

Planes versus Passengers: Effects of Airline Alliances on Traffic and Seats

Attiat F. Ott¹ and Oswaldo J. Patino²

1. Introduction

A New York Times' article "Airlines Find a Cruising Speed" by Jad Monawad (October 9, 2010, pp.B1-B2), presented data which purports to show that airlines have embraced a practice that would put their planes on Furlough. In doing so, airlines are able to weather the effects of recessions and oil price shocks. The author presented data covering the period 2000-2010 documenting this trend—fewer total flights, with an expansion in flights load factor by more than 17 percent. The outcome is not unexpected: rising air fares, congestion at terminals with little if any empty seats.

The grounding of planes to fill seats to capacity is but another way for airlines, especially domestic airlines to stay afloat. The deregulation of the US Airlines Industry in the 1970's eliminated government control over fares, routes and market entry. With deregulation, entry accelerated and fares reduced especially for long distance travel. In 1978, airline profits reached record levels. This rosy outlook did not last. The 1979 oil crisis hit the airline industry hard by raising fuel costs. This adverse effect on airline profitability was further magnified by a slump in air traffic

¹ Attiat F. Ott, Research Professor, Clark University, Worcester, MA, USA
Email: aott@clarku.edu

² Oswaldo J. Patino, Ph.D. Candidate, Clark University, Worcester, MA, USA
Email: opatino@clarku.edu

brought about by the recession of the 1980. Some airlines faced bankruptcy, others ceased operations altogether.

Deregulation and its aftermath pushed airlines to charter a new path. For example, there was a shift in operations from a point-to-point system to a hub-and-spoke system. Another innovation was the formation of airline alliances. The most prevalent types of these alliances are code-sharing and antitrust immunity.³

Another and perhaps most significant innovation is the formation of air carrier alliances. At present there are three major airline alliances composed of both US and international carriers. These three are: Star Alliance, Sky Team and One World. The first alliance, the Star Alliance, was formed in 1997 with five air carriers: Air Canada, Lufthansa, Scandinavian Airline System (SAS), Thai Airways and United Airlines. The Sky Team was formed in 1999 with four members: Aeromexico, Delta Airlines, Air France and Korean Air. The third alliance, One World, also was established in 1999 with four airlines: American Airlines, British Airways, Cathay Pacific and Qantas. Over time, the alliances have expanded their membership and some carriers both domestic and foreign either joined an alliance or exited from the alliance. Currently there are 52 air carriers in the three alliances.

Forming an alliance is but one way to shore-up profits by expanding the air carrier market. This arrangement is not new, countries form alliances to share benefits from

³ For details types of arrangements see Oum, T. H et al (1996), Oum, T. H, and Park J.H. (2000) and Whalen, T. (2007) to name a few.

certain activities. In the case of air carriers, alliances provide multiple coverage of routes, thereby reducing the cost of travel through competition.

How well did airline alliances fare? In terms of membership, it has expanded rapidly—from a few air carriers—12 airlines in the 1990's to over 50 carriers in one decade. Membership in an alliance however, did not guarantee an airline a bigger market share, lower its operating costs or increase its profits. The data suggests that some carriers benefited while others did not.

Given this pattern, the purpose of this paper is to shed light on two questions: Did airline alliances live up to air carriers' expectations? and secondly, who gained and who lost?

2. Airline Alliances: The Data

Data analysis is needed to answer the questions posed above. The three samples utilized are: The Origin and Destination Survey, the T-100 Segment dataset and the P-11 and P-12 sample. The first sample provides data for two types of carriers, international and domestic. It consists of two data banks: Data Bank 1A which is restricted by the US Department of Transportation to US citizen users and command a price, and Data Bank 1B which covers only US carriers and is not restricted in its use and is available online. Data Bank 1A covers both domestic and international routes but the data coverage is limited to few years. Data Bank 1B covers domestic routes and is available for several years. The second sample, T-100 Segment dataset

contains information on domestic and international routes also for several years. The third dataset, the so-called P-11 and P-12 samples contains financial data for US carriers only for a number of years.

To answer the questions posed in this paper, some consolidation and verification of carriers' entry into or exit from an alliance were deemed necessary. Accordingly, we have constructed comprehensive data files. The first file contains data for US air carriers; the second is a file for alliances among US and international carriers. A description of these files is given below:

2.1 The Alliance File: US carriers only

As mentioned before, the airline industry data are provided in three different samples that cover some but not all the airlines in the industry. To gain full understanding of the progression of the alliances it was necessary to combine the separate data on air carriers to create the Alliance File. Given that in the three samples, the data are inclusive for only US airlines, the Alliance File was created for all US airlines reported in the three separate samples.

The Alliance File thus constructed traces the development of the US airline alliances over the span of 10 years. There we matched the airline with its partners over time, traced its exit and/or entry into an alliance as well the cost and profitability of the airline before and after its entry into an alliance. The file thus constructed permits a thorough investigation of the impact of the alliances on the industry as a whole as

well as on an individual carrier. Table A.1 lists alliance membership over the period 1997 -2007. Evolution of membership is given in Table A.2.

2.2 US and International Carriers Alliance File

The file provides a cross-section data for air carriers domestic and international for two periods: 2003 and 2008. The Origin and Destination data set provides information on an air carrier and its affiliates by the year of entry. Exit from an alliance is also recorded. The sample thus is dynamic in that it traces entry and exit of an air carrier over the period of 1997-2008. Hence, the file for 2003 checks the status of a carrier as to whether it belongs to an air carrier that has entered in an alliance say in 1997 and it has remained in that alliance in 2003. Similarly, for the 2008 file. The file reports the status of the carrier that entered in an alliance in any year between 1997 and 2008 if it has remained in that alliance. Verification is needed as a carrier may have entered one alliance in say 2003, left said alliance in 2005 and then joined another alliance in 2008. For domestic carriers in this sample we augmented the data by adding information on profits and costs from the P-11 and P-12 samples.

