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Concentration in the airline industry: Evidence of economies of scale?

Ahren Johnston
Missouri State University, ahrenjohnston@missouristate.edu

John Ozment
University of Arkansas, ozment@walton.uark.edu

CONCENTRATION IN THE AIRLINE INDUSTRY: EVIDENCE OF ECONOMIES OF SCALE?

Ahren Johnston
Missouri State University

John Ozment
University of Arkansas

ABSTRACT

The early experience of the airline industry under deregulation was very much as expected, with increased competition and new entrants offering highly competitive rates. However, there are approximately 130 airlines operating today, and the industry remains more heavily concentrated than it was prior to deregulation. This study reports on concentration in the US airline industry between 1970 and 2009, as measured by the Herfindahl-Hirschman Index (HHI) and Concentration Ratio, together with changes in industry costs. The results show a trend of industry-wide reduced costs per available seat mile that is negatively correlated with the increased level of industry output over the last 30 years and increased concentration, which demonstrate the need for more research into the question of scale economies in air transportation.

INTRODUCTION

Prior to passing the Airline Deregulation Act of 1978, members of Congress wanted to be assured that eliminating federal economic regulation would result in neither destructive competition, nor increased concentration within the industry, which could lead to the threat of monopoly abuse or increased prices. Research presented before Congress provided a very convincing argument that neither condition would develop (U.S. Senate, 1975; U.S. House, 1976; White, 1979; Kyle and Phillips, 1985; Antoniou, 1991). Moreover, since there was no investment in the way required, entry was believed to be relatively easy due to low capital requirements and the flexibility with which equipment could be acquired, reassigned, and/or retired (Harper, 1982; Levine, 1987; Dempsey, 1993). This belief of easy entry was reinforced by the concept of Contestable Markets, which suggested that the potential threat of entry could keep prices down, even in markets with only one competitor (Baumol, Bailey, and Willig, 1977; Panzar and Willig, 1977; Bailey and Panzar, 1981). Thus, Congress passed the 1978 legislation with the belief that it would bring about an increase in the number of competitors and a decrease in the level of industry concentration, leading to lower rates and better service throughout the airline industry.

The early experience after deregulation was very much as expected. There was a rush of new entrants into the market, rates became highly competitive, and the industry became less concentrated. In 1978, there were 33 airlines serving U.S. markets (A4A, 1979). In 1979, the first year after deregulation, 18 new carriers entered the market and another 13 entered the following year. By 1985, there were 106 airlines operating scheduled service in the US. (A4A, 1986). By the end of the decade, however, many of the new carriers had exited the market and the industry was more concentrated than ever (Kahn, 1988; Borenstein, 1992; Rakowski and Bejou, 1992; Dempsey, 1993; Brueckner and Spiller, 1994; Goetz and Sutton, 1997). This led Alfred Kahn, former Chairman of the Civil Aeronautics Board and one of the strongest proponents of deregulation, to question the outcome of the 1978 legislation (Kahn, 1988). Others actually called for re-regulation of the industry

(McGinley, 1989; Dempsey, 1990; Nomani and Barrett, 1990). However, there was continued belief in the positive results of deregulation and strong support for the new environment (Gattuso, 1986; GAO, 1991; TRB, 1991), so no action was taken.

Throughout the 1990s, the trend toward fewer, larger carriers continued due to bankruptcies and mergers (TRB, 1999; DOT, 2001); however, new competitors continued to enter the market, and the overall number of carriers increased. By 1997, there were 99 airlines servicing U.S. markets (A4A, 1998), compared to just 66 in 1991 (A4A, 1992). With the new millennium came additional carriers, and in 2003, 150 airlines were providing service to U.S. markets (A4A, 2004). As mergers and bankruptcies reduced the number of carriers, they were replaced in part by new ones. In 2004, there were only 139 carriers, but by 2008 the number was back up to 150 (A4A, 2006, 2009). Still, questions regarding concentration in the airline industry have continued, together with persistent calls for re-regulation (Senate, 2001; Staff, 2001; USDOJ, 2001; Isadore, 2007; McGee, 2008; Lowy, 2010).

Increasing levels of industry concentration seem contradictory to increasing numbers of competitors, but studies noting levels of industry concentration have not been published recently. Yet levels from the late 1980s and early 1990s appear to remain valid since complaints against the industry continue to link bankruptcies and merger activity to industry concentration and "unreasonable" fares and poor service (GAO, 2006; Isadore, 2007; McGee, 2008; Lowy, 2010). However, questions arise as to whether these concerns are justified. Moreover, it is important to know whether the levels of concentration in the airline industry have continued to increase, or if the new carriers entering the market in recent years have led to reductions.

This study reports on changes in industry concentration in the U.S. airline industry between 1975 and 2009. This study also reports on changes in industry costs and revenues over this period. The following section provides a brief overview of the two most popular measures of industry concentration, those used in this study, and a review of previous studies of concentration in the airline industry. This is followed by a description of the data, and then the results of the analysis are presented. Finally, conclusions and suggestions for future research are discussed.

MEASURING INDUSTRY CONCENTRATION

The concept of industrial concentration has been studied extensively over the years, and many measures have been proposed. Bikker and Haaf (2002) reviewed 10 different measures that had been used in studies of concentration in the banking industry. The two most common measures include basic concentration ratios (CR) and the Herfindahl-Hirschman Index (HHI). These measures are discussed briefly below, and this is followed by a brief review of studies of industry concentration in the U.S. airline industry.

