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Proceedings

Thirty-Third annual meeting

Transportation Research Forum (TRF)

Halloween In New Orleans



October 31 -
November 2, 1991
New Orleans, LA

Editor:
Louis A. Le Blanc

**FINANCIAL STRESS IN
THE U.S. AIRLINE INDUSTRY**

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Introduction

The last few years have been seminal for the airline industry. They saw the bankruptcy and eventual liquidation of Eastern Airlines and Braniff as well as bankruptcy filings by Continental, Midway, and Pan Am. Other carriers such as TWA and USAir also had significant losses in 1990. The war in the Persian Gulf dampened international travel for most of the world's airlines. Travel fell off with the onset of the U.S. military deployment in August 1990 and turned down even further after hostilities began in January, 1991. The Persian Gulf war also led to a surge in fuel prices in 1990, and although these returned to prior levels by the war's end, travel had not. At the same time, the U.S. was undergoing a downturn in economic activity, and with recent data, experts have concluded that the U.S. was in a recession during 1990.

This paper provides up-to-date information on the financial status of the major U.S. passenger air carriers. It utilizes a bankruptcy model to provide a consistent framework in which to examine carrier finances. The objective here is not to predict which carriers may enter bankruptcy in the future. Rather, the paper examines the five year period, 1986 through the first quarter of 1991, to determine if identifiable trends in carriers' financial measures can be isolated prior to the onset of bankruptcy and to provide up-to-date estimates of financial stress in the U.S. airline industry. Since the wave of mergers in the early 1980's, policymakers have been concerned about the number of carriers and whether they will be sufficient to assure healthy competition in the U.S. airline industry. In addition, others raise concerns about carriers' financial performance and their ability to meet necessary safety expenditures and to retire or hush kit noisy aircraft.

Structured assessments of financial stress using "bankruptcy models" began with the work of Altman (1968). Altman examined the financial performance of bankrupt and non-bankrupt firms using

multiple discriminant analysis. Discriminant analysis is a form of limited dependent variable regression analysis where the dependent variable takes on the value of zero or one, depending on the status of particular observation (bankrupt or non-bankrupt). Independent variables are selected financial ratios which have been shown to discriminate well between bankrupt and non-bankrupt firms. The measure of worth of a bankruptcy model is generally taken as its ability to properly classify bankrupt and non-bankrupt firms. A discriminant model uses a form of ex post discrimination because it looks at firms that have failed versus those that have not. Some have questioned the predictive power of such a model, i.e., one able to determine, ex ante, those firms which may fail in the future (Gilbert, Menon, and Schwartz 1990). However, others note that the models are reasonably capable of predicting bankruptcy within one year.

Other researchers have used logit analysis and linear probability models as alternative statistical techniques to discriminant analysis to develop bankruptcy forecasting procedures (Collins and Green 1982). Gritta (1982) applied the original Altman model to the major U.S. airlines. Altman later extended his work to develop a specific model for airline bankruptcy propensity, but did not report the coefficients of the discriminant function (Altman and Gritta 1984). Scaggs and Crawford (1986) adjusted the Altman model coefficients to improve its predictive power for the airline industry.

After review of the literature, it was determined that a model based on a broad representation of industries may be preferred for assessing financial stress. This paper uses the basic Altman equation which reads:

$$Z = 1.2(X1) + 1.4(X2) + 3.3(X3) + .6(X4) + .999(X5) \quad (1)$$

Where:

X1 = Working Capital/Total Assets, a liquidity measure. It is assumed that a high WC/TA ratio implies greater liquidity and therefore a more solvent firm.

X2 = Retained Earnings/Total Assets, a measure of accumulated past profits to assets. Relatively high retained earnings indicate "staying power" and thus a low risk of bankruptcy.

X3 = Earnings Before Interest and Taxes/Total Assets, a measure of a firm's operating profit on assets. A higher ratio implies lower bankruptcy risk.

X4 = Market Value of Equity/Book Value of Debt, an indication of financial leverage. Just as low debt-to-equity ratios indicate financial health, so do high equity/debt ratios.

X5 = Sales/Total Assets, a measure of productivity. Also termed the capital turnover ratio, high productivity implies greater firm strength.

This approach produces a Z-value which, as shown above, is the weighted average of several important balance sheet and income statement ratios. Following Altman (1968) the Z-values below 1.81 imply serious financial stress and a risk of bankruptcy. Z-values above 2.99 imply relative financial health. Airlines, however, may have generally lower than average Z-scores because of the high level of operating and financial leverage which characterize the industry. As will be shown below, few major carriers have maintained Z-values above 2.99 and many have operated for extended periods with a Z-value close to 1.0 without entering bankruptcy. The U.S. carriers which declared bankruptcy between 1987 and 1991 had Z-scores between 1.0 and -0.5.