3. The effects of Alliances on the Air Carriers Markets

In this section we aim to shed light on the first question raised in the paper: Did alliances live up to expectations? To answer this question, we first have to layout what those expectations were. From an airline point of view expanding its presence

in the market (domestic and international) is one; enhancing profitability is another. From the point of view of clients—airline passengers—the benefits are lower air fares, better service through the expansion of routes covered and availability of seats. The second question: who gained and who lost can also be answered with the aid of information collected to shed light on the first question. For this reason, the analysis proceeds as follows: First we look at the growth rates of passengers and the growth rates of traffic (departures) for carriers in alliances, first for international routes and secondly for carriers in the domestic market.

Income and expense data obtained for the domestic sample are used to sort out gainers and losers for carriers in the alliances. This data will clearly shed light on who had benefited by joining an alliance as well as provide a comparison of the performance of the three alliances.

3.1 Data Analysis

We begin with a look at the performance of air carriers belonging to airline alliances. The first set of tables provide information obtained from the Origin and Destination sample (Data Bank 1A) from international routes for the years 2003 and 2008. In Table 1, we show departures performed for each carrier in an alliance for the two years and the rate of growth of departures over this period. Table 2, shows the numbers and growth rate of passengers for each carrier in an alliance as well as its

growth rates between 2003 -2008. Next, we provide in Table 3 data on capacity: seats available over the same period. Finally, in Tables 4, 5 and 6 the same type of

Table 1: Departures: International Routes 2003 and 2008 for Air Carriers in Alliances

Star Alliance	Departures Performed		
Carrier	Departures 2003	Departures 2008	Av. Growth Rate
<i>Air Canada (AC)</i>	128,388	131,790	0.004
<i>Lufthansa (LH)</i>	15,704	21,430	0.052
<i>SAS (SK)</i>	5,036	3,849	-0.045
<i>Thai Airways (TG)</i>	450	1,098	0.149
<i>United Airlines (UA)</i>	66,389	69,388	0.007
<i>ANA (NH)</i>	5,041	5,131	0.003
<i>Air New Zealand (NZ)</i>	3,590	3,499	-0.004
<i>Singapore Airlines (SQ)</i>	3,821	4,273	0.019
<i>British Midland (BD)</i>	1,045	912	-0.023
<i>Asiana Airlines (OZ)</i>	2,567	3,991	0.074
<i>LOT (LO)</i>	1,688	2,197	0.044
<i>US Airways (US)</i>	38,159	47,397	0.036
<i>TAP Portugal (TP)</i>	779	826	0.010
Sky Team	Departures Performed		
Carrier	Departures 2003	Departures 2008	Av. Growth Rate
<i>Aeromexico (AM)</i>	22,711	22,318	-0.003
<i>Air France (AF)</i>	13,602	15,807	0.025
<i>Delta (DL)</i>	67,733	101,979	0.068
<i>Continental (CO)</i>	101,993	152,673	0.067
<i>Northwest (NW)</i>	52,374	64,549	0.035
<i>Korean Air (KE)</i>	6,359	9,038	0.059
<i>CSA Czech (OK)</i>	736	659	-0.018
<i>Alitalia (AZ)</i>	4,908	4,907	0.000
One World	Departures Performed		
Carrier	Departures 2003	Departures 2008	Av. Growth Rate
<i>American Airlines (AA)</i>	198,707	210,670	0.010
<i>British Airways (BA)</i>	26,975	28,178	0.007
<i>Cathay Pacific (CX)</i>	2,483	5,535	0.134
<i>Qantas (QF)</i>	3,895	5,400	0.054
<i>Finnair (AY)</i>	676	644	-0.008
<i>Iberia (IB)</i>	7,946	4,073	-0.111
<i>LAN (LA)</i>	4,698	6,409	0.052

Source: Origin and Destination Survey and T-100 Segment data

information is given for the domestic market. In this dataset, however the growth rates are calculated over the period 1999-2007. Net income and operating expenses

for domestic carriers operating in the domestic (US) market are reported in Table 7 for each US carrier belonging to an alliance.

3.2 A look at the performance of carriers in the airline alliances: The International Sample.

As outlined above, the international sample contains information for air carriers in the three alliances for the two years 2003 and 2008. Using information on departures of carriers serving international routes reported in Table 1 the following observations are made:

First, with the exception of few carriers, departures performed has grown between 2003 and 2008 for carriers in the three alliances. In Star Alliance, the best performance was recorded for the two Asian carriers: Thai Airways with an average annual growth rate of 14.9 percent and Asiana Airlines with 7.4 percent average growth rate. US Airways traffic did grow by 3.6 percent while United Airlines only managed to grow its traffic by less than 1 percent. Airlines that had negative annual growth rates were SAS, Air New Zealand and British Midland.

The growth rates of departures for Sky Team members were somewhat similar to those recorded for Star Alliance membership. There were two non-performing carriers—Aeromexico and CSA Czech both of which recorded negative growth rates between 2003 -2008. Of interest, however, is the performance of US carriers, Delta, Continental and Northwest. All three carriers experienced positive growth rates. In the One World Alliance, Cathay Pacific airlines experienced the highest

annual growth rate (13 percent) not only among its alliance members but also for the three alliance members. American Airlines did poorly with an annual growth rate of 1 percent.

The picture that emerged using departures as a yardstick is not sufficient however to convey the status of an air carrier within an alliance or the comparative performance of the three alliances. The next table, Table 2, evaluates carrier performance through the growth of passengers. This data supplements departures data in that carriers' traffic may rise or fall while their passengers load may not rise or fall with departures.

As the data in the table reveals, passengers ridership performed well for the two Asian carriers hence matching the growth of departures and passengers although Asiana Airlines recorded higher passenger growth rate (an average annual growth rate of 9 percent). Thai Airways average growth rate was a bit lower at 6.4 percent. The unexpected finding is the growth of passengers recorded for US Airways. While its departure growth rate was modest (3.6 percent) compared to the Asian carriers, its passenger grew by an average annual growth rate of 7.2 percent.