Concentration Ratios

Basic concentration ratios (CR_k) measure the proportion of industry revenue earned by the k largest firms in the industry. The most frequently used values of k are 4 and 8, providing the four-firm (CR_4) and eight-firm (CR_8) measures, respectively (Bain, 1951, 1954; Scherer and Ross, 1990; Bikker and Haaf, 2002; Snyman, 2010). Basic concentration ratios are seen as inferior to other measures of concentration, such as HHI, because they don't take into account the behavior of any firms other than the four or eight largest. Also, many different distributions of those largest firms would result in equivalent measures of CR_4 and CR_8. Despite these shortcomings, concentration ratios have been found to correlate highly with the HHI (Scherer and Ross, 1990) and continue to be used. Economists researching concentration ratios have predominately looked for critical values of measures that are positively correlated with

higher profitability (Schmalensee, 1987; Bikker and Haaf, 2002). The idea being that when large firms begin to behave as an oligopoly, their profitability tends to increase because the large firms can easily see what their competitors are charging and charge a similar amount. Several different numbers have been proposed as the critical value, but for CR_4 the critical value generally is considered to be between 45 and 55 percent, and for CR_8 it is between 60 and 70 percent (Bain, 1951; Meehan and Duchesneau, 1973; Dalton and Penn, 1976).

Herfindahl-Hirschman Index

The Herfindahl-Hirschman Index (HHI) is the sum of the squared market shares for each firm in a given industry (Rhoades, 1993; Nauenberg, Basu and Chand, 1997; Bikker and Haaf, 2002). This gives proportionally greater weight to firms with large market shares and "reflects both the distribution of the market shares of the top four firms and the composition of the market outside the top four firms" (Rhoades, 1993; USDOJ, 1997).

The Herfindahl-Hirschman Index (HHI) is generally accepted as a better measure of industry concentration than basic CRs, and it is the measure used by the U.S. Department of Justice (USDOJ) in determining whether a proposed merger deserves further investigation before approval (USDOJ, 1997). The HHI ranges from 0 to 10,000 for industries ranging from perfect competition to monopoly. As an example, an industry with four firms with the following market shares (40, 30, 20, and 10) would have a CR_4 of 100% and a HHI of 3,000. If the industry was more concentrated, as with the following market shares (80, 10, 5, and 1), the CR_4 would still be 100%, but the HHI would be 6,526. Finally, for a monopoly the CR_4 would still be 100%, but the HHI would be 10,000.

According to the guidelines set forth by the USDOJ and the Federal Trade Commission, an industry with an HHI lower than 1,000 is considered un-concentrated, and mergers need not be analyzed. An industry with an HHI between 1,000 and 1,800 is considered moderately concentrated and mergers that create an increase in HHI greater than 100 points raise competitive concerns and need to be approved. Finally, an industry with an HHI greater than 1,800 is considered highly concentrated, and mergers causing an increase of greater than 50 points raise competitive concerns (USDOJ, 1997). As with concentration ratios, the HHI can be measured using market shares expressed in either dollar terms or physical terms, such as units sold or revenue passenger miles (RPM).

STUDIES OF AIRLINE INDUSTRY CONCENTRATION

By the end of the first decade of deregulation, it was clear that the industry was changing dramatically. This prompted a wave of research assessing the results of deregulation. Several studies analyzed the effects of mergers and concentration on fares at the route-level or at airports/hubs (Hurdle et al., 1989; Borenstein, 1990, 1991, 1992; Joesch and Zick, 1990; Morrison and Winston, 1990; Abramowitz and Brown, 1993; Kim and Singal, 1993). These studies revealed mixed results, such that in some cases fares were lower in heavily concentrated markets and in others fares were higher. What was revealed was that other factors must be considered together with the level of concentration. Others studies challenged the Theory of Contestable Markets, noting that firms may prevent entry of new carriers without lowering prices. This could be accomplished by development of Hub-and-Spoke Systems, Frequent Flyer Programs, Computerized Reservation Systems, Travel Agent Commission Overrides, and control at "Fortress Hubs" of airport slots and gates (Levine, 1987; Borenstein, 1989, 1992; Fawcett and Farris, 1989; Hurdle et al., 1989; Evans and Kessides, 1993b; Joesch and Zick, 1994).

Very few studies reported concentration at the industry level, and most of these studies were conducted during the wave of research that assessed the effects of deregulation at the end of the first decade of experience; very little

attention has been given to industry-level of concentration in recent years. Rakowski and Bejou (1992) showed that in 1977, the largest 15 airlines controlled over 95 percent of the market in terms of passenger revenues. The largest 8 controlled nearly 80 percent, and the largest four controlled over half. By 1985, those numbers were down to 91, 71, and 41, respectively. However, by 1989 the concentration ratios were back up above 1977 levels with the largest 15 carriers controlling 99 percent, the largest 8 with over 91 percent, and the largest 4 at nearly 55 percent.

Borenstein (1992) reported the CR_4, CR_8, and HHI for 1977, 1982, 1987, and 1990. The 4-firm ratios were 56.2, 54.2, 64.8, and 61.5, for 1977, 1982, 1987, and 1990, respectively. The 8-firm ratios were 81.1, 80.4, 86.5, and 90.5, for those same years, and the HHIs were 1060, 930, 1230, and 1210, respectively. Evans and Kessides (1993a) reported measures of concentration for the fourth quarters of 1978-1988. The CR_4 decreased from the 4th quarter of 1978 to a low of 38.4 by the 4th quarter of 1985; however by the 4th quarter of 1988, it was back up to 45.5. The CR_8 fell from 77.6 in 1978 to a low of 40.7 in 1985 and then increased to 78.0, its highest level up to that point. The HHI fell from 930 in the 4th quarter of 1978 to a low of 630 in 1985, and rose steadily through 1988 to 870.

Brueckner and Spiller (1994) showed a similar pattern of change in industry concentration as measured by Revenue Passenger Miles. They reported the CR_4 as 59.1, 53.6, and 59.1 for 1979, 1985, and 1988, respectively. Clearly, the pattern was well established. The initial response to deregulation was the entry of several new carriers and more extensive competition, but by the end of the decade, most of the new carriers were gone, and the industry was more heavily concentrated than it was prior to deregulation. Mergers and bankruptcies have continued to raise the ire of consumers and public policy makers (Senate, 2001; Staff, 2001; USDOT, 2001; Isadore, 2007; McGee, 2008; Lowy, 2010), but little is known about the actual levels of concentration in the industry and its relationship to overall fare levels and costs.

