An Update on Airline Financial Condition and Insolvency Prospects Using the Altman Z" Score Model

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Stricken by the events of Sept. 11, 2001, and by increases in fuel prices, a key cost which has spiked upward as the price of oil has risen to more than $130 per barrel, the airlines find themselves, once again, in fragile financial shape. The purpose of this article is to measure the financial condition of the industry, given this situation, using a popular financial stress model, the Altman Model.

INTRODUCTION

The U.S airline industry has been stricken by the events of the new millennium. First traffic was severely hurt by the events of Sept. 11, 2001, and after traffic growth had finally resumed, the war in Iraq contributed to the price of a barrel of oil soaring to nearly $100 per bbl. in late 2007 and to more than $130 in May of 2008. These events as well as the labor unrest present in the industry have financially affected all the carriers, causing a spate of bankruptcy filings.

The purpose of the paper is to assess the current financial condition of the major U.S. air carriers and to compare their financial strength to the 1995-1999 period when the carriers earned record profits. The methodology employed will be the Z" Score Model, a variant of the Altman Z Score Model, perhaps the most popular approach to tracking financial health and the potential for insolvency.

METHODOLOGY

In the past, several of the authors of this paper have tracked air carrier financial condition and forecasted financial stress and insolvency using the standard Altman Z Score Model (Altman 1968) which is widely known and used for many industries. The model weights key ratios that are used by financial analysts to gauge the liquidity, leverage (debt burdens), turnover (or efficiency), and profitability of the companies. The Z Score model takes the form:

(1) $Z= 1.2X_1 + 1.4X_2 + 3.3X_3 + .6X_4 + 1.0X_5$

Where $X_1 – X_5$ are ratios that measured each of the aspects of financial strength.

X_1 = net working capital to total assets (a liquidity ratio)
X_2 = retained earnings to total assets (a profitability ratio)
X_3 = operating profit to total assets (a profitability ratio)
X_4 = market value of equity to book value of debt (a leverage ratio)
X_5 = operating revenues to total assets (an efficiency ratio)

The coefficients in the equations were the results of a stepwise multiple discriminant analysis or MDA regression. High ratios increase the Z Score and thus lessen the danger of failure, and vice versa. These ratios were weighted by the intercept terms to produce the Z Score. Altman (1968) found that the critical values of the Z were 1.81 and 2.99. Firms with scores of <1.81 fit a bankruptcy profile, while firms with scores>2.99 fit the solvency profile. Scores between the two values lie in what Altman (1968) called the "gray zone" where profiling is more difficult. If the analyst wanted one key score in place of the "gray zone," he argued for a 2.67 cutoff because that zone contained

both failed and non-failed firms. The barrier of 2.67 minimized the misclassifications. The model's overall success rate in forecasting firms that ultimately failed was 76%.

The Altman model has been used in air transport to successfully predict carrier failures as early as the 1980s where it correctly presaged the bankruptcy filings of both Braniff and Continental (Gritta 1982), and in subsequent years to track airline financial performance. Because of the significant increase in the use of leasing to finance assets in this industry, that model has become less reliable over time (Gritta et al. 1995). The use of off-the-balance-sheet leverage via operating leases can overstate the X_5 variable in the model by understating the assets that produce the revenues. The revenues generated by these "hidden" assets appear on the income statement but the assets are not recorded on the balance sheet. In addition, Altman (1983) has suggested the use of a slightly different model, the Z", when assessing the financial condition of service type firms. For these reasons, the authors use the latter model in this paper. It takes the form:

$$(2) \quad Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

This model utilizes four input variables; $X_1 - X_4$ as defined above and the same MDA regression procedure to estimate the intercept terms in the equation.

A Z" Score of 1.1 or less indicates a high degree of financial stress, and thus an increase in the probability of bankruptcy in the near future. A Z" Score of 2.6 or above indicates a high probability that bankruptcy will not occur, while a Z" Score between these two numbers indicates that there is insufficient statistical significance to make a prediction. As is the case with the Z Score Model, Altman (1968) originally referred to scores in this range as the "gray zone." In this range lie some firms that have failed and some that have remained solvent. It should be noted that the model can also be used to assess overall relative financial strength for comparative purposes.

Table 1 shows Z" Scores for the major carriers for the years 1997-2006. Included in the table are all the passenger carriers now classed as majors under the DOT classification ($1.0 billion of revenues).

