared to their network competitors. Figure 4-4 supports very well this claim by showing that, in 2004, lowfare Majors were still one order of magnitude below the legacy Majors in terms of revenue share, with the exception of WN that was bigger than US. Indeed, while each legacy Majors had a 2-digit (or close to) revenue share, all lowfare airlines had a revenue share below 10%.

An interesting observation can be made regarding the difference of revenue share between the two subsets of Majors. This difference is higher when dealing with operating revenues than when dealing with passenger revenues. The ratio of Legacies’ revenue share over Lowfares’ revenue share ranges from 7.4 (in 1999) to 5.1 (in 2004) for operating revenues while it ranges from 7.1 (in 1999) to 4.3 (in 2004) for passenger revenues. This indicates that in 1999 the Lowfares were more passenger-focused than network carriers and that this trend strengthened between 1999 and 2004. This claim is fully confirmed by results from Section 4.1.2 and more precisely by Figure 4-9.

### Average Fare and Passenger Yield

The *Average Fare* can be computed by dividing the passenger revenues by the number of enplaned passengers. The average fare is really the average price paid by passengers for one coupon, *i.e.* for one flight segment. Figure 4-5 illustrates the variations in average fare for the period 1999-2004. Specifically, Figure 4-5(a) makes comparisons between the groups of airlines possible, while Figure 4-5(b) compares the variations in average fare for the 12 Majors with the changes in the cost of living – through the variations in *Consumer Price Index (CPI)*<sup>1</sup>.

<sup>1</sup>The CPI is nothing else than a cost of living index, see [16] for more details.

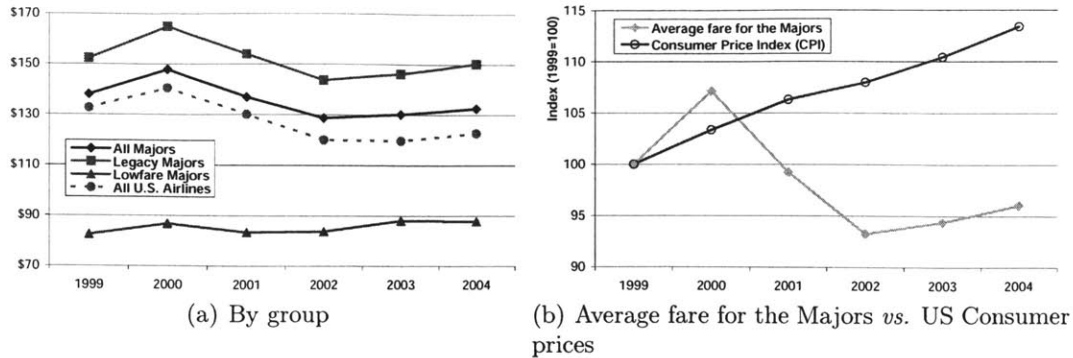


Figure 4-5: Average fare, by group

For the 12 Majors, average fares dropped by about 13% between 2000 and 2002. They have rebounded slightly since then but the total variation between 2000 and 2004 is still negative, by about  $-10\%$ . This trend is all the more unexpected that, during the same period of time, the CPI rose by about  $10\%$ . It is worth noticing that, in contrast to what happened for the network airlines, the average fare paid by lowfare airlines' passengers slightly increased over the period 2000-2004. In spite of this, passengers pay much smaller fare (from 40 to 50%) on flights operated by lowfare carriers. This difference may come from two sources: it was shown earlier (see Section 2.3.4) that on average, passengers of lowfare carriers fly shorter haul, but it can also come from a lower fare charged per mile.

The average fare is a consumer-focused metric – how much am I paying? – but it is not very convenient for inter-airline comparisons in the sense that it does not take into account the average length of passenger haul that can highly distort the fare (on average, the further you fly, the more you will pay). This major flaw can easily be prevented by using another metric called the *Passenger Yield* for inter-airline comparisons. The passenger yield, usually shortened to yield, is defined as the ratio of passenger revenues and number of RPMs. The yield is widely used by analysts because it provides many insights concerning the pricing power of an airline, *i.e.* concerning how much the airline is able to charge its passengers.

From a customer point of view, the yield is really the average fare paid to travel one mile.

$$\begin{aligned}
 \text{PassengerYield} &= \frac{\text{Passenger Revenues}}{\text{RPMs}} \\
 &= \frac{\text{Passenger Revenues}}{\text{Enplaned Passengers}} \cdot \left( \frac{\text{RPMs}}{\text{Enplaned Passengers}} \right)^{-1} \\
 &= \frac{\text{Average Fare}}{\text{ALH}}
 \end{aligned}$$



The data for the two groups of airlines over the period 1999-2004 are presented on Figure 4-6 while individual results are reported in Table 4.3. Note that it is fully relevant to present also the results for the whole US industry since the yield is computed from two passenger airlines related metrics – on the contrary to the unit cost (see Section 3.1.2).

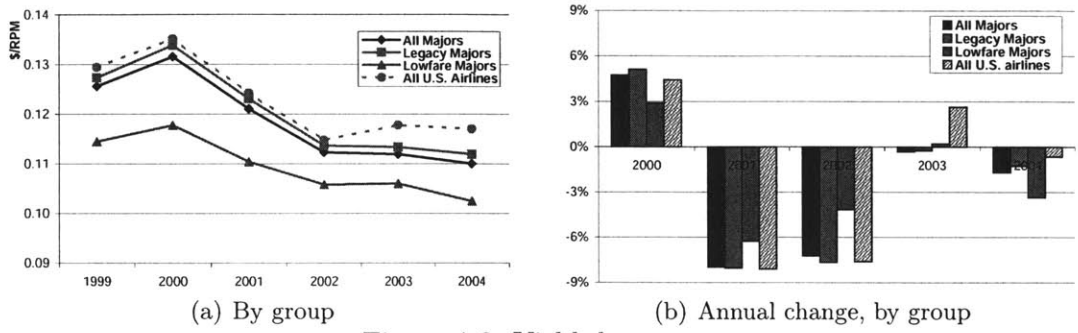


Figure 4-6: Yield, by group

Table 4.3: Yield (in ¢/RPM), by airline

	1999	2000	2001	2002	2003	2004
<b>AA</b>	13.1	14.0	13.2	11.8	11.8	11.0
<b>CO</b>	12.0	12.9	12.2	11.5	11.4	11.2
<b>DL</b>	12.6	13.1	12.2	11.4	11.5	11.0
<b>NW</b>	11.6	12.0	11.2	10.7	11.1	11.5
<b>UA</b>	12.3	13.1	11.5	10.5	10.2	10.4
<b>US</b>	16.5	16.1	14.3	13.0	13.0	12.5
<b>AS</b>	12.6	13.2	12.8	12.3	12.3	12.1
<b>HP</b>	11.4	11.4	10.1	9.7	9.9	9.4
<b>TZ</b>	6.4	6.5	6.7	6.7	7.1	7.0
<b>WN</b>	12.3	12.8	11.9	11.5	11.7	11.4
<b>B6</b>		10.2	9.5	9.0	8.4	7.8
<b>FL</b>	13.6	14.6	14.2	12.8	12.4	11.8

When looking at those data, many trends are worth noticing. Between 2000 and 2004, the yield of the 12 Majors felt by about 15%. The decrease was quite similar for both subsets with more than 16% for the Legacies and about 13% for the lowfare carriers. Even though the drop is less pronounced than it was between 2000 and 2002, the yield was still decreasing in the second part of the period 2000-2004. Part of the explanation lies in the fact that, everything else being equal, people are no longer willing to pay the same fares that they used to. And more importantly, they do not have to do so. Indeed, overcapacity forced the airlines to reduce their fares to fill their airplanes. What is even worse for the airline industry is that it is highly unlikely that the yield will be back to pre-2001 levels in the near future. Another phenomenon that certainly played a key role in this decline is the increasing stage length, or more precisely, the increasing length of passenger haul. Indeed, even though it can not be

denied that on average longer flights mean higher fares, it is not true that fares are directly proportional to flight length. As a result, increasing length of passenger haul immediately translates into decreasing yield<sup>2</sup>.

On average, the 12 Majors' yield is below the average yield for the whole industry. The main reason that helps explain this observation is the difference in stage length. On average, the Majors operated on longer stages than the industry as a whole and therefore, a lower yield is barely a surprise (see Figure 4-7 for more details regarding the correlation between yield and length of flight). Note that this result – Majors' yield below industry's yield – could have been anticipated earlier by noticing that the passenger revenue share of the Majors is below their passenger traffic share (89% *versus* 91% in 1999 and 84% *versus* 89% in 2004). This "distortion" can only be explained by a Majors' yield lower than the one of whole industry.