DATA

The data used in this analysis were obtained from the annual reports published by the Airlines for America (A4A). These reports, dating back to 1937, report information on the general state of the industry such as total revenue, expenses, revenue passenger miles (RPM), available seat miles (ASM), and names of all U.S. carriers with scheduled passenger service. In addition to this industry-wide information, similar financial and production information is reported for the largest carriers each year dating back to 1970 (A4A, 2009). Table 1 provides an overview of the U.S. airline industry with respect to the number of carriers, total passenger revenue, operating profit and four measures of industry concentration for the past 40 years. To show trends in pricing and cost data, it was necessary to adjust dollar figures for inflation. This was accomplished by dividing by the implicit price deflator (IPD) as reported by the Bureau of Economic Analysis (2011). The specific IPD used was based on annual GDP with a base year of 2005.

NUMBER OF CARRIERS

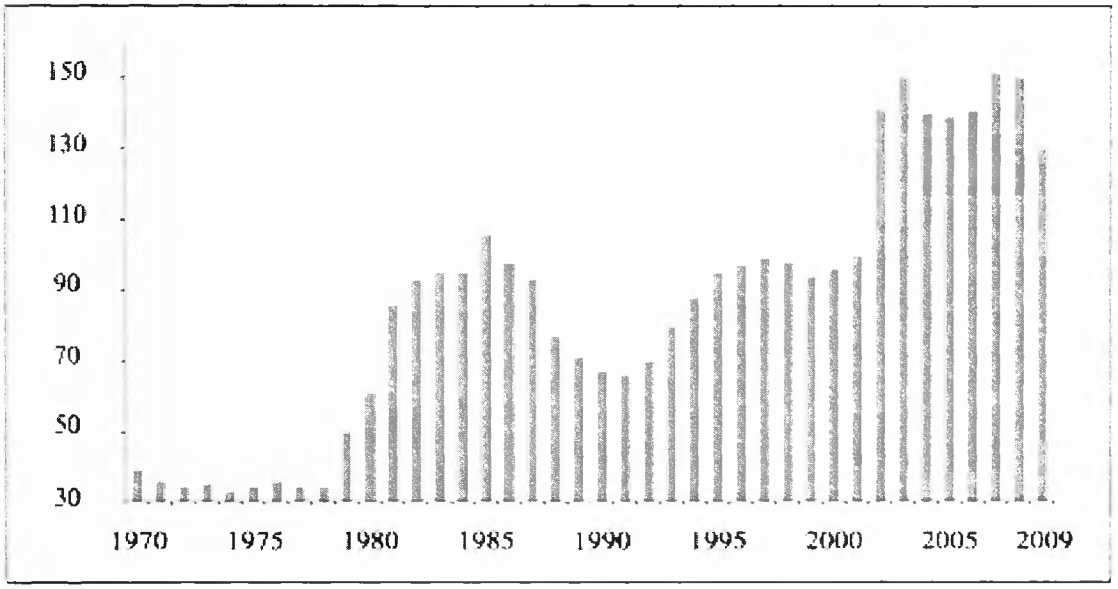
An expected result of airline deregulation was an increase in the number of carriers serving the U.S. scheduled passenger service market because of reduced barriers to entry. Figure 1 shows that the number of carriers has increased dramatically since deregulation. Between 1978 and 1985, there was a significant increase in the number of carriers with new entrants into the market; however, during that period there were also many small carriers that exited the market. By 1985, 9 of the 34 airlines that existed in 1978 and 11 of the 17 that entered the market in 1979 had exited the market. The number of carriers peaked in 1985, declined through 1991, and has trended upward through 2009 with a few minor declines.

With this significant growth in the number of carriers, one would expect to see a corresponding decrease in the concentration of

TABLE 1:
INDUSTRY OVERVIEW

Year	Number of Carriers	Passenger Revenue ($ Billions)	Operating Profit ($ Billions)	RPM (Billions)	ASM (Billions)	CR4	CR8	HHI	Gini Index
1970	39	31.3	0.2	131.7	264.9	57	83	1,076	78
1971	36	32.2	1.2	135.7	279.9	56	82	1,037	76
1972	34	34.9	2.2	152.4	287.4	57	83	1,056	75
1973	35	36.5	2.1	162.0	310.6	54	83	1,024	76
1974	33	38.7	2.4	162.9	297.0	53	83	1,015	74
1975	34	36.8	0.3	162.8	303.0	53	82	995	74
1976	36	40.2	2.0	179.0	322.8	53	82	992	76
1977	34	43.1	2.4	193.2	345.6	52	81	978	74
1978	34	46.5	3.4	226.8	358.8	53	81	1,004	74
1979	50	52.0	0.5	262.0	416.0	50	79	901	81
1980	61	58.7	-0.5	254.2	431.2	49	80	920	83
1981	86	58.5	-0.8	248.8	432.5	47	76	853	87
1982	93	55.1	-1.3	259.0	424.9	47	77	854	87
1983	95	56.8	0.5	281.3	463.4	48	76	860	86
1984	95	61.8	3.6	304.5	514.0	46	74	817	86
1985	106	63.7	2.3	335.9	547.0	45	73	782	88
1986	98	63.6	2.1	366.3	606.8	48	74	833	87
1987	93	69.3	3.8	404.3	648.4	51	84	989	90
1988	77	75.4	5.2	423.3	648.7	53	85	1,027	89
1989	71	77.2	2.7	432.7	684.4	57	87	1,094	89
1990	67	80.9	-2.6	457.9	733.4	57	88	1,111	89
1991	66	76.2	-2.4	447.8	715.0	63	90	1,230	89
1992	70	78.0	-3.1	478.1	751.8	69	94	1,407	92
1993	80	81.7	1.8	489.1	770.8	69	93	1,407	92
1994	88	81.1	3.5	518.2	783.8	68	91	1,347	92
1995	95	85.1	7.2	540.4	806.6	67	89	1,312	92
1996	97	88.2	7.5	578.4	834.7	66	89	1,280	92
1997	99	93.9	10.2	605.4	860.6	66	89	1,278	92
1998	98	94.6	10.9	619.5	874.2	65	89	1,273	92
1999	94	96.9	9.1	651.6	917.8	64	89	1,233	92
2000	96	105.5	8.0	692.5	956.5	62	88	1,185	91
2001	100	89.2	-11.1	651.7	930.5	64	89	1,244	92
2002	141	79.5	-9.3	639.6	892.7	62	87	1,185	93
2003	150	81.8	-2.3	655.9	893.9	58	83	1,069	92
2004	140	88.5	-1.4	731.9	969.0	57	81	1,029	91
2005	139	93.4	0.3	779.0	1,003.3	55	83	1,028	91
2006	141	98.0	7.3	797.4	1,006.4	54	82	1,007	92
2007	151	100.7	8.7	829.0	1,037.1	53	81	968	91
2008	150	102.8	-3.3	811.4	1,020.1	61	83	1,188	92
2009	130	83.2	2.2	769.5	952.2	60	83	1,157	92