One characteristic of the airline industry, extensive aircraft leasing, raises the issue of whether the financial statements should be adjusted to account for this factor. Laurence and Bear (1986) analyzed this issue for a number of industries and concluded that restatement of financial ratios to account for leases does not materially improve bankruptcy models. However, it must be recognized that airlines make intensive use of aircraft equipment leases. To the extent these are long-term, they are reflected in long-term liabilities.

The carriers included in this study include the major passenger air carriers, which are defined by the U.S. Department of Transportation as those with annual revenues of \$1 billion or more. The carriers' revenues in 1990 were used to make this determination (Southwest became a major carrier in 1989 and America West reached this status in 1990.) The study also includes two national carriers--Braniff and Midway--who filed for bankruptcy during the 1986-1990 time period in order to obtain additional observations of how the Z-score of a sizable carrier fares as its Z-score in the period immediately preceding bankruptcy.

The financial data in this paper were developed using company annual and quarterly reports, supplemented by Form 41 data. The data in this paper are current as of the financial reporting periods indicated. Carriers may have taken actions subsequent to these which could affect their current financial strength.

Analysis

The U.S. major airlines suffered an operating loss of \$2.3 billion in the fourth quarter of 1990. For the entire year the U.S. major airlines had an operating loss of \$1.7 billion (Aviation Daily, May 24, 1991). Part of the loss can be attributed to the significant increase in fuel costs associated with the Persian Gulf crisis. Not all of this could be passed on to airline passengers. The downturn in traffic also affected profits because airlines are characterized by fixed capacity costs in the short-run. They cannot rapidly adjust capacity and reduce costs when faced with a sudden downturn in traffic.

The Bankrupt Carriers

Table 1 shows the Z-scores for the five carriers which filed bankruptcy over the last few years. It tracks these for the five quarters prior to filing bankruptcy.

Braniff and Eastern are being liquidated because they could not achieve a successful financial reorganization while in bankruptcy. Continental, Pam Am and Midway are attempting reorganization under Chapter 11. Pan Am recently sold its U.S.-London routes to United and is contemplating the sale of other assets such as the Pan Am Shuttle. The Z-score for Continental (CO) is high for a bankrupt airline. This may be a case of defensive reorganization, where CO anticipated that it could incur additional liabilities as a result of the liquidation of its affiliate, Eastern Airlines. Eastern, Midway and Pan Am also showed a deteriorating Z-score in the quarters prior to bankruptcy, although Pan am and Midway were able to avoid bankruptcy for a number of quarters when the Z-score was at a level indicative of significant financial stress. The data for the five carriers indicate a Z-score range of from -0.5 to +1.1 in the three quarters leading to filing for bankruptcy.

Table 1: Z-Statistics for Carriers Which Filed for Bankruptcy

Carrier	Date of Bankruptcy	Z-Statistics Five Quarters Up Through Bankruptcy				
		4	3	2	1	0
Branniff (1)	1989, Quarter 3	1.9	1.8	1.0	0.6	-0.5
Continental (1)	1990, Quarter 4	N/A	1.1	1.1	1.0	0.5
Eastern (1)	1989, Quarter 1	1.0	0.8	0.7	-0.1	0.5
Midway (2)	1991, Quarter 1	0.5	0.4	0.3	-0.1	N/A
Pan Am (3)	1991, Quarter 1	-0.2	-0.2	-0.1	N/A	N/A

- (1) Assumes market value of equity is zero because book value of equity is zero or negative and no market value of equity was reported.
- (2) Uses positive book value of equity because no market value of equity was reported.
- (3) Uses positive market value of equity although book value of equity is negative.

Source: Carriers' Form 41 filings with the U.S. Department of Transportation.

The Major Carriers

The Z-scores for the years 1986, 1987, 1988 and 1989 are calculated for each major carrier where data are available. From the first quarter of 1990 through the first quarter of 1991, Z-scores are calculated using financial data for the year ended that quarter. For example, the Z-score data for the end of the second quarter of 1990 include the last two quarters in 1989 and the first two quarters in 1990. They let us examine, at least in part, how much deterioration in a carriers financial performance could be attributed to the fall off in air travel in 1990 and what part was due to a more long-term erosion of a carrier's financial situation.

Table 2 and Figure 1 shows the Z-scores for the major carriers. As noted above, both Pan Am and Continental are attempting reorganization in bankruptcy. Each carrier is briefly discussed below.