Passenger data for the Sky Team alliance again support the observed trend, at least on the part of US carriers to "fill" their planes thereby reducing departures. Earlier, from Table 1, we noted that Delta and Continental had high departure growth rates. Passenger growth rates reported in Table 2 were even higher, than departures with

Delta recording an average annual growth rate of passengers of 10.9 percent and 7.7 percent for Continental. CSA Czech and Aeromexico lost passengers as wells as traffic.

Table 2: Passengers: International Routes 2003 and 2008 for Air Carriers in Alliances

Star Alliance	Passengers		
Carrier	Passengers 2003	Passengers 2008	Av. Growth Rate
<i>Air Canada (AC)</i>	6,581,815	7,344,058	0.018
<i>Lufthansa (LH)</i>	3,874,141	4,994,210	0.042
<i>SAS (SK)</i>	939,168	815,057	-0.024
<i>Thai Airways (TG)</i>	120,572	177,254	0.064
<i>United Airlines (UA)</i>	8,916,133	10,805,105	0.032
<i>ANA (NH)</i>	872,617	911,246	0.007
<i>Air New Zealand (NZ)</i>	974,372	925,884	-0.009
<i>Singapore Airlines (SQ)</i>	821,241	863,689	0.008
<i>British Midland (BD)</i>	182,148	158,676	-0.023
<i>Asiana Airlines (OZ)</i>	555,353	952,070	0.090
<i>LOT (LO)</i>	320,016	421,513	0.046
<i>US Airways (US)</i>	4,062,536	6,258,061	0.072
<i>TAP Portugal (TP)</i>	140,612	148,651	0.009
Sky Team	Departures Performed		
Carrier	Passengers 2003	Passengers 2008	Av. Growth Rate
<i>Aeromexico (AM)</i>	1,676,634	1,529,781	-0.015
<i>Air France (AF)</i>	2,933,326	3,631,114	0.036
<i>Delta (DL)</i>	6,944,943	13,221,914	0.107
<i>Continental (CO)</i>	9,593,325	15,240,792	0.077
<i>Northwest (NW)</i>	7,125,276	8,968,479	0.038
<i>Korean Air (KE)</i>	1,495,302	2,158,074	0.061
<i>CSA Czech (OK)</i>	133,659	103,903	-0.042
<i>Alitalia (AZ)</i>	934,191	879,533	-0.010
One World	Departures Performed		
Carrier	Passengers 2003	Passengers 2008	Av. Growth Rate
<i>American Airlines (AA)</i>	18,452,240	23,473,742	0.040
<i>British Airways (BA)</i>	5,401,532	5,574,983	0.005
<i>Cathay Pacific (CX)</i>	601,531	1,356,578	0.136
<i>Qantas (QF)</i>	1,076,287	1,370,281	0.040
<i>Finnair (AY)</i>	143,932	154,547	0.012
<i>Iberia (IB)</i>	1,240,852	946,316	-0.045
<i>LAN (LA)</i>	706,068	1,087,809	0.072

Source: Origin and Destination Survey and T-100 Segment data

With respect to the performance of the One World alliance members, only Cathay Pacific has an average annual growth rate of passengers matching its growth rate of

departures (13.6 percent). American Airlines recorded a higher growth rate of passengers (average annual growth rate of 4 percent) compared to that of departures. Given that passengers to departures ratios were neither uniform nor equal, it is of interest to look at airlines' capacity—passengers to seats available ratios. This information is reported in Table 3. As the growth rates of passengers/seats ratios indicate, the Airline industry as a whole have kept the ratios almost unchanged, the exception being Air Canada which is shown to have increased its capacity by 3.4 percent over the period 2003 -2008.

3.3 A look at the Performance of Domestic Carriers: The Domestic Sample

We begin the analysis by looking at departures recorded for US carriers in the domestic market over the panel data 1999-2007. US carriers in alliances are: United and US Airways in Star Alliance; Delta, Continental and Northwest in Sky Team alliance and American Airlines in One World alliance.

Average annual growth rates of departures reported in Table 4 for most US carriers are in the negative territory for most years between 1999 and 2007, the year 2003 being the exception for United Airlines (growth rate of 26 percent) and US Airways (17 percent). For Sky Team members, Delta had three years of good performances, a growth rate of 8.14 percent in 2002, 5 percent in 2003 and 6 percent in 2005. Continental Airlines did much better with positive growth rates (although modest in most years).

Table 3: Capacity: Seat Available and Ratio Passenger to Seat Available, International Routes 2003 and 2008