FIGURE 1:
NUMBER OF U.S. AIRLINES 1975-2009



the industry and equality of carriers' market share, especially if there were no economies of scale. That is, if all carriers, regardless of size, had the same costs per unit of output, the concentration today should be lower than the concentration was in 1975 because the new entrants into the market would be able to take significant amounts of market share from the industry leaders. This is not the case, however, and the following sections will illustrate that industry concentration and inequality has actually increased over this time period.

CONCENTRATION RATIOS

Figure 2 shows a graphical representation of the annual four and eight firm concentration ratios calculated using market shares measured in both dollar sales and units sold between 1975 and 2009 as well as the most conservative (highest) critical values of CR_8 and the range of critical values for CR_4. From this figure, it is obvious that the airline industry is currently operating above these critical values and has been for most of, if not all of, the past 35 years. This suggests that the industry is behaving as an Oligopoly and is a highly concentrated industry. This can be further verified by the fact that ticket prices for the same lane among the largest airlines are generally very similar, and when checked baggage fees were added in 2009 they were added for all of the largest airlines, with the exception of Southwest Airlines, which, as of 2011, doesn't charge a checked baggage fee but frequently charges slightly higher ticket prices than the other major national airlines. However, an industry behaving as an oligopoly should have higher profitability (Bikker and Haaf, 2002), and this is not the case in the U.S. airline industry, where industry profits per unit of output have remained fairly constant over the past 40 years.

HERFINDAHL-HIRSCHMAN INDEX

Figure 3 shows the HHI calculated annually for the U.S. airline industry from market shares measured in terms of both dollar sales and units sold. Both methods result in measures of HHI that are very similar at every point in the sample. This illustrates that the airline industry is moderately concentrated and has been for most of the past 35 years. It is also clear that when the number of carriers was increasing, between 1978 and 1985, the concentration of the industry was decreasing. However, when the number of carriers began decreasing between 1985 and 1991, the concentration increased rapidly, and

FIGURE 2:
ANNUAL CR_4 AND CR_8 of U.S. AIRLINE INDUSTRY

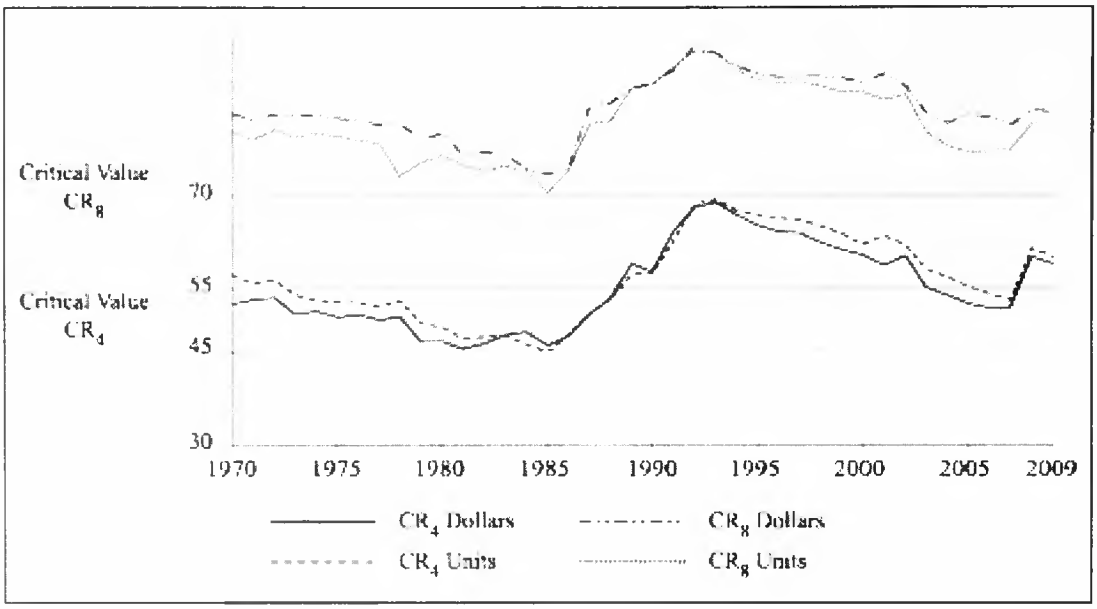
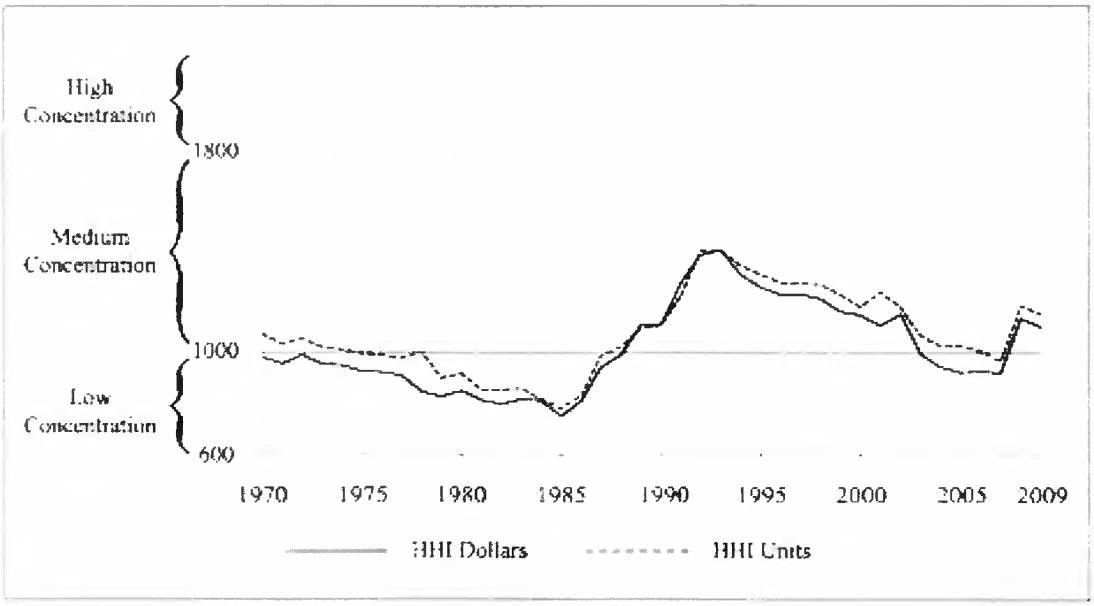