Table 2: Z-Statistics for Major U.S. Air Carrier Companies

Company	(Source)	1986	1987	1988	1989	1990	1990	1990	1990	1991 Q1
America West Airlines***	(1)	N/A	N/A	1.4	1.4	0.9	1.0	0.9	0.9	0.7
AMR Corp. (American)	(1)	1.6	1.5	1.7	1.7	1.5	1.4	1.2	1.2	1.1
Continental Airlines**	(2)	1.5	1.0	0.9	1.1	1.1	1.1	1.0	0.5	N/A
Delta Air Lines, Inc.*	(1)	2.0	2.1	2.4	2.6	2.4	2.2	1.8	1.5	1.5
Northwest Airlines	(2)	N/A	1.9	2.0	2.2	1.9	1.8	1.6	1.4	N/A
Pan Am Corp.**	(3)	0.2	0.4	0.7	0.1	-0.2	-0.1	-0.1	N/A	N/A
Southwest Airlines Co.***	(1)	2.2	1.9	1.9	1.9	1.8	1.8	1.8	1.9	2.1
Trans World Airlines, Inc.	(3)	0.9	1.3	1.3	1.0	0.9	0.9	0.9	0.8	0.1
UAL Corp. (United)	(1)	1.1	1.6	2.0	2.1	1.9	1.9	1.7	1.7	1.6
USAir Group, Inc.	(1)	2.5	1.4	1.8	1.4	1.2	1.0	0.9	0.8	0.8

(1) Using parent company financial statements.

(2) Using data from carrier's Form 41 filed with the U.S. Department of Transportation.

(3) Pan Am data for 1986-1989 from (1), for 1990 Q1-Q3 from (2).
Trans World data for 1986-1989 and 1990 Q4 from (1), for 1990 Q1-Q3 from (2).

* Delta Airlines 1986-1988 data for fiscal year ending June 30.

** Continental Airlines declared bankruptcy in 1990 Q3.
Pan Am Corp. declared bankruptcy in 1991 Q1.

*** America West Airlines became a major airline (\$1 billion or more in operating revenues) in 1990. Southwest Airlines became a major airline in 1989.