Table 1: Air Carrier Z" Scores, 1997-2006

CARRIRER	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Airtran	-5.92	-2.01	-1.19	-3.38	-1.89	-1.58	2.10	2.01	1.04	0.34
Alaska	0.77	1.67	1.51	1.29	1.14	0.77	0.88	1.03	0.42	0.10
American	1.03	1.69	1.51	0.75	0.44	-1.74	-1.21	-1.31	-1.56	-1.34
American Eagle		1.72	0.90	0.08	-1.67	-1.59	-0.75	-0.57	-0.41	-0.29
ATA	-0.74	1.24	0.79	-0.91	-0.72	-2.33	-1.56	-38.70	-110	-24.11
Americawest	0.90	1.69	2.82	1.84	-0.93	-1.13	0.22	-1.16	-1.29	-2.22
Atlantic SE	4.20	5.49	7.35	7.93	.272	1.67	1.46	-1.65	-0.53	
Comair						2.90	1.88	-4.56	0.06	-1.44
Continental	0.36	0.97	0.68	0.78	-0.27	-0.68	0.08	-0.68	-0.48	-0.41
Delta	1.02	1.17	1.43	0.72	-0.41	-1.21	-1.03	-2.38	-4.28	-5.94
Express Jet							1.46	1.91	3.15	
Jet Blue				0.00	0.10	0.94	1.95	0.74	0.18	0.26
Northwest	1.40	-0.18	0.52	0.61	0.29	-0.49	0.49	-0.31	-1.10	-1.85
Southwest	2.84	3.15	3.00	3.10	2.78	3.11	3.25	2.60	2.80	2.85
United	-0.05	-0.22	0.39	0.08	-1.62	-2.48	-3.34	-4.02	-13.3	5.39

Source: Calculated from raw data contained in Air Carrier Financial Statistics Quarterly, various issues.

One significant factor stands out from the table. Of the 15 carriers listed, most have had a score in the danger zone for most of the years since 1997. In fact six (ATA, American West, Continental, Delta, Northwest and United) have filed under the Bankruptcy Act and an additional carrier, American, has threatened to do so since 2000. Only Southwest stands out as a beacon in a sea of red ink and financial stress over the entire study horizon, although several carriers have had stronger scores for some years in the 10 years of the study. These include AirTran, Alaska, Atlantic South East, Comair, and Express Jet. Although FedEx was not included in the table, its performance mirrors Southwest with Z" Scores that are quite good (consistently above 2.00 for the entire period).[1]

Negative numbers indicate severe financial distress, the result of negative X variables in the equations for these carriers (that is, negative profitability, negative net working capital, etc.). A major factor in the calculation of the Z'' scores is the X_4 variable, the Equity to Debt (Leverage) ratio. Table 2 lists the leverage ratios for the major air carriers used to calculate the Z'' scores. Negative numbers results from negative equity. With the exception of Comair, the carriers that used less leverage (higher equity/debt ratios) had the highest average Z'' score over the past decade. This provides further evidence that the carriers that relied less on leverage were in better financial health. A potentially worse signal of the health of the major carriers is that over the six-year period from 1997 to 2003 only an average of two major carriers a year had negative equity (negative equity/debt ratios, the result of debt exceeding equity), but that number increased to almost six per year from 2004 to 2006.