FIGURE 3:
ANNUAL HERFINDAHL-HIRSCHMAN INDEX (HHI) OF U.S. AIRLINE INDUSTRY



did not decrease dramatically as more carriers later began to enter the market. Therefore, despite the fact that there are between 4 and 5 times as many carriers today as there were in 1978, the HHI is actually higher. The large firms have increased their market share and the small firms are dividing a decreasing percentage of the market between them. This indicates that there is some reason the large firms are able to increase their power, whether it is due to economies of scale, scope, or density.

INEQUALITY

When discussing industry concentration, it makes sense to also discuss the related concept of inequality of the distribution of market share of the firms in the industry. A common way to measure inequality is the Gini index (Damgaard and Weiner, 2000). The Gini index is based on Pareto's law and is the ratio of the area between a diagonal representing equal distribution and the Lorenz curve and the area below a diagonal representing equal distribution. In the Lorenz curve, individuals are ranked by size, and the cumulative percentage of carriers is plotted on the x-axis against the corresponding cumulative percentage of the market on the y-axis. In figure 4, the Lorenz curve for the U.S. airline industry in 2009,

$$Gini = {}^{A}/_{(A+B)}. \quad (1)$$

To make computation easier and avoid the estimation of a formula for the Lorenz curve, the following formula is an unbiased estimator of the Gini index if the carriers are ranked by size (Damgaard and Weiner, 2000), where x_i is the size or market share of each carrier and μ is the average size of all carriers.

$$Gini = {}^{\sum_{i=1}^{n}(2in - 1)x_i}/_{(1 - n)n\mu} \quad (2)$$

Figure 5 shows the Gini index for the U.S. airline industry for the past forty years calculated using size measured in both passenger revenue and RPM. This shows that inequality in the industry increased significantly immediately following deregulation and has continued to do so. If there was no benefit to being a larger carrier (no returns to scale or scope), we would expect to see the industry approaching a more equitable distribution of the market when in fact the opposite has been the case. Furthermore, the correlation between the Gini index and number of carriers is 0.8165, indicating that as the number of carriers increases so does the inequality in market share between carriers.

These multiple measures of industry concentration and inequality were examined to clearly illustrate that the concentration of the U.S. airline industry has been increasing since deregulation despite the fact that there has been a substantial increase in the number of firms. While this alone, does not indicate economies of scale or scope, it certainly raises questions as to how the largest firms have been able to maintain control of the marketplace and actually increase market share with the near constant introduction of new competitors. One possible explanation might be that operating costs per unit of output are actually lower for the larger carriers. If this explanation is accurate, it would indicate the presence of economies of scale, economies of scope, or both in the airline industry.

COST AND REVENUE PER PASSENGER MILE (RPM)

Since 1975, there has been an increase in the size of the airline industry as a whole. This can be measured by revenue (dollar sales), RPM (unit sales), or ASM (output). All three measures have shown an increasing trend since 1975 and can be seen in Figure 6. In order to fit data of differing scales on the same graph and show the increasing trends more clearly, revenue, RPM, and ASM have been indexed with a base year of 1975 by dividing each year's value by the value from 1975. The revenue values were adjusted for inflation before being indexed. Figure 6 clearly shows an increasing trend in the size of the U.S. airline industry, but it also shows that output and units sold have been increasing more rapidly than revenue. This is another indication of scale economies and shows that costs have risen less quickly than output.