Star Alliance	Seats Available		Passengers/Seats Available		
Carrier	Seats 2003	Seats 2008	Pass/Seats 2003	Pass/Seats 2008	Av. Growth Rate
<i>Air Canada (AC)</i>	11,212,319	10,213,316	0.59	0.72	0.034
<i>Lufthansa (LH)</i>	4,544,024	5,922,231	0.85	0.84	-0.002
<i>SAS (SK)</i>	1,229,186	989,965	0.76	0.82	0.012
<i>Thai Airways (TG)</i>	182,106	240,438	0.66	0.74	0.018
<i>United Airlines (UA)</i>	11,640,986	13,803,348	0.77	0.78	0.004
<i>ANA (NH)</i>	1,204,408	1,221,501	0.72	0.75	0.005
<i>Air New Zealand (NZ)</i>	1,236,795	1,167,274	0.79	0.79	0.001
<i>Singapore Airlines (SQ)</i>	1,325,530	1,268,506	0.62	0.68	0.016
<i>British Midland (BD)</i>	254,980	198,816	0.71	0.80	0.018
<i>Asiana Airlines (OZ)</i>	755,356	1,193,485	0.74	0.80	0.014
<i>LOT (LO)</i>	368,967	503,541	0.87	0.84	-0.006
<i>US Airways (US)</i>	5,567,248	7,956,551	0.73	0.79	0.012
<i>TAP Portugal (TP)</i>	177,072	209,883	0.79	0.71	-0.019
Sky Team	Seats Available		Passengers/Seats Available		
Carrier	Seats 2003	Seats 2008	Pass/Seats 2003	Pass/Seats 2008	Av. Growth Rate
<i>Aeromexico (AM)</i>	2,729,129	2,543,918	0.61	0.60	-0.004
<i>Air France (AF)</i>	3,672,396	4,473,846	0.80	0.81	0.003
<i>Delta (DL)</i>	9,676,046	16,914,288	0.72	0.78	0.014
<i>Continental (CO)</i>	13,484,152	19,812,624	0.71	0.77	0.013
<i>Northwest (NW)</i>	9,490,916	11,171,265	0.75	0.80	0.011
<i>Korean Air (KE)</i>	2,178,273	2,756,914	0.69	0.78	0.022
<i>CSA Czech (OK)</i>	152,352	136,413	0.88	0.76	-0.024
<i>Alitalia (AZ)</i>	1,195,030	1,224,715	0.78	0.72	-0.014
One World	Seats Available		Passengers/Seats Available		
Carrier	Seats 2003	Seats 2008	Pass/Seats 2003	Pass/Seats 2008	Av. Growth Rate
<i>American Airlines (AA)</i>	27,416,218	31,543,752	0.67	0.74	0.017
<i>British Airways (BA)</i>	7,240,793	7,514,509	0.75	0.74	-0.001
<i>Cathay Pacific (CX)</i>	932,404	1,940,430	0.65	0.70	0.013
<i>Qantas (QF)</i>	1,443,126	1,869,564	0.75	0.73	-0.003
<i>Finnair (AY)</i>	197,105	181,326	0.73	0.85	0.026
<i>Iberia (IB)</i>	1,659,445	1,150,184	0.75	0.82	0.016
<i>LAN (LA)</i>	1,024,373	1,407,106	0.69	0.77	0.019

Source: Origin and Destination Survey and T-100 Segment data

Likewise Northwest with 4 years out of 9 recording positive growth rates. American Airlines, the only US carrier in the One World Alliance had positive growth rates for

only three years. In short, joining an alliance seem to have done some good in stimulating US carriers traffic.

Table 4: Departures: Domestic Market Carriers in Alliances, 1999-2007

Star Alliance										
United Airlines				US Airways						
<i>Year</i>	<i>Departures</i>	<i>Growth rate deps.</i>	<i>Average growth rates deps.</i>	<i>Departures</i>	<i>Growth rate deps.</i>	<i>Average growth rates deps.</i>				
1999	851,480			705,698						
2000	849,690	0.00		734,830	0.04					
2001	790,569	-0.07		661,115	-0.11					
2002	792,064	0.00		589,222	-0.12					
2003	1,030,610	0.26		698,180	0.17					
2004	1,039,639	0.01		718,302	0.03					
2005	837,907	-0.22		749,539	0.04					
2006	708,524	-0.17		636,843	-0.16					
2007	704,925	-0.01	-0.02	655,194	0.03	-0.01				
Sky Team										
Delta				Continental			Northwest			
<i>Year</i>	<i>Departures</i>	<i>Growth rate deps.</i>	<i>Average growth rates deps.</i>	<i>Departures</i>	<i>Growth rate deps.</i>	<i>Average growth rates deps.</i>	<i>Departures</i>	<i>Growth rate deps.</i>	<i>Average growth rates deps.</i>	
1999	1,115,012			667,940			786,276			
2000	1,282,287	0.14		691,360	0.03		800,512	0.02		
2001	1,248,250	-0.03		666,506	-0.04		760,493	-0.05		
2002	1,305,987	0.05		620,892	-0.07		758,589	0.00		
2003	1,250,854	-0.04		627,789	0.01		854,366	0.12		
2004	1,322,517	0.06		664,183	0.06		893,759	0.05		
2005	1,320,824	0.00		692,837	0.04		916,132	0.08		
2006	1,102,846	-0.18		745,113	0.07		810,809	-0.12		
2007	1,057,276	-0.04	-0.01	756,241	0.01	0.01	777,732	-0.04	0.00	
One World										
American										
<i>Year</i>	<i>Departures</i>	<i>Growth rate deps.</i>	<i>Average growth rates deps.</i>							
1999	1,101,772									
2000	1,181,726	0.07								
2001	1,160,065	-0.02								
2002	1,292,764	0.11								
2003	1,179,081	-0.09								
2004	1,176,210	0.00								
2005	1,202,363	0.02								
2006	1,187,423	-0.01								
2007	1,160,439	-0.02	0.01							

Source: Origin and Destination Survey (Data Bank 1B) and T-100 Segment Data

The next data set (Table 5) shed further light on air traffic in the domestic market. Once again, the data reinforces what was uncovered using departure data. The period 1999-2007 was marred by negative or zero growth rates of passenger traffic for five out of the 9 year period for United Airline, four years for US Airways, both carriers being members of the Star Alliance.

Continental and Northwest both members of Sky Team recorded positive growth rates of passenger traffic for most years with Delta Airlines trailing behind recording very small growth of passengers in only three years. American Airlines, a member of One World alliance did quite a bit better especially where passenger traffic grew by 20 percent in 2002 and 8 percent in 2005. The story on passenger traffic then is neither alliance specific nor airline specific. Being a member of an alliance may have helped US carriers to withstand the rising cost of fuel and the recession but surely was not sufficient to produce gains for all carriers.

The next two tables enhance our assessment of what US carriers had to do to withstand adverse market conditions. In Table 6, we report, passenger to seats available while Table 7 records data on US carriers operations (net income and expenses) realized in the domestic market.