The difference between the two groups of Majors is far from negligible. In 2004, Lowfares' yield was still about 8% smaller than Legacies' one. This result justifies the term *lowfare* often used to describe this group of airlines. This can be explained by recalling that flights operated by lowfare airlines usually offer less amenities on-board and thus, travelers' willingness to pay for this product tends to be lower. For the period 1999-2004, the difference of yield between legacy and lowfare Majors narrowed. From 1.6¢/RPM in 2000, it dropped to 1.0¢/RPM in 2004 (it was even as low as .7¢/RPM in 2003). Based on what was previously noted regarding the relation between yield and average length of flight, adjusting yield values for average length of passenger haul would certainly make the yield difference between the two subsets of Majors even more significant. Indeed, everything else being equal, if the average length of passenger haul were the same for the two subsets of Majors, lowfare carriers would certainly have an even smaller yield.

Decreasing yield – no matter the type of airline – and yield convergence together are probably some of the most important changes that have occurred in the airline industry during the past few years.

As previously highlighted, since the length of flight may strongly affect the yield, the yield is itself of little interest for inter-airline comparisons. Stage length must be taken into account for comparisons. On Figure 4-7, yield is plotted against the average stage length for each one of the 12 Majors, both for the years 2000 and 2004. For each airline, an arrow indicates the direction of variation (from 2000 to 2004).

Results presented on Figure 4-7 help to justify the use of the term *lowfare* used to describe 6 of the 12 Majors. With the exception of AS, the airlines from the lowfare group have a lower yield than their legacy competitors, no matter the stage length. AS' situation is more fuzzy since, when looking at Figure 4-7, it is not very

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<sup>2</sup>Recall that yield can be defined as the ratio of average fare and average length of passenger haul.

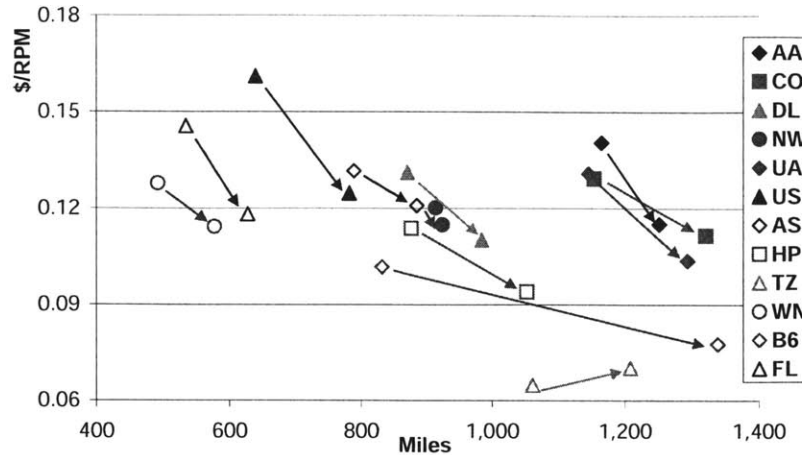


Figure 4-7: Changes in yield and average stage length, 2000 vs. 2004

clear whether it would be more accurate to consider AS a lowfare airline or a legacy airline. Here again, the airline is on the edge between the two groups.

Figure 4-7 illustrates quite well the theoretical correlation between yield and length of flight. On average, the longer the flight, the lower the yield. With so few airlines, it would be hard to decide what type of regression – linear, power or exponential – would fit the best but the decreasing trend is quite clear.

Individual data for yield (Table 4.3 and Figure 4-7) and those related to profitability (operating margin for example) show that there is no clear relation between how an airline's yield changes and how profitable the airline is. To support this claim, one can look at JetBlue's performance. Although it has been quite profitable since 2001, JetBlue is the airline whose yield decreased the most between 2000 and 2004 (almost  $-24\%$ ). One could argue however that because of the  $60\%$  increase of its stage length it is only logical that its yield decreased so much. On the contrary, ATA is the only airline whose yield increased but that did not prevent the airline from filing for bankruptcy in October 2004. Again, one could argue that though increasing, ATA has the lowest yield over the Majors. Now consider US Airways which is at the opposite extreme. US Airways had the highest yield for the period under analysis and yet the airline has not stopped losing money since 2000. In September 2004 it even filed for bankruptcy for the second time in two years. One could also compare Continental's situation with United's. In 2000 as well as in 2004, the two legacy airlines had quite the same yield and stage length. However, while Continental was certainly the most profitable – actually the least unprofitable – legacy between 2000 and 2004, United's financial performance is much less desirable. Between 2000 and 2004, United's operating margin was among the two worst within the group of Majors. This lack of correlation between yield and profitability is hardly surprising for many reasons. First, the profitability has to do not only with unit revenue but also with unit cost. Secondly, profitability is a more general measure than the yield on

the revenues side to the extent that it does not only take into account the passenger revenues but instead the total revenues. And finally, a big drawback of the yield is that it does not take into account the load factor. Indeed, a high yield is of little value if the airplanes are half empty. The *Unit Passenger Revenue* may answer this issue.

## Unit Passenger Revenue

The *Unit Passenger Revenue*, shortened to *PRASM*, is computed by dividing the passenger revenues by the ASMs. It can also be computed from the yield and the load factor as shown below.

$$\begin{aligned}
 \text{Unit Passenger Revenue} &= \frac{\text{Passenger Revenues}}{\text{ASMs}} \\
 &= \text{Passenger Revenues} \cdot \left( \frac{\text{RPMs}}{\text{Load Factor}} \right)^{-1} \\
 &= \frac{\text{Passenger Revenues}}{\text{RPMs}} \cdot \text{Load Factor} \\
 &= \text{Yield} \cdot \text{Load Factor}
 \end{aligned}$$

The variations in unit passenger revenue are pictured on Figure 4-8.

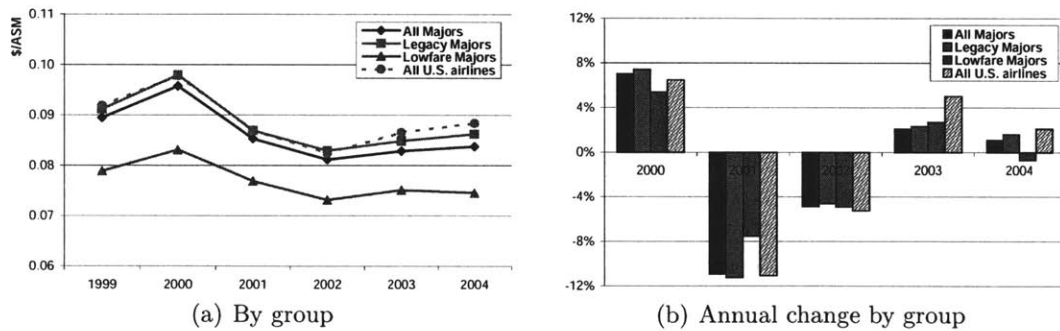


Figure 4-8: Unit passenger revenue (PRASM), by group

Figure 4-8(a) deeply differs from Figure 4-6(a). The beginning of the story is similar – growth until 2000 and then serious drop – but the two measures diverged between 2002 and 2004 with a unit passenger revenue that rebounded in 2002 and a yield that kept decreasing. This rebound is mainly due to the efforts of the airlines to increase the load factor. In such a crisis period they tried to limit the effect of the decline of passengers’ willingness to pay by a better use of their airplanes’ seats. Over the whole 2000-2004 period, the unit passenger revenue of the Majors “only” lost 12.5%. This result should be compared to the –16.3% for the yield. More details of

the differences between the variations in yield and those of the unit passenger revenue can be found in Table 4.4 in which annual changes for both the metrics are reported.

Table 4.4: Annual changes for yield and unit passenger revenue, by group

		2000	2001	2002	2003	2004
All Majors	Yield	+4.7%	-8.0%	-7.2%	-.3%	-1.7%
	PRASM	+7.0%	-10.9%	-4.9%	+2.1%	+1.1%
Legacies	Yield	+5.1%	-8.0%	-7.7%	-.2%	-1.3%
	PRASM	+7.4%	-11.2%	-4.6%	+2.3%	+1.6%
Lowfares	Yield	+2.9%	-6.2%	-4.2%	+.2%	-3.3%
	PRASM	+5.4%	-7.5%	-4.9%	+2.7%	-.7%

### 4.1.2 Other Revenues

Revenues accounted in this item called *Operating Revenues* are of two types (the definitions are taken from [1]).

**The Transport Revenues** that “shall include the revenues generated by the performance of air transportation services”. This category can be subdivided in “revenues generated from the transportation of passengers” – these are the *Passenger Revenues* analyzed in the previous section – and “revenues generated by the transportation of property and mail” – these are usually called *Cargo Revenues*.