FIGURE 4:
CALCULATION OF THE GINI INDEX

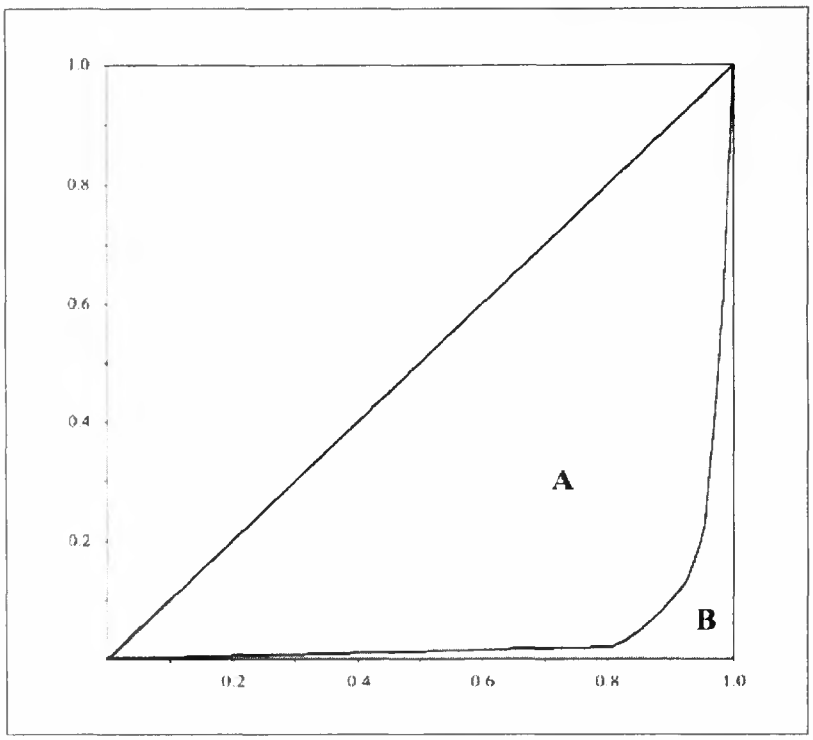


FIGURE 5:
GINI INDEX OF U.S. AIRLINE INDUSTRY

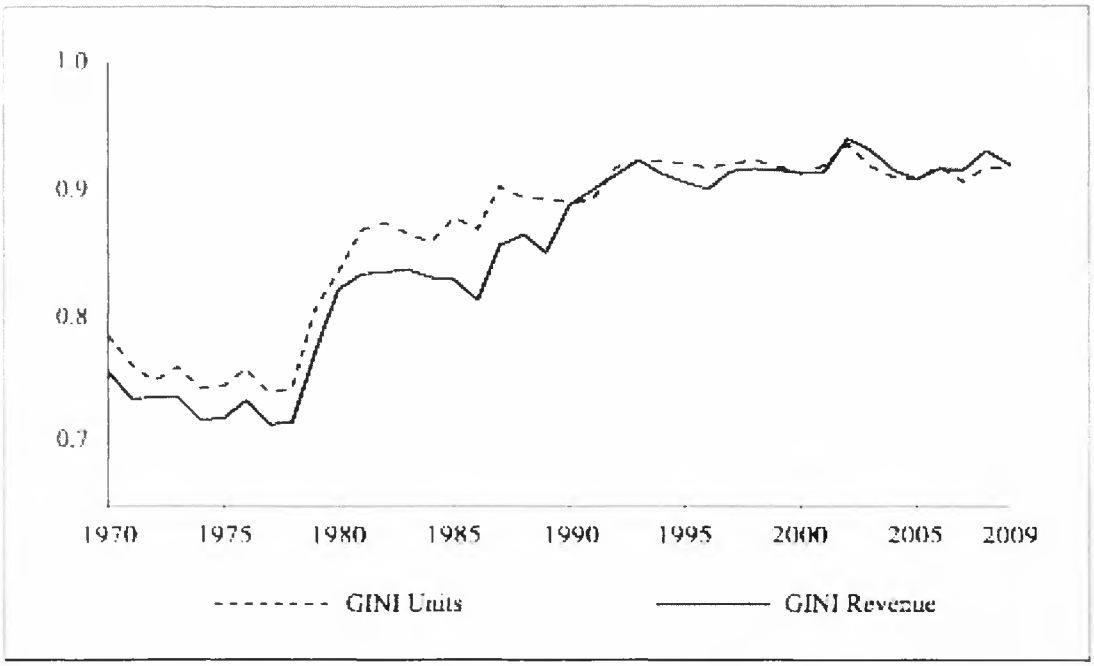


Figure 7 shows the increase in billions of RPM sold for what are, as of 2010, the three largest airlines in the U.S. (United, American, and Delta) for each year between 1975 and 2009. This figure illustrates that not only has the entire industry been increasing in size, but the largest firms have also been increasing. Figure 7 also shows that the period from 1979-1985 resulted in a relative lack of growth for these three carriers while the industry as a whole was growing. This lack of growth for the large carriers as the industry grew corresponds to what was shown in figures 1-3, that the number of firms increased in this time period and the industry concentration, as measured by CR_4, CR_8, and HHI, decreased.

Correlated to the growth of the industry was an equally impressive decrease in both expenses and revenue per RPM and ASM. This can be seen in Figure 8. This figure is based on monetary figures, which were adjusted for inflation by dividing each year's observation by the corresponding IPD. This is another indicator that economies of scale or scope may exist in the airline industry. The correlation between industry output (measured in either RPM or ASM) and expenses per RPM is -0.86.

However, the fact that revenue per unit of output has decreased at nearly the same rate indicates that the carriers do not appear to be acting as though they are market leaders in a concentrated industry. Actually, the correlation between sales per RPM and output is even higher at -0.96, indicating that the price of air travel has decreased more quickly than the cost of providing air travel. For those interested in re-regulation, this raises the question of whether the current state of the industry and competition is bad for the consumer. Presumably the role of regulation would be to help the consumer and maintain competitiveness in the industry. However, the industry seems to be lowering prices even faster than expenses, suggesting that competition is keeping prices low despite high levels of industry concentration.