Table 2: Carrier Equity to Debt Ratios, 1997-2006

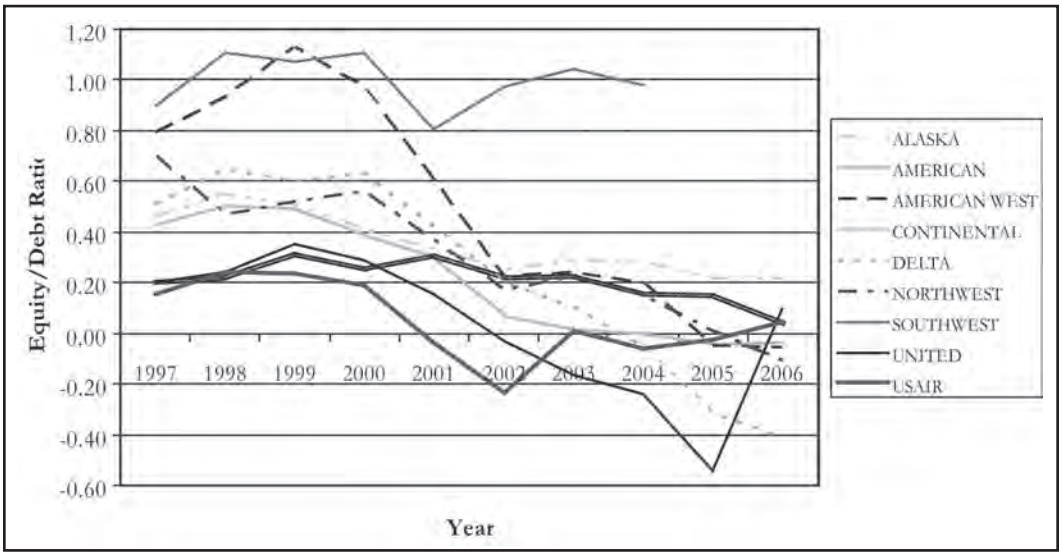
CARRIRER	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Airtran		.17	-.08	.01	-.04	-.02	.14	.58	.44	.31
Alaska	.46	.55	.51	.41	.34	.25	.29	.29	.22	.22
American	.43	.50	.49	.38	.30	.07	.01	.00	-.04	-.04
American Eagle		.37	.25	.10	.02	.00	.03	.04	.04	.06
ATA	.01	.09	.14	.10	.02	-.15	-.14	-.70	-.94	.24
Americawest	.79	.93	1.13	.98	.61	.22	.24	.20	-.05	-.06
Atlantic SE	.88	1.23	1.30	5.21	2.26	1.00	.71	.24	.33	.37
Comair						2.18	1.30	.39	.36	.20
Continental	.20	.22	.31	.25	.31	.22	.23	.16	.15	.04
Delta	.51	.65	.60	.63	.42	.20	.10	-.06	-.32	-.41
Express Jet	-.25	-.09	.04	.21	.56	-.35	.00	-.16	-.20	-.06
Jet Blue				.50	.36	.43	.44	.37	.31	.24
Northwest	.70	.47	.53	.56	.37	.17	.23	.15	.01	-.11
Southwest	.90	1.11	1.07	1.11	.80	.97	1.04	.98	1.10	1.14
United	.20	.24	.35	.29	.15	-.03	-.17	-.24	-.54	.10
US Air	.15	.24	.24	.19	-.03	-.24	.01	-.06	-.03	.04

Source: Calculated from raw data contained in Air Carrier Financial Statistics Quarterly, various issues

Note that leverage became more attractive during this period. Interest rates on Baa bonds, according to data from the Federal Reserve (www.stlouisfed.org), were fairly constant from January 1997 (8.09%) through December 2000 (8.02%). Then rates dropped more than 300 basis points from a high of 8.90% in May of 2000 to 5.82% in February of 2005. This dramatic decline in the cost of borrowing created an incentive for carriers to increase their use of leverage during the first

half of this decade. Figure 1 shows the trend of the equity/debt ratios for the major carriers from 1997 through 2006.

Figure 1: Trend of Equity / Debt Ratios, 1997-2006



If these firms increased debt levels during this period and were able to maintain equity values then equity/debt ratios would decline. However, not to the degree that is shown in the graph above. A carrier doubling its debt levels would halve its equity/debt ratio, but a majority of these carriers experience a greater decline than 50% in their equity/debt ratio over the decade. Additionally, the fact that only three of the nine carriers listed were able to maintain a double-digit equity/debt ratio shows that equity values were declining while debt levels were increasing.[2]

CONCLUSION

The financial health of the major U.S. air carriers has worsened throughout the first decade of the 21st century. With the exception of Southwest, carriers experienced a decline in their financial health as measured by the Altman Z'' Score Model. A key factor in this trend has been the combination of decreasing equity values and increasing use of debt. Some of this trend can be explained by the drop in interest rates from 2000 to 2005, which increases the attractiveness of debt as a source of capital. However, the industries reliance on debt could have a significant negative impact on the major carriers if interest rates rise again in the next several years.

Endnotes

1. Note that scores below the 1.1 barrier don't always presage immediate failure. There are several reasons for this. In some cases, lenders continue to renegotiate terms of debt rather than see the carrier face liquidation. In addition, many of these carriers face weakened competition (other carriers with low scores) and still continue to compete because of the weakness of the opponent in the battle for market share. The overall low scores in this industry, however, is clear proof of the fragile condition of the vast majority of the airlines.

2. The tremendous volatility in this industry is due to two key factors. The first is the tremendous operating leverage present in all the carriers. This stems from the presence of a significant amount of fixed costs the carriers face. The second is the financial over-leverage taken on by management. These two factors interact in a multiplicative way to create wide swings in profits. For a complete discussion of this issue, see Gritta et al. (2005) and Gritta et al. (2006).

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