**The Transport-Related Revenues** that “shall include monies received for providing air transportation facilities associated with the performance of services which flow from and are incidental to air transportation services performed by the air carrier”. Among them are “in-flight sales, restaurant and food service (ground), rental of property or equipment, limousine service, interchange sales, and cargo pick-up and delivery charges”.

Thus, even though for the airlines under analysis in this study, most revenues are generated from the transportation of passengers, total operating revenues also include other types of revenues that may be quite significant for some airlines. Figures 4-9 and 4-10 illustrate the significance of passenger revenues as a part of total operating revenues.

As concerns Figure 4-9 the most striking observation is probably the difference between the whole industry and the Majors. On average, the Majors rely much more on passenger revenues than an average US airline. Indeed, the portion of passenger revenues in total operating revenues is about 15 percentage points higher for the major airlines. This is hardly surprising since some of the airlines used to compute

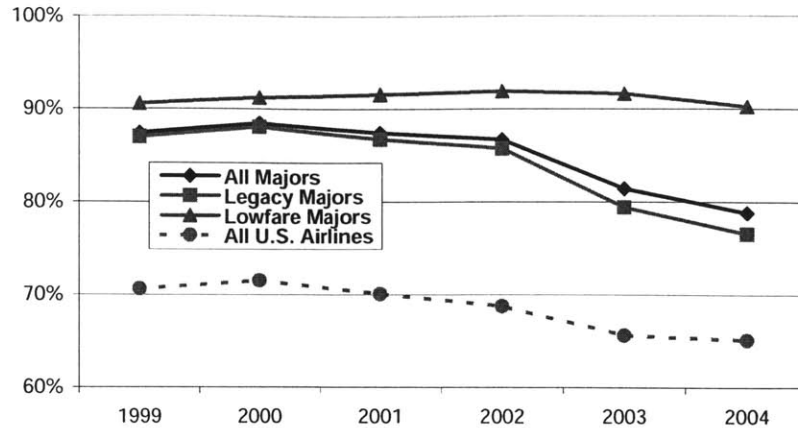


Figure 4-9: Portion of passenger revenues in total operating revenues, by group

the average for the whole industry are cargo carriers. It is also worth noticing that the trends were quite different for the two subsets of Majors. Whereas the portion of passenger revenues in total operating revenues decreased considerably since 2000 for legacy carriers – from more than 88% in 2000 to less than 77% in 2004 – it slightly increased between 1999 and 2002 and started decreasing since then for lowfare carriers – from 90.6% in 1999 to 90.2% in 2004 through almost 92% in 2002. It should be emphasized that this portion is on average higher for the Lowfares than for the Legacies. There are multiple reasons for this effect. First the Lowfare airlines are usually more passengers-focused in the sense their cargo division is less developed. And then they have low so-called *Transport-Related Revenues*. They usually do not own neither additional equipment to rent, nor ground services facilities – restaurant or limousine.

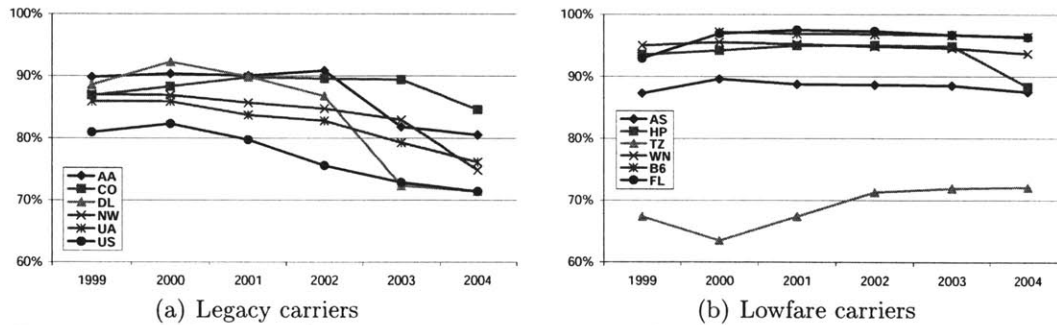


Figure 4-10: Portion of passenger revenues in total operating revenues, by airline

On Figure 4-10, it is quite striking that for both the legacy and the lowfare groups, the airlines that do the best during the period under analysis – *i.e.* the ones with the highest operating margin, see Section 4.2.2 – are those that are the most passenger-centered, in other words the ones whose portion of revenues that is passenger revenues is the highest. Among the Legacies, these airlines are CO and, to a lower extent DL (DL did quite well in 1999 and 2000, when it had one of the highest portion of revenues

that was passenger revenues, but in 2003 and 2004, it was the most unprofitable and the least passenger-centered Majors. For the lowfare subset, these airlines are B6, WN and FL. What about the causality? It is quite hard to say which one came first. Do airlines that are not profitable try to diversify their revenues into activities not directly related to their main job in order to avoid competition from newer lowfare airlines that are generally highly passenger focused? Or do they lose money because they have gone too far away from their main job and because their structure is not well adapted to cargo service?

## 4.2 Operating Profitability

After the costs analysis presented in Chapter 2 and the revenues investigation in the first section of this chapter, it is quite natural to combine them and look at the airlines' profitability and determine if the airlines were making money in operations. Thus the basic idea of any profitability analysis is to compare costs and revenues. Many measures of profitability can be used. In this section, three of them are analyzed. Since each one of these measures presents the profitability issue from a different point of view, the combination of them can provide useful insights. Note that to be consistent with what was done previously in this study, only the operating profits are investigated.

### 4.2.1 Unit Cost, Unit Revenue & Unit Income

The easiest way to analyze the operating performance of an airline is to look simultaneously at unit operating cost and unit operating revenue<sup>3</sup>. Recall that, since both these measures are computed from ASMs, comparing them is absolutely consistent.

$$\textit{Operating Income} = \textit{Operating Revenues} - \textit{Operating Costs}$$

and thus

$$\begin{aligned}\textit{Unit Income} &= \frac{\textit{Operating Income}}{\textit{ASMs}} \\ &= (\textit{Unit Revenues} - \textit{Unit Cost}).\end{aligned}$$

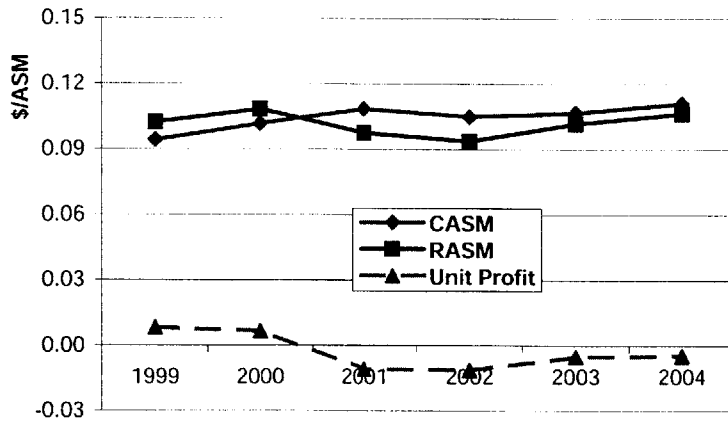
An airline is said to operate profitably if its unit operating revenue is higher than its unit operating cost, or in other words, if its unit operating income – often shortened to unit income in this document – is positive. When it is higher than zero (respectively smaller than zero), it is sometimes called unit profit (respectively unit loss). The variations in unit income are plotted in dashed line for each group of Majors – *i.e.* for the group of Majors and its two subsets – on Figure 4-11. In order to better understand the changes in unit income, both the unit cost and the unit revenue are also plotted on the graphs.

Historical data (not presented here) show that, before 2001 the industry was profitable and that both CASM and RASM were increasing. But Figure 4-11 reveals that in 2001 the situation changed dramatically, at least for the Majors. In 2001, the unit revenue started contracting and dropped below the unit cost, that was still

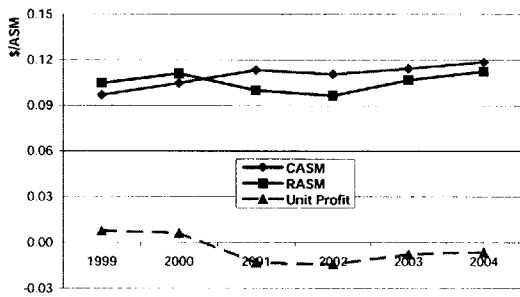
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<sup>3</sup>Unit operating revenue is often shortened to unit revenue. Note also that unit operating revenue is built from total operating revenues and not only from passenger revenues.