FIGURE 6:
ANNUAL INDEXED MEASURES OF INDUSTRY SIZE (1970=1)

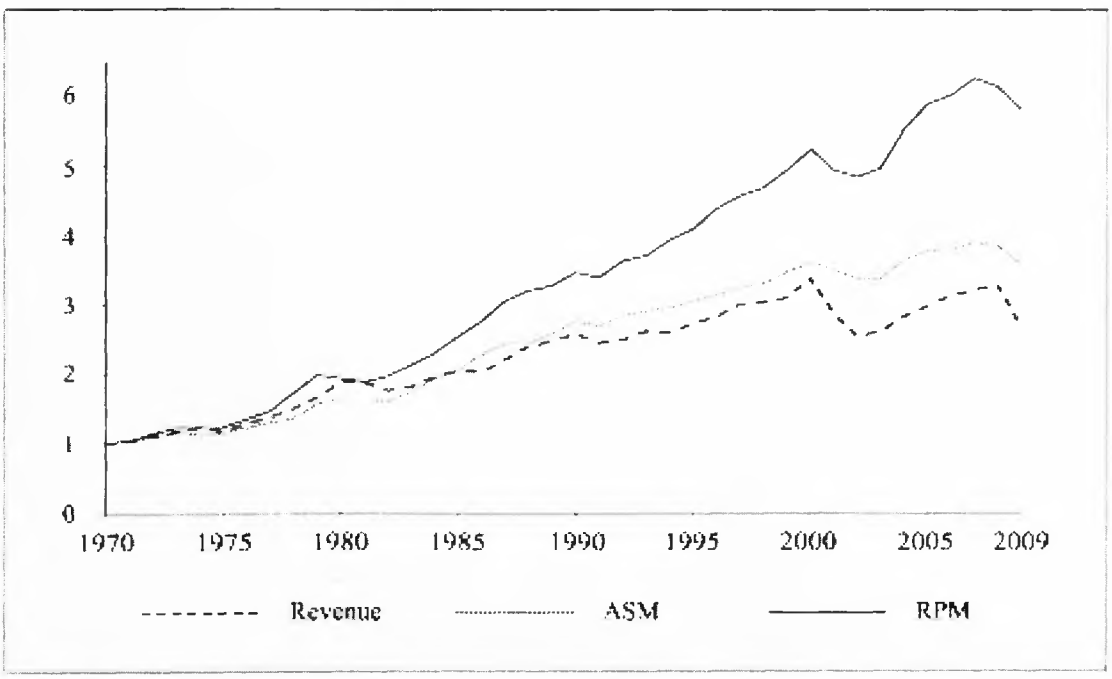


FIGURE 7:
ANNUAL RPM (BILLIONS) OF 2009's 3 LARGEST CARRIERS

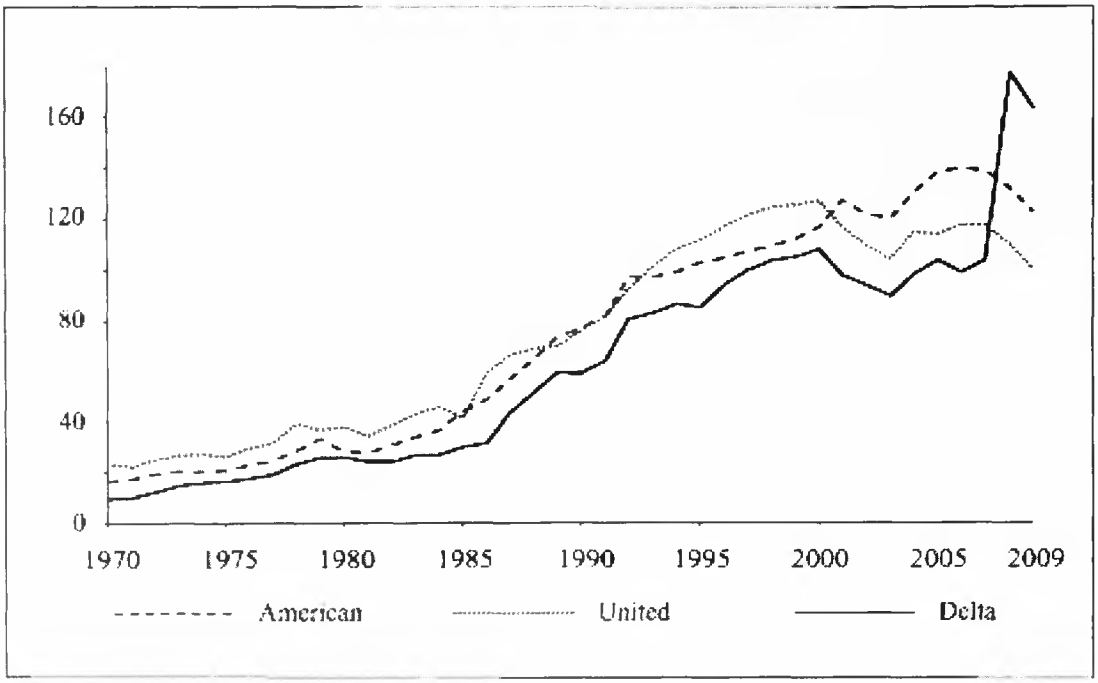
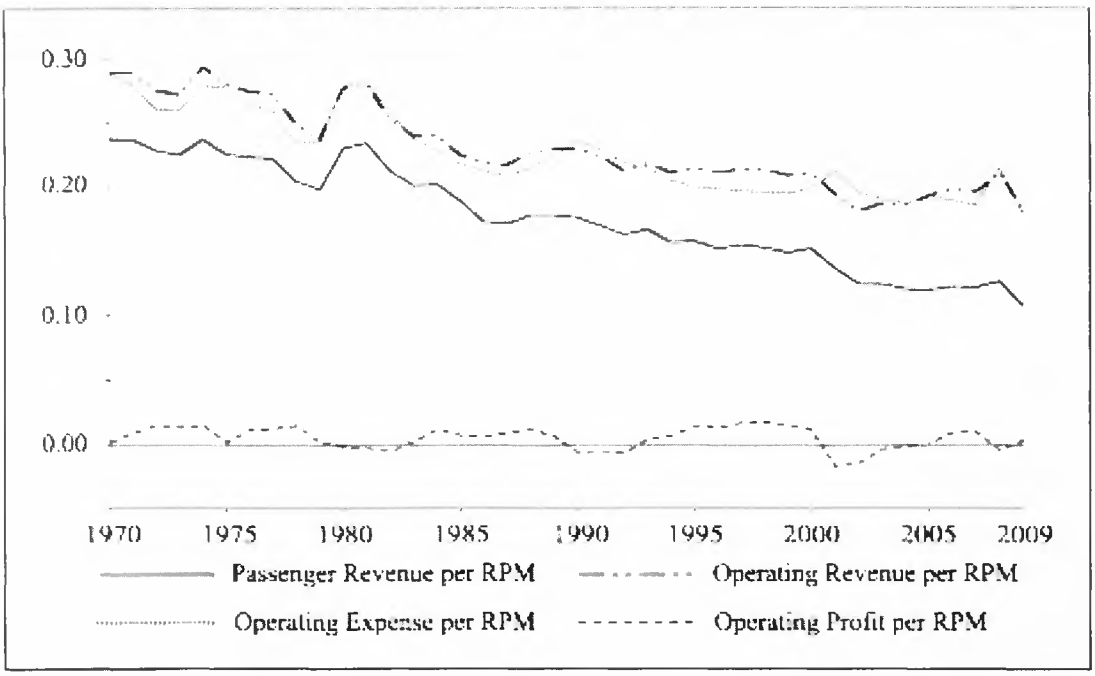