Looking first at the passenger/seat ratios it is worth noting that “crowding out” of passengers seemed to have occurred in the second half of the period. In other words, US carriers found a way to fill their planes by increasing utilization of their seats

Table 5: Passengers: Domestic Market Carriers in Alliances, 1999-2007

Star Alliance										
	United Airlines			US Airways						
<i>Year</i>	<i>Passengers</i>	<i>Growth rate pass.</i>	<i>Average growth rates pass.</i>	<i>Passengers</i>	<i>Growth rate pass.</i>	<i>Average growth rates pass.</i>				
1999	80,895,056			55,965,044						
2000	77,693,800	-0.04		58,899,644	0.05					
2001	69,256,640	-0.11		53,806,152	-0.09					
2002	65,297,484	-0.06		45,735,420	-0.16					
2003	71,699,120	0.09		42,336,988	-0.08					
2004	75,324,472	0.05		44,292,200	0.05					
2005	68,413,272	-0.10		45,560,768	0.03					
2006	64,154,068	-0.06		41,145,864	-0.10					
2007	63,379,084	-0.01	-0.03	46,245,020	0.12	-0.02				
Sky Team										
	Delta			Continental			Northwest			
<i>Year</i>	<i>Passengers</i>	<i>Growth rate pass.</i>	<i>Average growth rates pass.</i>	<i>Passengers</i>	<i>Growth rate pass.</i>	<i>Average growth rates pass.</i>	<i>Passengers</i>	<i>Growth rate pass.</i>	<i>Average growth rates pass.</i>	
1999	105,903,272			43,593,580			53,432,200			
2000	111,880,840	0.05		44,898,180	0.03		55,655,140	0.04		
2001	100,013,776	-0.11		43,237,712	-0.04		51,549,268	-0.08		
2002	101,620,200	0.02		40,979,576	-0.05		50,425,872	-0.02		
2003	98,305,384	-0.03		42,029,060	0.03		53,934,244	0.07		
2004	102,667,488	0.04		44,527,564	0.06		58,099,864	0.07		
2005	102,646,672	0.00		47,798,888	0.07		60,771,700	0.04		
2006	87,344,160	-0.16		52,447,472	0.09		58,201,232	-0.04		
2007	85,211,000	-0.02	-0.02	53,048,856	0.01	0.02	56,521,740	-0.03	0.01	
One World										
	American									
<i>Year</i>	<i>Passengers</i>	<i>Growth rate pass.</i>	<i>Average growth rates pass.</i>							
1999	76,048,736									
2000	81,114,600	0.06								
2001	74,066,864	-0.09								
2002	90,209,144	0.20								
2003	85,539,232	-0.05								
2004	88,645,600	0.04								
2005	95,781,776	0.08								
2006	96,625,912	0.01								
2007	96,261,960	0.00	0.03							

Source: Origin and Destination Survey (Data Bank 1B) and T-100 Segment Data

Table 6: Capacity: Domestic Market Carriers in Alliances, 1999-2007

Star Alliance										
	United Airlines			US Airways						
<i>Year</i>	<i>Seats (millions)</i>	<i>Passengers (millions)</i>	<i>Pass/Seats</i>	<i>Seats (millions)</i>	<i>Passengers (millions)</i>	<i>Pass/Seats</i>				
1999	119.268	80.895	0.68	87.538	55.965	0.64				
2000	113.379	77.693	0.69	92.673	58.899	0.64				
2001	102.620	69.256	0.67	85.894	53.806	0.63				
2002	95.215	65.297	0.69	72.838	45.735	0.63				
2003	98.884	71.699	0.73	65.609	42.336	0.65				
2004	102.430	75.324	0.74	67.319	44.292	0.66				
2005	89.216	68.413	0.77	69.837	45.560	0.65				
2006	82.148	64.154	0.78	57.967	41.145	0.71				
2007	80.157	63.379	0.79	62.715	46.245	0.74				
Sky Team										
	Delta			Continental			Northwest			
<i>Year</i>	<i>Seats (millions)</i>	<i>Passengers (millions)</i>	<i>Pass/Seats</i>	<i>Seats (millions)</i>	<i>Passengers (millions)</i>	<i>Pass/Seats</i>	<i>Seats (millions)</i>	<i>Passengers (millions)</i>	<i>Pass/Seats</i>	
1999	154.762	105.903	0.68	63.127	43.593	0.69	81.732	53.432	0.65	
2000	161.872	111.880	0.69	64.323	44.898	0.70	83.441	55.655	0.67	
2001	152.672	100.013	0.66	62.979	43.237	0.69	79.150	51.549	0.65	
2002	148.804	101.620	0.68	58.892	40.979	0.70	76.943	50.425	0.66	
2003	138.392	98.305	0.71	58.054	42.029	0.72	80.219	53.934	0.67	
2004	143.286	102.667	0.72	60.387	44.527	0.74	83.236	58.099	0.70	
2005	139.941	102.646	0.73	61.510	47.798	0.78	82.963	60.771	0.73	
2006	114.156	87.344	0.77	65.583	52.447	0.80	75.474	58.201	0.77	
2007	108.965	85.211	0.78	67.138	53.048	0.79	72.820	56.521	0.78	
One World										
	American									
<i>Year</i>	<i>Seats (millions)</i>	<i>Passengers (millions)</i>	<i>Pass/Seats</i>							
1999	114.141	76.48	0.67							
2000	118.232	81.14	0.69							
2001	112.273	74.66	0.66							
2002	133.440	90.09	0.68							
2003	121.786	85.539	0.70							
2004	121.948	88.645	0.73							
2005	125.525	95.781	0.76							
2006	122.809	96.625	0.79							
2007	121.121	96.261	0.79							

Source: Origin and Destination Survey (Data Bank 1B) and T-100 Segment Data

capacity. This pattern is recorded for all carriers regardless of which alliance they belonged to. Of interest is the fact that the passengers/seats ratio which hovered around 65 – 67 percent rose to 78 – 79 percent for all carriers.

Given that the six US carriers in the alliances were successful in “filling” their seats, the expectation is that operating costs would moderate, if not fall and hence

operating revenues would rise. This expectation can be tested by reference to the data reported in Table 7.