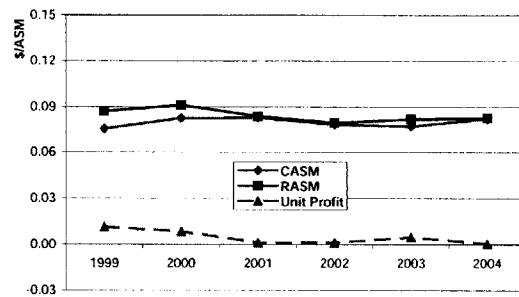




(a) All Majors



(b) Legacy Majors



(c) Lowfare Majors

Figure 4-11: Unit cost, unit revenue and unit income, by group

increasing. The Majors' initiatives to cut costs demonstrated some success as soon as 2002 and then the unit cost decreased, following unit revenue's trend. As a result, the Majors experienced tremendous losses in 2001 and 2002 (about 1.1¢/ASM). In 2003, both CASM and RASM were back to growth and the good news is that, because RASM's rate of growth was higher than CASM's one, their convergence led to smaller losses (the average unit income was  $-.5\text{¢}/\text{ASM}$  in 2003 and in 2004). Since 2003, both RASM and CASM have increased, like pre- 2001. But the situation has been inverted, with the unit cost above the unit revenue.

As concerns the Legacies, the situation is even worse. They lost about 1.3¢/ASM at the peak of the crisis (in 2001 and 2002) and from  $.8\text{¢}/\text{ASM}$  to  $.6\text{¢}/\text{ASM}$  for the two-year period 2003-2004.

On the Lowfares side, carriers have never stopped to be profitable on average, even though in 2001 these carriers almost operated at the break-even point (a modest  $.1\text{¢}/\text{ASM}$  as unit income). The main difference between the legacy and the lowfare carriers lies in the fact that Lowfares were able to cut unit cost sooner and to maintain the decrease during three consecutive years at the peak of the crisis (from 2000 to 2003, their average unit cost decreased by more than 6%). The results for the year 2004 are

more surprising. Whereas the Legacies improved their results and converged to the break-even point (RASM and CASM get closer), in 2004 the Lowfares reported results that were worse than those for 2001. With an unit income below  $.1\text{¢}/\text{ASM}$ , they were not far above the break-even point. This is mainly due to a significant growth in unit cost. A deeper analysis shows that this unexpected result can be attributed for the most part to the tremendous losses issued by ATA in 2004<sup>4</sup>. If one computes the unit cost, unit revenue and unit income for the five other lowfare carriers, the results for 2004 are about the same as the results for 2003 (about  $.4\text{¢}/\text{ASM}$  for the unit income). Yet, even without ATA, the Lowfares' results for 2004 were not very satisfying because for the first time since 2000, unit costs rose in 2004 (by about 2.5%).

Among airlines, the differences in unit cost were sometimes very significant. Investigating the consequences of an high unit cost from a profitability point of view can be very insightful. One could compare United Airlines's situation with JetBlue's in 2004. Note that since both airlines had almost the same stage length – 1,293 and 1,338 miles respectively – it makes sense to compare their unit cost. While JetBlue's CASM ex-Transport Related expenses was about  $6.1\text{¢}/\text{ASM}$ , United Airlines spent on average  $9.7\text{¢}$  to produce one ASM (ex-Transport Related expenses), which is about 160% as much as JetBlue. As a result, to be able to generate the same unit profit – everything else being equal – UA had to obtain 160% as much RASM as B6. For the sake of the argument, one can assume that all operating revenues are passenger revenues. It then follows that UA had to yield 160% as much PRASM as B6. Using the equation from Section 4.1.1 leads to the conclusion that this can be done through any of the following actions:

- Filling 160% as many seats. This is physically impossible since it would require for UA a passenger load factor of about 132% (in 2004, B6's load factor was 83%).
- Selling its seats at fares 60% higher than B6's fares. Yield convergence detailed in Section 4.1.1 makes this very unlikely even though in 2004, UA still had a yield advantage over B6 of about 33%.
- A combination of both.

This argument illustrates quite well how difficult it was for an airline that had a high unit cost to be profitable, especially in an environment of decreasing yield.

Looking simultaneously at the unit cost and the unit revenue gives a lot of information regarding the reasons why an airline is profitable or not. Did it become unprofitable because its unit cost increased? Or is it due to a unit revenue that is too low? But since each airline has its own structure, investigating the profitability issue by comparing the unit cost and the unit revenue between airlines may not be the best way to do it. Considering the operating margin may be a better idea to compare the profitability of airlines with very different structures.

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<sup>4</sup>At this point, it should be reminded that the airline filed for Chapter 11 bankruptcy protection on October 2004.

## 4.2.2 Operating Margin

The *Operating Margin* is a way of investigating the profitability of a company. The *Bureau of Transportation Statistics (BTS)* defines the operating margin as the airline's operating incomes – *i.e.* the total operating revenues discounted by the total operating expenses – expressed as a percentage of the total operating revenues<sup>5</sup>.

$$\begin{aligned} \text{Operating Margin} &= \frac{\text{Operating Income}}{\text{Operating Revenues}} \\ &= \frac{(\text{Operating Revenues} - \text{Operating Expenses})}{\text{Operating Revenues}} \end{aligned}$$

or, using unit revenue and unit cost

$$\begin{aligned} \text{Operating Margin} &= \frac{\text{Unit Revenue} - \text{Unit Cost}}{\text{Unit Revenue}} \\ &= 1 - \left( \frac{\text{Unit Cost}}{\text{Unit Revenue}} \right) \end{aligned}$$

The variations in operating margin from 1999 to 2004 are depicted on Figure 4-12 for each group of airline. For the reason above explained, the operating margin of a subset of lowfare Majors – only TZ was removed from the “classical” lowfare subset – was added to the figure. Individual data – *i.e.* data for each airline – are presented on Figure 4-13.

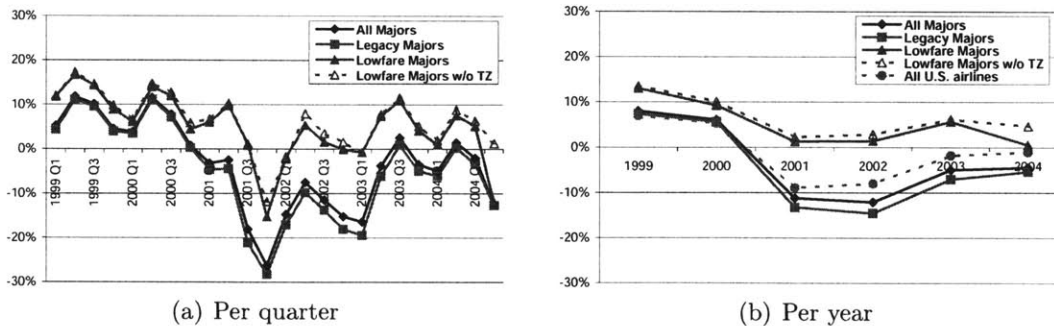


Figure 4-12: Operating margin, by group

Figure 4-12(a) points out very well the seasonality of this industry. Except in 2001, Q2 and Q3 have always been better – *i.e.* more profitable or less unprofitable – than Q1 and Q4.

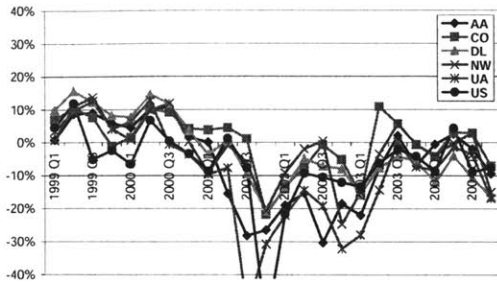
<sup>5</sup>More precisely, in any of its quarterly release regarding airlines financial data, the BTS defines “domestic operating margin measures operating profit or loss as a percentage of the airline’s total domestic operating revenue”.

But the figure also indicates that the Majors as a group were profitable until the end of 2000 and started to be unprofitable as early as the first quarter of 2001. After 9/11 their operating margin suddenly dropped to its deepest level (as low as -28% for the 4<sup>th</sup> quarter of 2001). Thus, even though it would obviously be false to claim that 9/11 did not affect the airline industry, this figure shows that the first symptoms of the crisis could be observed before the terrorist attacks. Since then, profits have become very scarce. Indeed, since 2001, the group of Majors has only reported two profitable quarters – the 3<sup>rd</sup> quarter of 2003 and the 2<sup>nd</sup> of 2004, with respectively +2.5% and +1.5% of operating margin – but no profitable year. About the legacy subset, its profitability performance really looks like that of the group of Majors especially before 9/11. Since the terrorist attacks, Legacies' operating margin has been about 2 to 3 percentage points below the average for the 12 Majors. Note that on average, during the year 2002, Legacies were losing almost 15¢ on every dollar of revenue.