FIGURE 8:
REVENUE, EXPENSES, AND PROFIT PER REVENUE PASSENGER MILE



The bottom line on Figure 8 illustrates the profit per RPM, and this measure has stayed fairly stable over the past 35 years. In fact, the entire industry lost money 11 out of the past 35 years. If this is a result of destructive competition, there may be a need for regulation simply to keep the large carriers from losing money or requiring governmental monetary intervention to avoid bankruptcy. The entire industry has lost approximately $9 Billion since 2001. However, this is more likely the result of a few large firms losing a lot of money rather than all of the major carriers losing money. Based on information from their annual reports to the SEC, America West and U.S. Airways combined, pre-merge, and post merge losses since 2001 have totaled close to $8 Billion, leading to the conclusion that the rest of the industry only lost $1 Billion; this includes at least 40 bankruptcies, with at least 12 of the bankruptcies resulting in the cessation of operations.

These findings support reregulation of the airline industry in that they provide evidence of economies of scale, and a major reason for deregulation was a multitude of studies showing a lack of scale economies in the industry. The industry has concentration ratios indicating that it should be behaving as an oligopoly, all measures of concentration show increased concentration ratios since deregulation, and cost per unit of output has steadily decreased as output has increased. Contrary to this evidence is the fact that price per unit of output has decreased even faster than costs. This reduced price is beneficial to consumers as long as destructive competition does not drive prices down so far that the established carriers are forced out of business. However, it has been pointed out that the majority of industry losses over the past 9 years have been the result of two carriers who merged.

MERGERS AND ACQUISITIONS

The final piece of evidence that there may be economies of scale in the U.S. airline industry is the recent abundance of mergers and acquisitions. If there are no cost benefits from increased size of operations, why are there so many mergers? The following is an account of some of the recent mergers: American Airlines purchased the assets of the bankrupt Trans World Airlines in 2001. America West and U.S. Airways (both with recent bankruptcies) merged in 2005 and integrated their operations in 2008. Delta and Northwest merged in 2008. United Airlines and Continental Airlines merged in October of 2010. ExpressJet Airlines merged with SkyWest/ASA in November of 2010. Finally, Southwest Airlines announced a merger with AirTran Airways in September of 2010 which was finalized May 2, 2011.

While many carriers are merging operations, there are also several instances of a single holding company owning multiple carriers. This would further suggest that the carriers see no possibility of economies of scale. However, in some cases, these are the same companies that were previously mentioned. For example, Delta Airlines owns Comair and operates it separately; AMR Corporation owns American Airlines, American Eagle, and Executive Airlines; U.S. Airways Group owns U.S. Airways, Piedmont Airline, Inc., and PSA Airlines; and Republic Airline Holding owns Frontier, Republic, Shuttle America, Chatauqua, and Midwest. This indicates that mergers may not be attempts to exploit economies of scale but may be due to some other rationale.

CONCLUSIONS

This paper is intended to investigate the state of the airline industry, show its increasing level of concentration, and point out the need for further investigation into the existence of scale economies. Whether industry concentration is measured by concentration ratios or the HHI, the U.S. airline industry has been increasing in concentration while also increasing in size and number of carriers. The fact that large carriers can increase market share in the presence of increased competition seems to suggest the existence of scale economies. Costs per unit of output have been steadily decreasing as industry output and output of the largest carriers has

increased. This is yet another indicator that scale economies may exist. Finally, some air carriers behave as though they will see a benefit from merging with other carriers, indicating a belief or hope that scale economies exist, while other companies own multiple carriers without merging operations, indicating that they see no benefit from increasing the size of operations. For this reason alone, it may be time to reinvestigate the existence of scale economies in the U.S. airline industry, so airline holding companies will know if they could expect to see reduced cost from merging operations instead of operating multiple carriers.

For all of these reasons, the apparent shifts in market structure as seen by changes in equality in Figure 5, and the recent calls for re-regulation; it seems as though there exists a need for further investigation into the presence or absence of economies of scale and scope in the U.S. airline industry. Further validating this argument, is the fact that the most recently published study into this matter, while published in 2001, used data from 1983-1989 (Creel and Farrell, 2001). This means that an additional 20 years of available data has not been included in any previous studies on scale economies in the U.S. airline industry. It is time for a thorough study using the most up to date information to investigate the existence of economies of scale, scope, and density.

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AUTHOR BIOGRAPHIES

Ahren Johnston is an assistant professor of business at Missouri State University at Springfield, MO. He received an M.T.L.M. degree and a Ph.D. from the Sam M. Walton College of Business at the University of Arkansas. His research interests center on logistics and transportation: specifically costs, quality, and service. AhrenJohnston@missouristate.edu

John Ozment is a professor and the Oren Harris Chair of Transportation at the Sam M. Walton College of Business at the University of Arkansas at Fayetteville, AR. He received a M.B.A. from the University of Tulsa and a Ph.D. from the University of Minnesota. John has published more than 100 articles and reports, many of which have appeared in top journals of his field and in the proceedings of national and international conferences. His research interests are the relationship between cost and service in the railroad and airline industries. jozment@walton.uark.edu