Table 7: Net Income and Operating Expense: Domestic Market Carriers in Alliances , 1999 - 2007

Star Alliance						
	United Airlines		US Airways			
<i>Year</i>	<i>Net Income (millions)</i>	<i>Operating Expenses (millions)</i>	<i>Net Income (millions)</i>	<i>Operating Expenses (millions)</i>		
1999	840	11,513	264	7,717		
2000	-10	12,666	-241	8,519		
2001	-1,278	12,955	-1,969	8,588		
2002	-2,168	11,146	-1,591	7,051		
2003	-1,976	10,156	1,442	6,242		
2004	-1,699	11,699	-652	6,383		
2005	-12,832	11,690	50	6,408		
2006	-13,505	12,687	201	5,606		
2007	-40	12,780	222	6,666		
Sky Team						
	Delta		Continental		Northwest	
<i>Year</i>	<i>Net Income (millions)</i>	<i>Operating Expenses (millions)</i>	<i>Net Income (millions)</i>	<i>Operating Expenses (millions)</i>	<i>Net Income (millions)</i>	<i>Operating Expenses (millions)</i>
1999	1,262	10,510	303	5,600	319	5,839
2000	694	11,077	68	6,215	320	6,507
2001	-847	11,158	-411	6,192	-91	6,755
2002	-858	10,393	-853	5,810	-436	6,444
2003	-771	12,611	-321	5,228	-623	6,213
2004	-2,883	13,635	-1,091	7,703	-359	7,842
2005	-3,109	13,739	-880	8,175	-1,871	8,920
2006	-4,224	12,721	-657	8,948	-1,527	7,825
2007	1,614	12,665	-908	9,445	1,349	7,652
One World						
	American					
<i>Year</i>	<i>Net Income (millions)</i>	<i>Operating Expenses (millions)</i>				
1999	466	10,307				
2000	511	11,627				
2001	-1,354	12,973				
2002	-2,904	14,121				
2003	-1,819	13,973				
2004	-1,314	13,206				
2005	-974	13,819				
2006	-290	13,971				
2007	-290	14,153				

Source: US Department of Transportation Financial Data: Schedule P-12

Table 7 adds further insight into the US carriers' performance in the domestic market. The first column in the table shows the net income arising from domestic

service. This figure clearly nets out operating expenses from revenues, hence provides information on profitability in serving the domestic market.

The picture that emerges is not unexpected in light of the earlier data we have reported in tables 4 through 6. Most carriers have experienced net operating losses since 2001 with the profit picture rebounding for some at the end of the period. One noticeable finding is the performance of US Airways, a member of the Star Alliance. In the net income column, the airline was successful in achieving net gains in 5 out of 9 years. Its success in part can be attributed to its efforts in controlling costs. These costs have fallen from their highest level of US\$8,588 millions in 2000 to US\$6,666 millions in 2007. Of note is the fact that only US Airways was successful in cutting its operating costs and achieving noticeable gains in the domestic market.

4. Conclusion

The focus of this paper is on the impact of airline alliances on air travel—passenger and seat available and profitability of US carriers. Using three sets of data, the Department of Transportation’s Origin and Destination Survey data; the T-100 Segment dataset and P-12 sample, we have addressed two questions: Did airline alliances enhance airlines’ returns and secondly, did alliances serve well their clients. The analysis shows mixed results. Some airlines, mostly international carriers did well by joining an alliance others did not. US carriers in particular, independent of

the alliance they joined did relatively less well than international carriers in the international market.

Data analysis of six US carriers, members of the alliances, operating in the domestic market paint somewhat of a grim picture. It looks as if alliances did not matter much in lowering the cost of operation or in increasing profitability. What the alliances seem to have accomplished is enhancing the utilization of available capacity. The data clearly shows that the six US airlines have increased the passenger/seats ratios thereby removing the necessity of adding planes to accommodate demand for travel.

The finding reported above lends support to the observation made by Jad Monawad (referred to above) that air carriers especially US carriers seem to have put their planes on “Furlough”. Whether or not such a trend continues will clearly depend on the growth rates of traffic. Improvements in economic conditions worldwide will increase demand for travel and with it an expansion of capacity. On the other hand, a rise in the cost of fuel is likely to make “Furlough” an attractive option.

Appendix

Table A-1: Alliance Members		
Star Alliance		
<i>Carrier</i>	<i>Period of Membership</i>	<i>Affiliate</i>
<i>Adria Airways (Slovenia)</i>	2004 - Present	
<i>Air Canada (Canada)</i>	1997 - Present	Air Canada Jazz Air Canada Jetz Air Georgian
<i>Air China (China)</i>	2007 - Present	
<i>Air New Zealand (New Zealand)</i>	1999 - Present	Air Nelson Eagle Airways Mount Cook Airline
<i>All Nippon Airways (Japan)</i>	1999 - Present	Air Central Air Japan Air Next Air Nippon
<i>Ansett Australia (Australia)</i>	1999 - 2001	
<i>Asiana Airlines (South Korea)</i>	2003 - Present	
<i>Austrian Airlines (Austria)</i>	2000 - Present	Tyrolean Airways Lauda Air
<i>Blue1 (Finland)</i>	2004 - Present	
<i>BMI (United Kingdom)</i>	2000 - Present	BMI Regional
<i>Brussels Airlines (Belgium)</i>	2009 - Present	
<i>Continental Airlines (United States)</i>	2009- Present	Cape Air Colgan Air CommutAir Gulfstream International Airlines Chautauqua Airlines ExpressJet Airlines Continental Micronesia
<i>Croatia Airlines (Croatia)</i>	2004- Present	
<i>Egypt Air (Egypt)</i>	2008- Present	Egypt Air Express
<i>LOT (Poland)</i>	2003 - Present	EuroLOT
<i>Lufthansa (Germany)</i>	1997	Lufthansa Italia Air Dolomiti Augsburg Airways Contact Air Eurowings Lufthansa CityLine
<i>Mexicana (Mexico)</i>	2000-2004	
<i>SAS Scandinavian Airlines (Sweden-Denmark-Norway)</i>	1997 – Present	
<i>Shanghai Airlines (China)</i>	2007 – Present	
<i>Singapore Airlines</i>	2000 – Present	