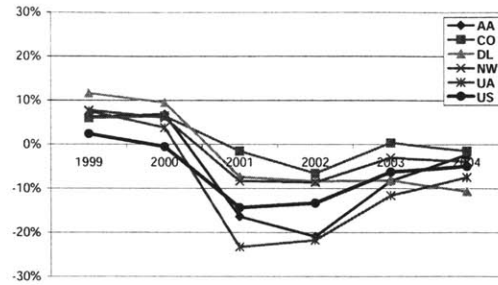
As regards the Lowfares, their performance was better than that of the legacy group. Some similarities can be observed in the variations in operating margin for the two groups of Majors – the direction of variation were very similar. However, the magnitude of those variations were smaller for the lowfare Majors. As a result, the Lowfares as a group did post few enough unprofitable quarterly results to be able to keep positive their yearly operating margin during the period 1999-2004. More precisely, the Lowfares were unprofitable quarters in 2001 Q4, 2002 Q1, 2003 Q1 and in 2004 Q4 (if TZ is not taken into account, the 5 other lowfare Majors were profitable during the last quarter of 2004).

It is worth noticing that, whereas they were quite similar in 1999 and in 2000 – *i.e.* before 9/11 attacks – the performance of the group of Majors and that of the whole industry started diverging in 2001. The rationale behind this is again to search for on the cargo side. Indeed, cargo business was much less affected by 9/11 than passenger business and thus, relatively good results from cargo airlines helped to balance bad results from passenger airlines and to make industry's operating margin higher than Majors' one.

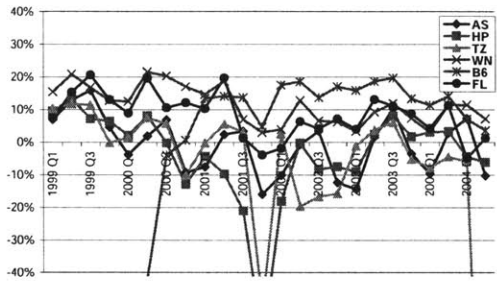
Individual data presented on Figure 4-13 highlight the differences between the airlines. As concerns the Legacies, it is quite striking that all of them posted operating profits in 2000. Since then, their situation has deteriorated even though some of them were able to keep their operating margin not too far from the break-even point. CO lay at the top of the range to the extent that between 2001 and 2004, CO had the highest operating margin among the Majors. Moreover, CO is the only airline from the legacy group that did post a profitable year after 2001 (in 2003, the airline's operating margin was +.4%). At the other extreme are two legacy Majors, namely DL and UA, that have not reported any quarterly operating profit since 2001. Yet, the situation of these two airlines are highly dissimilar. Whereas DL's operating margin has kept decreasing since 2000, UA has posted rising operating margin for the period 2001-2004.



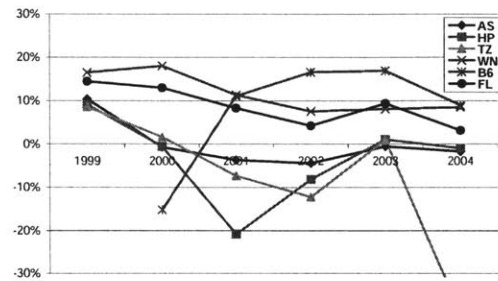
(a) Legacy Majors, per quarter



(b) Legacy Majors, per year



(c) Lowfare Majors, per quarter



(d) Lowfare Majors, per year

Figure 4-13: Operating margin, by airline

On the Lowfares side, the results were much better. All the lowfare Majors posted operating profits in 1999. In 2000, with the exception of JetBlue that started operating this year, they were all close to the break-even point – AS (-.7%), HP (-.6%) and TZ (+1.6%) – or largely above – WN was at +18% while FL reported +13%. Again, in 2004, with the exception of TZ that filed for bankruptcy protection, all the Lowfares were close the break-even point – AS (-1.7%) and HP (-1.0%) – or above – WN (+8.5%), B6 (+8.9%) and FL (+3.2%). Between 2000 and 2004, WN, B6 and FL were consistently profitable. Actually WN has not report any unprofitable quarter. This also holds for B6 that never stopped being profitable since its forth quarter of operations. As for FL, the airline posted only three unprofitable quarters. In the meanwhile, TZ, HP and AS have struggled to post operating profits.

Note the tremendous losses by TZ in 2004 due to a huge operating loss in the fourth quarter, with an operating margin as low as -150%. Such a operating margin is able to distort by itself the result of the lowfare group. That is why when dealing with profitability, it was decided to compute also the result of an alternative lowfare group composed by the five other lowfare Majors.

### 4.2.3 Break-even Load Factor

*Break-even Load Factor* (or *BELF*) is the average percentage of seats that must be sold for the airline's operating revenues to break even with the airline's operating costs. In this definition, it is assumed that the seats are sold at current average fares and that the current non passenger revenues hold.

$$\begin{aligned} \text{Passenger Revenues} &= (\text{RPMs} \cdot \text{Yield}) \\ &= (\text{ASMs} \cdot \text{ALF}) \cdot \text{Yield}. \end{aligned}$$

But at the break-even point, the operating costs are equal to the operating revenues, *i.e.* the passenger revenues plus the non passenger revenues

$$\begin{aligned} \text{Operating Costs} &= \text{Operating Revenues} \\ &= (\text{ASMs} \cdot \text{BELF}) \cdot \text{Yield} + \text{Non Passenger Revenues}, \end{aligned}$$

and thus the BLF may be computed from the following formula

$$\text{BELF} = \frac{\text{Operating Costs} - \text{Non Passenger Revenues}}{\text{ASMs} \cdot \text{Yield}}.$$

Using some of the previous equations, one can make the ALF visible in the formula

$$\text{BELF} = \text{ALF} \cdot \left(1 - \frac{\text{Operating Incomes}}{\text{Passenger Revenues}}\right).$$

The break-even load factor is a measure of profitability that is very revenue oriented. Indeed, taking the operating costs as a given, it determines how much passenger revenues are needed to break even. The value of the BELF for each airline is reported, on a yearly basis, in Table 4.5. The BELF is hardly useful in itself but must be paralleled to the ALF to provide more insights. Thus the value of the ALF is also indicated in this table for the sake of comparison.

The results presented in Table 4.5 obviously validate the trends previously noted. Before 2001, the difference between the ALF and the BELF was maximal for both the subsets of airlines. While the Legacies could have afforded to sell 7 to 8% less seats without losing any money, the margin was even more substantial for the Lowfares since selling 11 to 14% less seats would have kept them away from losses. But in 2001, the situation worsened, especially for the Legacies. In 2002, to break even, the legacy Majors must have filled about 85% of the seats they offered in their aircraft. Given that in 2002 their ALF was 73%, it simply means that, just to prevent them from any loss, they must have sold about 16% more seats – again with the constraint

Table 4.5: Average load factor *vs.* break-even load factor, by group and by airline

1999		2000		2001		2002		2003		2004	
<i>ALF</i>	<i>BELF</i>	<i>ALF</i>	<i>BELF</i>	<i>ALF</i>	<i>BELF</i>	<i>ALF</i>	<i>BELF</i>	<i>ALF</i>	<i>BELF</i>	<i>ALF</i>	<i>BELF</i>

**All Majors**

<b>Average</b>	71%	65%	72%	68%	70%	80%	72%	82%	73%	79%	76%	80%
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**Legacy Majors**

<b>AA</b>	70%	65%	72%	67%	69%	82%	71%	87%	73%	80%	75%	77%
<b>CO</b>	73%	68%	74%	69%	72%	74%	74%	80%	76%	75%	78%	79%
<b>DL</b>	72%	63%	73%	66%	69%	75%	72%	79%	74%	83%	76%	87%
<b>NW</b>	75%	68%	77%	71%	74%	82%	77%	85%	77%	80%	80%	84%
<b>UA</b>	71%	65%	72%	69%	71%	90%	74%	93%	76%	88%	79%	87%
<b>US</b>	70%	68%	70%	71%	69%	81%	71%	84%	73%	80%	75%	80%
<b>Average</b>	72%	66%	73%	68%	71%	81%	73%	85%	75%	82%	77%	82%

**Lowfare Majors**

<b>AS</b>	68%	60%	69%	70%	68%	71%	68%	71%	70%	70%	73%	74%
<b>HP</b>	68%	62%	70%	71%	72%	88%	74%	80%	76%	76%	77%	78%
<b>TZ</b>	74%	64%	73%	71%	72%	80%	70%	82%	69%	68%	70%	108%
<b>WN</b>	69%	57%	70%	57%	68%	60%	66%	61%	67%	61%	70%	63%
<b>B6</b>	-	-	73%	84%	77%	68%	83%	69%	84%	69%	83%	75%
<b>FL</b>	62%	53%	70%	61%	69%	63%	67%	65%	71%	64%	71%	68%
<b>Average</b>	69%	59%	71%	63%	70%	69%	69%	68%	71%	66%	73%	72%

of an unchanged average fare. Given the overcapacity and the depressed demand, this was simply impossible. Since then, ALF and BELF have converged both because of an increasing ALF and because of a decreasing BELF.