<i>(Singapore)</i>		
<i>South African Airways (South Africa)</i>	2006 – Present	Airlink South African Express
<i>Spanair (Spain)</i>	2003 - Present	
<i>Swiss International Air Lines (Switzerland)</i>	2006 – Present	Swiss European Air Lines
<i>TAP Portugal (Portugal)</i>	2005 – Present	Portugalia PGA Express
<i>Thai Airways International (Thailand)</i>	1997 – Present	
<i>Turkish Airlines (Turkey)</i>	2008 – Present	
<i>United Airlines (United States)</i>	1997 – Present	Chautauqua Airlines Colgan Air GoJet Airlines Mesa Airlines Shuttle America SkyWest Trans States Airlines
<i>US Airways (United States)</i>	2004 – Present	Air Wisconsin Chautauqua Airlines Colgan Air Mesa Airlines Piedmont Airlines PSA Airlines Republic Airlines Trans States Airlines US Airways Shuttle
<i>Varig (Brazil)</i>	1997-2007	
Sky Team		
<i>Carrier</i>	<i>Date</i>	<i>Affiliate</i>
<i>Aeroflot Russian Airlines (Russia)</i>	2006 – Present	Donavia Nordavia
<i>Aeromexico (Mexico)</i>	2000 – Present	Aeromexico Connect Aeromexico Travel
<i>Air France (France)</i>	2000 – Present	Brit Air CityJet Regional
<i>Alitalia (Italy)</i>	2008 – Present	Alitalia Express
<i>Alitalia-Linee Aeree Italiane (Italy)</i>	2001-2008	
<i>China Southern Airlines (China)</i>	2007 – Present	
<i>Continental (United States)</i>	2004-2009	
<i>Czech Airlines (Czech Republic)</i>	2001 – Present	
<i>Delta Airlines (United States)</i>	2000 – Present	Delta Connection Delta Shuttle
<i>KLM (Netherlands)</i>	2004 – Present	KLM Cityhopper
<i>Korean Air (South Korea)</i>	2000 – Present	
<i>Norwest Airlines (United States)</i>	2004-2009	
One World		
<i>Carrier</i>	<i>Date</i>	<i>Affiliate</i>

<i>American Airlines</i> (United States)	1999 – Present	American Eagle Executive Airlines Chautauqua Airlines
<i>Aer Lingus</i> (Ireland)	2000 - 2007	
<i>British Airways</i> (United Kingdom)	1999 – Present	BA CityFlyer Comair Sun-Air
<i>Canadian Airlines</i> (Canada)	1999-2000	
<i>Cathay Pacific</i> (Hong Kong)	1999 – Present	Dragonair
<i>Finnair</i> (Finland)	1999 – Present	
<i>Iberia</i> (Spain)	1999 - Present	Air Nostrum
<i>Japan Airlines</i> (Japan)	2007 - Present	J-Air JAL Express JALways Japan Transoceanic Air
<i>Lan</i> (Chile)	2000 – Present	LAN Argentina LAN Ecuador LAN Express LAN Peru
<i>Malev</i> (Hungary)	2007- Present	
<i>Mexicana</i> (Mexico)	2009 – Present	MexicanaClick MexicanaLink
<i>Qantas</i> (Australia)	1999 – Present	Jetconnect Airlink Eastern Australia Airlines Sunstate Airlines
<i>Royal Jordanian</i> (Jordan)	2007 - Present	
<p>Sources: http://www.staralliance.com/en/about/airlines/ http://www.staralliance.com/en/about/airlines/ http://www.staralliance.com/assets/doc/en/about/member-airlines/pdf/star_backgrounder_history_chronological.pdf www.skyteam.com/news/facts/2010.html http://www.oneworld.com/ow/news-and-information/fact-sheets</p>		

Table A-2a: Alliance Membership Evolution: Star Alliance

1997 (N=6)	1998 (N=6)	1999 (N=9)	2000 (N=13)	2001 (N=12)	2002 (N=12)	2003 (N=15)	2004 (N=18)	2005 (N=19)	2006 (N=21)	2007 (N=22)	2008 (N=24)
Air Canada	Air Canada	Air Canada	Air Canada	Air Canada	Air Canada	Air Canada	Air Canada	Air Canada	Air Canada	Air Canada	Air Canada
Lufthansa	Lufthansa	Lufthansa	Lufthansa	Lufthansa	Lufthansa	Lufthansa	Lufthansa	Lufthansa	Lufthansa	Lufthansa	Lufthansa
SAS	SAS	SAS	SAS	SAS	SAS	SAS	SAS	SAS	SAS	SAS	SAS
Thai Airways	Thai Airways	Thai Airways	Thai Airways	Thai Airways	Thai Airways	Thai Airways	Thai Airways	Thai Airways	Thai Airways	Thai Airways	Thai Airways
United	United	United	United	United	United	United	United	United	United	United	United
Varig	Varig	Varig	Varig	Varig	Varig	Varig	Varig	Varig	Varig ^d	-	-
		Ansett	Ansett ^b	-	-	-	-	-	-	-	-
		ANA ^a	ANA	ANA	ANA	ANA	ANA	ANA	ANA	ANA	ANA
		Air New Zealand	Air New Zealand	Air New Zealand	Air New Zealand	Air New Zealand	Air New Zealand	Air New Zealand	Air New Zealand	Air New Zealand	Air New Zealand
			Singapore Airlines	Singapore Airlines	Singapore Airlines	Singapore Airlines	Singapore Airlines	Singapore Airlines	Singapore Airlines	Singapore Airlines	Singapore Airlines
			Mexicana	Mexicana	Mexicana	Mexicana	-	-	-	-	-
			British Midland	British Midland	British Midland	British Midland	British Midland	British Midland	British Midland	British Midland	British Midland
			Australian Airlines	Australian Airlines	Australian Airlines	Australian Airlines	Australian Airlines	Australian Airlines	Australian Airlines	Australian Airlines	Australian Airlines
						Asiana Airlines	Asiana Airlines	Asiana Airlines	Asiana Airlines	Asiana Airlines	Asiana Airlines
						Spanair	Spanair	Spanair	Spanair	Spanair	Spanair
						LOT	LOT	LOT	LOT	LOT	LOT
							US Airways	US Airways ^c	US Airways	US Airways	US Airways
							Blue1	Blue1	Blue1	Blue1	Blue1
							Adria Airways	Adria Airways	Adria Airways	Adria Airways	Adria Airways
							Croatia Airlines	Croatia Airlines	Croatia Airlines	Croatia Airlines	Croatia Airlines
								TAP Portugal	TAP Portugal	TAP Portugal	TAP Portugal
									South African Airways	South African Airways	South African Airways
									Swiss Airlines	Swiss Airlines	Swiss Airlines