### 4.3 Chapter Summary

For the Legacies, the total operating revenues decreased between 2000 and 2002 and then rebounded in 2002. For the Lowfares, they increased every single year between 2000 and 2004. Concerning the origin of operating revenues, analyses reveal that Legacies' engagement in cargo business and in other types of revenues increased during the period under study. On the other side, Lowfares remained very focused on passenger business. It should also be noticed that the fares declined immediately after 9/11, and then remained constant in 2003 and 2004 (as measured in constant dollars). Since during the same period, the average stage length increased, the average passenger yield for the Majors actually dropped meaning. But Legacies' yield, that was much higher in 2000, decreased more than Lowfares' yield and thus the yield of the two subsets converged.

As regards profitability, before 2001, both the Legacies and the Lowfares were profitable. But in 2001, the unit revenue started declining for both groups. On the contrary to what happened to the Lowfares that were able to control their unit cost and stay profitable on average, Legacies' unit revenue dropped below their unit cost and thus, Legacies have lost money in operations since 2001. But Legacies' profitability has been improving since 2002 and they have been closing most of the gap between costs and revenues. Lowfares' situation was slightly better. Even though they barely broke even in 2001 and 2002, on average they were back to profits in 2003 and in 2004. Regarding the whole industry, its results are slightly better than those of the Legacies because cargo business was less affected by 9/11 than passenger business. Individual data show that, whereas all Legacies laid in a quite narrow range, Lowfares' results reveal much more discrepancies among the lowfare group. On the contrary to B6, WN and FL that were consistently profitable, HP, TZ, and to a least extent AS reported significant losses.



# Chapter 5

## Conclusions

Since 2001, the US airline industry has faced an unprecedented set of challenges. Therefore, following the terrorist attack of September 11, 2001, the airline industry reported tremendous losses and several of the largest airlines went into bankruptcy. To recover from this situation and try to remain financially viable, airlines have taken a lot of measures. As a result, the airline industry has been very dynamic industry over the last few years.

The first objective of this thesis was to investigate the main changes that occurred in this industry between 1999 and 2004. This work focused both on financial and operating conditions of the airlines. Airlines' performance was analyzed in terms of traffic and productivity, as well as in terms of costs, revenues and profitability. Only the performance of a subset of the whole industry, namely the 12 main passenger Majors, was examined. These 12 airlines were categorized into two groups, the Legacies and the Lowfares. The former subset comprised American Airlines, Continental Airlines, Delta Air Lines, Northwest Airlines, United Airlines and US Airways. The lowfare group consisted of Alaska Airlines, America West Airlines, America Trans Air (ATA), Southwest Airlines, JetBlue Airways and Airtran Airways. The results for these two subsets were compared throughout this thesis.

Regarding the data used for the investigation, the main source was the Form 41 reports. The Form 41 is a financial statement that each US airline must report to the US DOT. It includes balance sheets, income statements, and aircraft operating expenses by equipment type, as well as summary operating statistics by equipment type. It also includes traffic schedules.

## 5.1 Traffic & Capacity

In 2001, US passenger traffic carried by the Majors dropped steeply because of the terrorist attacks of 9/11. It then remained at these low levels in 2002 as well as in 2003 but was finally back to growth in 2004. As a result, 2000 levels were about as high as 2004 levels – slightly above or below, depending on the metric used to measure passenger traffic (enplanements or RPMs). For the whole industry, the traffic performance was slightly better than for the group of Majors. The growth experienced by regional jets can explain this. Only the Lowfares were able to keep expanding in such a depressed environment. They never stopped growing and thus, between 1999 and 2004, they gained about 6 percentage points in passenger traffic share (as measured in RPMs), up to 18% in 2004.

As concerns the cargo traffic, it rebounded more strongly than the passenger traffic. But the Majors, and especially the legacy airlines, failed to take advantage of that recovery. Whereas total US cargo traffic almost gained 30% between 1999 and 2004, cargo traffic carried by the Majors decreased by more than 10%. Indeed, even though the Lowfares actually increased their cargo traffic by about 20% between 1999 and 2004, they were so small in the cargo business that their expansion was far from balancing the decline of their network competitors. As a result, cargo traffic share for the 12 Majors contracted from 50% in 1999, down to 34% five years later.

On the supply side, the two groups of airlines reacted to adjust their capacity to the traffic. In response to the overall decrease in the demand, legacy airlines reduced their passenger capacity. Yet, these adjustments were delayed – legacy airlines were not able to cut capacity fast enough to adjust to the steep decrease in demand – resulting in extra passenger capacity in 2001. But in 2002 and 2003, Legacies cut their capacity at a higher rate than the demand. Therefore, less extra capacity was produced. In 2004, the Legacies increased their passenger capacity to capture the rebound in demand. It is worth highlighting that the rate of growth of capacity was below its equivalent for demand. On the other hand, the Lowfares increased their capacity and gain some traffic share.

Some interesting trend can be noted concerning the characteristics of this traffic. First, the load factor, that measured the way the supply match the demand (*i.e.* the extra capacity), increased for both subsets of Majors. In 2004, the Majors were able to fill their airplanes to 76% on average, that is 5 percentage points higher than in 1999. Overall Lowfares' load factor is slightly below Legacies' even though JetBlue has had the highest load factor since 2001.

Data from Form 41 also reveal that, on the contrary to the size of the aircraft that did not change significantly between 1999 and 2004, the average stage length (ASL) substantially increased no matter the subset of Majors considered. Actually, it increased by about 150 miles for both types, up to 1,100 miles for the Legacies and

740 miles for airlines from the lowfare subset. It is also worth highlighting that the lowfare airlines flew smaller aircraft (on average 30 seats smaller) on shorter flights (on average, about 350 miles shorter) than the Legacies. These differences are due to the fact that airlines from the lowfare subset did not operate transoceanic flights and much fewer transcontinental flights than their legacy competitors. The most obvious exception is JetBlue that had the highest ASL thanks to its many coast-to-coast flights. For the ASL of the whole industry, the trend is opposite. The ASL decreased immediately after 2001 mainly because of the tremendous growth experienced by regional jets in the US.

## 5.2 Costs & Productivity

Because of the depressed demand after 9/11, costs mattered more than ever. Therefore, the Majors, as a group, did reduce their total operating costs. But this decrease did not really last. Started in 2002, it ended in 2003, resulting in a small 6% drop during this two-year period. Because the total operating expenses strongly increased in 2001 as well as in 2004, the variation for the whole period (2000-2004) is actually positive (+8%). But these variations did not match the variations in capacity since the capacity offered by the Majors did not change substantially between 2000 and 2004 (-1%). As a result the average unit cost for the Majors gained about 9%. The trend was very similar for the Legacies but the gain in unit cost was slightly higher (+13%).

The story for the Lowfares is significantly different. Their operating expenses increased every single year between 2000 and 2004 to support the increase in capacity. As a matter of fact, for 2000-2004, the total variation in capacity and in operating expenses were quite similar (+42% *versus* +41%). As a result, Lowfares' unit cost did not change much between 2000 and 2004 and remained below Legacies'. Actually it slightly decreased in 2002 and 2003 but this was balanced by the raise in 2004. Note that if one does not take into account TZ's results for 2004<sup>1</sup>, Lowfares' unit cost actually decreased by 4% during the four-year period. As a result, the gap in unit cost between the two subsets of Majors widened. From 2.2¢/ASM in 2000, the difference reached 3.6¢/ASM in 2004. Therefore, in spite of their cost-cutting efforts, legacy carriers were less cost competitive with lowfare airlines in 2004 than they were in 2000.

When adjusting for the average stage length, inter-airline comparisons show that every Lowfare had a lower unit cost than any Legacy. The results presented on Figure 5-1 also reveal that, with the exception of AS whose status is not very clear, it is very easy to separate the two types of airlines according to their unit cost.