Table A-2a continued...

										Air China	Air China
										Shanghai Airlines	Shanghai Airlines
											Turkish Airlines
											Egypt Air
<p>Notes: ^a ANA stands for All Nippon Airlines. ^b Ansett Australia had to leave Star Alliance due to bankruptcy. ^c In 2005 America West joins the Star Alliance after merging with US Airways. ^d Varig leaves the Star Alliance.</p> <p>Source: http://www.staralliance.com/en/about/airlines/ http://www.staralliance.com/assets/doc/en/about/member-airlines/pdf/star_backgroundunder_history_chronological.pdf</p>											

Table A-2b: Alliance Membership Evolution: Sky Team

2000* (N=4)	2001 (N=6)	2002 (N=6)	2003 (N=6)	2004 (N=9)	2005 (N=9)	2006 (N=10)	2007 (N=14)	2008 (N=14)
Aeromexico	Aeromexico	Aeromexico	Aeromexico	Aeromexico	Aeromexico	Aeromexico	Aeromexico	Aeromexico
Air France	Air France	Air France	Air France	Air France	Air France	Air France	Air France	Air France
Delta	Delta	Delta	Delta	Delta	Delta	Delta	Delta	Delta
Korean Air	Korean Air	Korean Air	Korean Air	Korean Air	Korean Air	Korean Air	Korean Air	Korean Air
	CSA Czech	CSA Czech	CSA Czech	CSA Czech	CSA Czech	CSA Czech	CSA Czech	CSA Czech
	Alitalia	Alitalia	Alitalia	Alitalia	Alitalia	Alitalia	Alitalia	Alitalia
				Continental	Continental	Continental	Continental	Continental
				KLM	KLM	KLM	KLM	KLM
				Northwest	Northwest	Northwest	Northwest	Northwest
						Aeroflot	Aeroflot	Aeroflot
							Air Europa	Air Europa
							Copa Airlines	Copa Airlines
							Kenya Airways	Kenya Airways
							China Southern Airlines	China Southern Airlines
Notes: *Sky Team alliance was launched in 2000. Source: www.skyteam.com/news/facts/2010.html								

Table A-2c: Alliance Membership Evolution: One World

1999 ^a (N=7)	2000 (N=8)	2001 (N=8)	2002 (N=8)	2003 (N=8)	2004 (N=8)	2005 (N=8)	2006 (N=8)	2007 (N=11)	2008 (N=11)
American	American	American	American	American	American	American	American	American	American
British Airways	British Airways	British Airways	British Airways	British Airways	British Airways	British Airways	British Airways	British Airways	British Airways
Cathay Pacific	Cathay Pacific	Cathay Pacific	Cathay Pacific	Cathay Pacific	Cathay Pacific	Cathay Pacific	Cathay Pacific	Cathay Pacific	Cathay Pacific
Canadian Airlines ^b	-	-	-	-	-	-	-	-	-
Qantas	Qantas	Qantas	Qantas	Qantas	Qantas	Qantas	Qantas	Qantas	Qantas
Finnair	Finnair	Finnair	Finnair	Finnair	Finnair	Finnair	Finnair	Finnair	Finnair
Iberia	Iberia	Iberia	Iberia	Iberia	Iberia	Iberia	Iberia	Iberia	Iberia
	LAN	LAN	LAN	LAN	LAN	LAN	LAN	LAN	LAN
	Aer Lingus	Aer Lingus	Aer Lingus	Aer Lingus	Aer Lingus	Aer Lingus	Aer Lingus	-	-
								Dragonair	Dragonair
								Malev	Malev
								Japan Airlines	Japan Airlines
								Royal Jordanian	Royal Jordanian

Notes:

^a The One World alliance was launched in 1999.

^b Canadian withdraws from One World after being purchased by Air Canada.

Source: <http://www.oneworld.com/ow/news-and-information/fact-sheets>

References

- Bamberger, G., Carlton, D. & Neuman, L. (2004). "An empirical investigation of the competitive effects of domestic airline alliances". *Journal of Law and Economics*, vol. 47: 195-222.
- Hassin, O. and Shy, O. (2000). "Code-Sharing Agreements, Frequency of Flight, and Profits in the Airline Industry". Department of Economics, University of Haifa, 31905 Haifa, Israel.
- Park, J. H. & Zhang, A. (2000). "An empirical analysis of global airline alliances: cases in North Atlantic markets". *Review of Industrial Organization*, vol. 16: 367-383.
- Oum, T. H., Park, J. H. and Zhang, A. (1996) "The Effects of Airline Code-Sharing Agreements on Firm Conduct and International Air Fares," *Journal of Transport Economics and Policy*, Vol. 30, No 2: 187-202.
- Oum, T.H., Park, J.H. (2000) *Globalization and Strategic Alliances: The Case of The Airline Industry*. Elsevier Science, Amsterdam, The Netherlands.
- Whalen, T. (2007). "A Panel Data Analysis of Code-Sharing, Antitrust Immunity, and Open Skies Treaties in International Aviation Markets," *Review of Industrial Organization*, 30, 39-61.