The functional cost categorization examined in this thesis showed that network airlines incurred higher unit cost in almost every – if not all – facet of their operations. The main differences between the two business models in terms of unit cost were observed in the Passenger Service expenses as well as in Transport Related expenses. As a matter of fact, even though the gap decreased during the period under analysis, in 2004 the Legacies still spent about 65% more dollars per RPM in Passenger Service than their lowfare competitors. Regarding the Transport Related expenses, the huge difference (1.7¢/ASM for the Legacies *vs.* .1¢/ASM for the Lowfares) comes from the fact that a great majority of regional capacity transfer from the Majors to the regional carriers is due to the Legacies.

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<sup>1</sup>TZ reported a unexpectedly high unit cost when it filed for bankruptcy in 2004

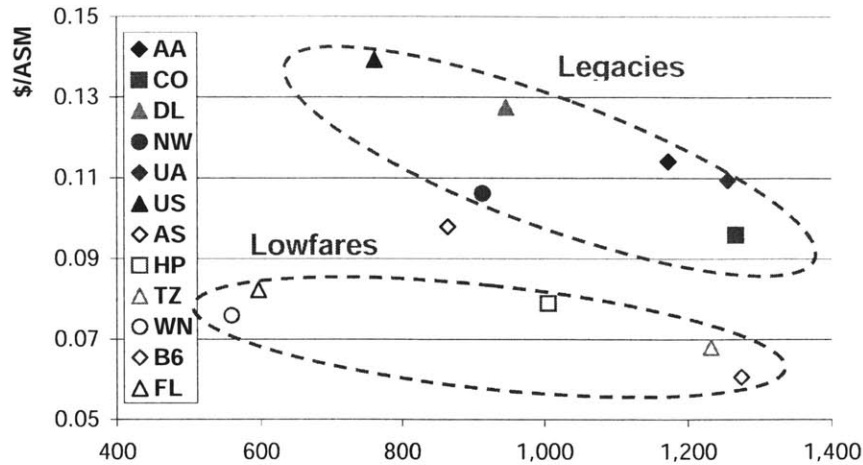


Figure 5-1: Unit cost *versus* average stage length in 2003

The categorization also highlighted some trends that were shared by both subsets of Majors. The Flying Operations expenses, for instance, increased for almost every airline, probably because of increasing fuel prices. On the contrary, the development of e-commerce allowed airlines to reduce their expenses related to Promotion & Sales.

Some major changes also occurred in the field of productivity and firstly in labor productivity. The number of people employed by the Majors was reduced by almost 20% between 2000 and 2004. Since in 2004 the traffic was back to 2000 levels, labor productivity, as measured in ASMs per employee, increased on average by more than 20% among the Majors. For the Lowfares, improvements in labor productivity could also be observed but they were due to a much faster growth in capacity than in employment. It is worth noticing that on average, Lowfares' labor productivity was 10 to 15% higher than Legacies'. This was all the more a good performance for the Lowfares that they had a lower ASL than the Legacies. As regards specifically the pilots, it was shown that even though the number of block-hours per pilot increased for the legacy subset and stayed the same for the lowfare subset, in 2004 the Lowfares' pilots were still more "productive" (about 17% more) than those employed by the legacy airlines.

Concerning aircraft productivity, the Lowfares largely led the way for aircraft utilization (block-hours per aircraft-day), especially if one adjusts aircraft utilization for average stage length. On the contrary, when dealing with ASMs per aircraft-day, there is no real discrepancy between the two types of airlines. The only clear trend is that the higher the ASL, the more ASMs per aircraft-day are produced.

Another area where significant improvements were made is in the way airlines used fuel. During the last few years, fuel prices have dramatically increased. Therefore fuel efficiency has been one of the top priority for airlines. Actually, every one of the 12 Majors increased its fuel efficiency, as measured in ASMs per gallon of fuel,

between 2000 and 2004 resulting in a 11% gain for the Majors as a group. Data also showed that fuel efficiency depends on both the average stage length and the average fleet age. The longer an airline flies, the more ASMs per gallon of fuel it produces. Similarly, the younger its fleets, the more productive it is.

## 5.3 Revenues & Profitability

Not very surprisingly, the variations in total operating revenues quite followed the variations in traffic. For the Legacies, as well as for the group of Majors, they decreased between 2000 and 2002 and rebounded between 2002 and 2004 to reach in 2004 quite the same levels than in 2000. The total operating revenues of the Lowfares also varied in correspondence with their traffic since they increased every single year between 2000 and 2004.

Concerning the origin of operating revenues, analyses reveal that Legacies' engagement in cargo business and in other types of revenues increased during the period under study. In 2004, Legacies' passenger revenues accounted for "only" 65% of their operating revenues. On the other side, Lowfares remained very focused on passenger business (at about 90%).

On the fare side, it is very obvious how the average fare declined during the peak of the crisis (2001 and 2002), especially if it is measured in constant dollars. In 2003 and in 2004, airlines were able to increase the average fare in nominal dollars at about the same rate than the cost of living and thus, average fare as measured in constant dollars did not really grow. The result is a decline in average fare between 2000 and 2004 that is all the more serious that the average stage length increased during the same period of time.

As for the passenger yield, a better metric to really investigate passenger revenues, two main changes occurred during the period under analysis. First airlines lost pricing power and thus, their yield decreased – by about 15% for the Majors between 2000 and 2004. And then yield of the two subsets converged. Indeed, Legacies' yield, that was much higher in 2000, decreased more than Lowfares' yield. Legacies were not able to fully preserve their revenue premium. And thus, if in 2003 one could still separate airlines from the two groups according to their yield (see Figure 5-2), the difference is less obvious than when dealing with unit cost. Note that from these results, Alaska Airlines' categorization within the lowfare group may be questioned.

For the Legacies, increasing load-factor could not balance the decline in yield and the increase in unit cost. As a result, Legacies' profitability deteriorated after 9/11 and legacy airlines have lost money in operations since 2001. But Legacies' profitability has been improving since 2002 and they have been closing most of the gap between costs and revenues. From +6¢/ per ASM in 2000, Legacies' unit income dropped down to –13¢ per ASM in 2002 and rebounded to –6¢ per ASM in 2004. On the lowfare side, things were better on average but not as good as before 9/11. From 9¢ per ASM, Lowfares' unit income contracted to less than 1¢ per ASM in 2004<sup>2</sup>. Analysis concerning the break-even load factor shows that, to return to profitability,

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<sup>2</sup>Actually, it was 4¢ per ASM in 2004 if one does not take into account TZ's huge losses in 2004.

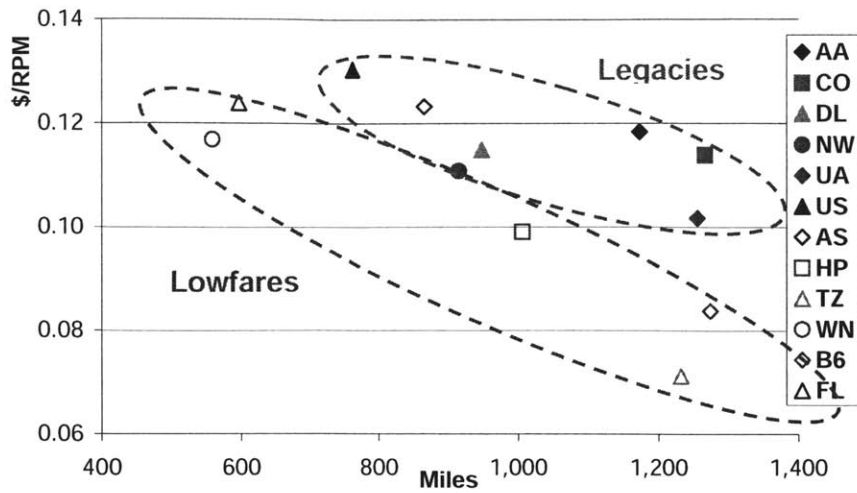


Figure 5-2: Yield *versus* average stage length in 2003

Legacies should have sold about 7% more seats in 2004 at the same average fare. Individual data show that, whereas all Legacies laid in a quite narrow range, Lowfares' results reveal much more discrepancies among the lowfare group. On the contrary to B6, WN and FL that were consistently profitable, HP, TZ, and to a least extent AS reported significant losses.



## 5.4 Future Research

The airline industry has been very dynamic over the past few years. Hardly a week goes by without hearing about important changes decided by some airlines. Therefore, what was true yesterday is not still necessarily true today. As a result, it is quite obvious that the initial work for any future analysis would be to update traffic and financial data and investigate to what extent the trends highlighted in this thesis have continued. And if some of these trends ended, to understand the reasons of this change.

In this thesis, only the main changes were analyzed for the sake of concision. But the Form 41 reports are such an abundant data sources that it is very easy to think of items that would be of interest for further work, including:

**Labor** A more in-depth investigation of the labor issues. This could include analyses about outsourcing, as well as about wages and salaries.

**Regional airlines** In this thesis, it was showed that the regional traffic has been expanding over the past few years. Therefore, an analysis specifically focused on the performance of regional carriers could be interesting to investigate the differences between the Majors and the Regionals.

**Bankruptcy** Several of the largest US airlines have filled for bankruptcy protection over the past few years. It is sometimes claimed that the airlines that operate under Chapter 11 have a competitive advantage over the competitors. It could then be interesting to examine more specifically the situation of the airlines that operate under bankruptcy protection or that of the airlines that have recently emerged.

**Differences with other markets** A comparison of the US market with other markets such as the European market or the booming Asian market could also reveal interesting trends. Note that because there is no real equivalent of the Form 41 in Europe or in Asia, finding relevant data for these markets is much less easy than for the US market.



# Appendix A

Landscape of the US Airlines  
Industry in 2004, from [6]

Table A.1: US airlines as of 2004

Majors (19)	Nationals (35)	Regionals (31)	Commuters (55)
Airtran	ABX	Aerodynamics	40-Mile
Alaska	Air Transport International	Ameristar	Air Midwest
America West	Air Wisconsin	Asia Pacific	Air St. Thomas
American	Allegiant	Capital Cargo	Alaska Central Express
American Eagle	Aloha	Caribbean Sun	Alaska Seaplane Service
ATA	Amerijet International	Casino Express	Aloha Island
Atlas/Polar	ASTAR	Centurion	Arctic Circle
Comair	Atlantic Southeast	Chicago Express	Arctic Transportation
Continental	Champion	Custom	Arizona Express
Delta	Continental Micronesia	Express.Net	Baker
ExpressJet	Evergreen International	Falcon Air Express	Bemidji
FedEx	Executive	Freedom	Bering
JetBlue	Florida West	Gulf & Caribbean	Big Sky
Northwest	Frontier	Kitty Hawk	Boston-Maine
SkyWest	Gemini	Lynden	Cape Air
Southwest	Hawaiian	NetJets	Cape Smythe
United	Horizon	Northern	Chautauqua
UPS	Independence	Pace	Colgan
US Airways	Kalitta	Pan American	Commutair
	Mesa	Planet	Corporate
	Mesaba	Primaris	Ellis Air Taxi
	Miami	Renown	ERA Aviation
	Midwest	Sierra Pacific	Flying Boat
	North American	SkyKing	Frontier Flying Service
	Omni	Southeast	Grand Canyon Helicopters
	Pinnacle	Southern	Grant
	PSA	Sunworld International	Great Lakes
	Ryan International	Tatonduk	Gulfstream
	Spirit	Tradewinds	
	Sun Country	Victory	
	Transmeridian	Zantop	
	Trans States		
	USA 3000		
	USA Jet		
	World		
			Hageland
			Iliamna
			Inland Aviation
			Island Air Service
			LAB Flying Service
			Mountain Bird
			Pacific Island Aviation
			Peninsula
			Piedmont
			Promech
			Seaborne
			Servant
			Shuttle America
			Skagway
			Skyway
			Smokey Bay
			Spernak
			Tanana
			Taquan
			Valley Air Express
			Vintage Props & Jets
			Warbelow's
			Ward
			West Isle
			Wings of Alaska
			Wright
			Yute Air Alaska

## Appendix B

### Sample of data from Form 41

Table B.1: Sample from Form 41

Schedule <P5.B>  
 Carrier <American Airlines> <AA^>  
 Equipment <All Equipment Types>

	1999 1	1999 2	1999 3	1999 4	2000 1	2000 2	2000 3	2000 4
z110.0- Enplaned Passengers - Sch+NSch Serv	18,383,721	20,583,275	21,613,929	21,026,940	20,506,357	22,507,747	22,948,842	20,419,189
z140.0- RPM's - Sch. + NonSch. Serv. (000's)	24,643,721	28,211,597	30,080,417	27,532,550	27,021,923	30,450,055	31,584,539	27,538,775
z240.0- Rev. Ton Miles- Sch+NSch Serv.(000's)	2,896,838	3,334,022	3,552,382	3,342,041	3,250,706	3,619,107	3,736,707	3,342,612
z247.0- Freight Rev.Ton Miles-Sch+NSch(000's)	351,234	427,657	457,669	484,027	457,640	485,360	487,309	486,365
z249.0- Mail Rev. Ton Miles - Sch+NSch(000's)	82,171	86,022	87,933	105,058	91,614	89,521	91,803	103,143
z280.0- Avl. Ton Miles- Sch+NSch Serv.(000's)	5,598,443	6,065,668	6,490,868	6,353,843	6,240,594	6,427,727	6,764,019	6,521,998
z320.0- ASM's - Sch. + NonSch. Serv. (000's)	36,641,509	39,341,377	41,843,735	40,834,249	40,021,073	40,095,997	41,418,403	39,499,119
z410.0- Rev. Arcft. Miles- Sch+NSch Serv.	223,522,845	239,292,004	254,316,599	249,190,494	244,501,062	250,054,410	262,596,126	253,762,565
z510.0- Departures Performed - Sch+NSch Serv	187,087	199,146	214,199	216,862	211,692	215,333	223,879	217,243
z610.0- Rev. Airborne Hours	490,459	520,254	520,582	537,470	537,663	545,767	564,980	554,569
z620.0- NonRevenue Airborne Hours	1,854	1,343	1,497	1,393	1,497	1,474	1,554	1,590
z630.0- Block Hours	571,071	613,078	618,882	628,971	630,595	645,136	668,283	656,163
z650.0- Total Airborne Hours	492,313	521,597	522,079	538,863	539,160	547,241	566,534	556,159
z810.0- Aircraft Days - Carrier Equipment	58,722	60,511	62,798	63,983	63,470	64,066	65,733	65,808
z820.0- Aircraft Days - Carrier Routes	58,722	60,511	62,798	63,983	63,470	64,066	65,733	65,808
z921.0- Gallons of Fuel	666,367,719	723,284,444	765,661,740	744,852,512	730,006,419	758,929,100	796,235,774	760,189,681

Schedule <P5.B>  
 Carrier <Alaska Airlines> <AS^>  
 Equipment <All Equipment Types>

	1999 1	1999 2	1999 3	1999 4	2000 1	2000 2	2000 3	2000 4
z110.0- Enplaned Passengers - Sch+NSch Serv	3,071,355	3,439,225	3,813,320	3,295,867	3,167,722	3,432,220	3,654,957	3,269,786
z140.0- RPM's - Sch. + NonSch. Serv. (000's)	2,701,495	2,976,423	3,273,801	2,833,965	2,814,005	3,047,421	3,226,319	2,898,911
z240.0- Rev. Ton Miles- Sch+NSch Serv.(000's)	286,141	317,603	347,293	300,115	297,193	323,219	339,733	305,308
z247.0- Freight Rev.Ton Miles-Sch+NSch(000's)	13,842	17,711	17,381	14,180	13,652	16,290	14,764	12,753
z249.0- Mail Rev. Ton Miles - Sch+NSch(000's)	2,150	2,251	2,533	2,538	2,141	2,187	2,338	2,665
z280.0- Avl. Ton Miles- Sch+NSch Serv.(000's)	539,547	558,470	607,411	565,469	557,446	553,149	588,393	571,501
z320.0- ASM's - Sch. + NonSch. Serv. (000's)	4,117,530	4,266,124	4,650,722	4,316,290	4,231,293	4,210,102	4,494,299	4,379,131
z410.0- Rev. Arcft. Miles- Sch+NSch Serv.	30,903,782	32,012,642	34,880,567	32,536,717	32,259,057	32,068,174	34,227,556	33,369,661
z510.0- Departures Performed - Sch+NSch Serv	40,631	42,055	45,256	42,266	41,192	40,781	43,132	42,081
z610.0- Rev. Airborne Hours	72,790	74,595	80,389	76,596	76,130	74,257	78,620	78,531
z620.0- NonRevenue Airborne Hours	363	298	236	319	440	322	355	405
z630.0- Block Hours	85,090	87,081	94,061	89,332	88,715	86,393	91,847	91,938
z650.0- Total Airborne Hours	73,153	74,893	80,625	76,915	76,570	74,579	78,975	78,936
z810.0- Aircraft Days - Carrier Equipment	7,618	7,795	8,001	8,149	8,076	8,167	8,476	8,624
z820.0- Aircraft Days - Carrier Routes	7,618	7,795	8,001	8,149	8,076	8,167	8,476	8,624
z921.0- Gallons of Fuel	73,107,092	75,126,349	81,839,965	75,893,879	74,467,674	74,168,636	78,491,606	75,727,837

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