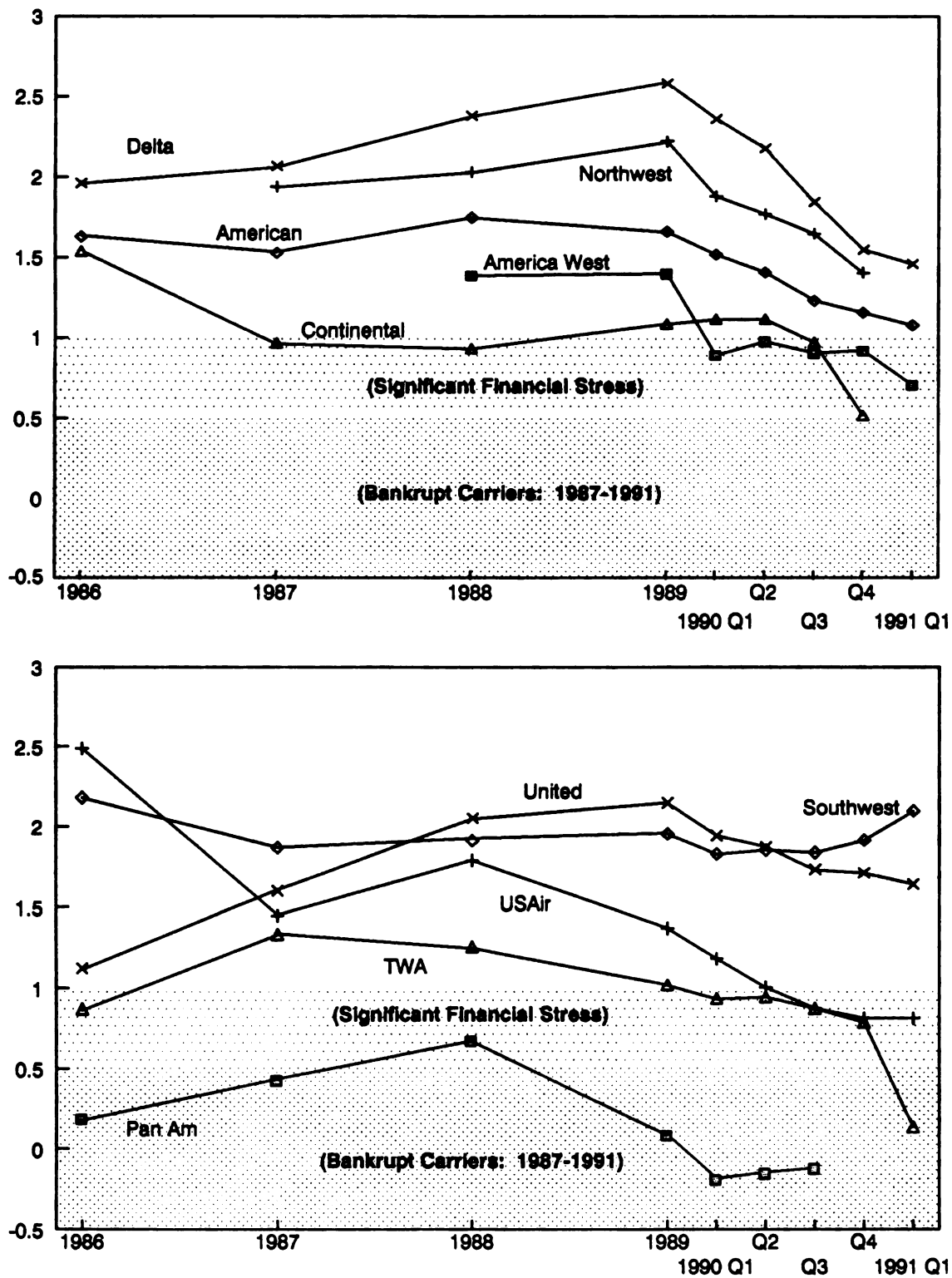


Figure 1: Z-Statistics for major U.S. Air Carrier Companies

America West has had a declining Z-score over the period. It is a carrier which has pursued an aggressive expansion over the last few years and is thinly capitalized with negative retained earnings. After profitable operations in 1988 and 1989, it experienced losses in 1990 and the first quarter of 1991. After discounting unrestricted fares to stimulate business travel and suspending payments on aircraft leases, the carrier declared bankruptcy in mid-1991.

American, one of the carriers believed to be financially strong, has shown a decline in its Z-score over the period. American has been operating with negative working capital over the last few years (i.e., its current liabilities exceed current assets), while it has pursued growth and fleet modernization. However, the carrier has a large book value (total assets minus total liabilities) to use as a cushion during the current downturn. American recently acquired TWA's London-Heathrow authority to operate from New York and two other U.S. cities.

Continental, which filed for bankruptcy in the fourth quarter of 1990, has been operating with negative retained earnings over the period studied. While it has had positive operating income, this amount has not been sufficient to cover fixed charges. With the Eastern situation behind it and a new management team, CO has stated that it expects a successful financial reorganization.

Delta, known as one of the financially strongest carries, has seen its Z-score erode in 1990. It experienced a loss in operations for 1990 after four years of highly profitable operations. As with American, Delta has had negative working capital over the last few years. It also has assets which exceed liabilities (on a book value basis) by a substantial margin which provides a financial cushion to see it through the current downturn.

Northwest, which was taken private in 1989, shows a continued deterioration of its Z-score through 1990. After an operating profit in the 1986 to 1989 period, it lost money in 1990. Long term debt has increased because of the leveraged buyout. Debt service will be an important issue as Northwest tries to strengthen itself financially. However, it too has a large book value to see it through a downturn.

Pan Am has been struggling financially for a number of years. Its Z-score has been in the danger zone throughout the period studied, and operating losses have totaled over \$1 billion in the last five years. It has sustained operations by selling assets such as its Pacific routes, the Pan Am building in New York, Pan Am World Services, the Intra-German Service, and its London-Heathrow operation. It also has achieved a significant cash influx from having aircraft modified for the U.S. Civil Reserve Air Fleet. Pan Am has been discussing the sale of the Shuttle and has reoriented activities around a hub in Miami and its South American operations.

Pan Am's prospects for a successful reorganization are not promising, and creditors are pursuing liquidation or sale to another carrier.

Southwest, which became a major carrier in 1989, has maintained profitable operations throughout the period studied. Its Z-score has increased over the period, indicating that it has strengthened itself financially even during the recession and Persian Gulf war. Noted for closely following its business strategy, Southwest's financial results have run counter to the rest of the industry.

TWA was taken private in 1988. Its Z-score for the first quarter of 1991 places it in the zone of bankrupt carriers. It sustained large operating losses in 1990 which were exacerbated by large interest payments on debt. It sold its Heathrow operation to American, although the U.S. DOT forced it to retain three of the routes which it will now operate to London-Gatwick. TWA's total liabilities exceeded its total assets (at book values) prior to the Heathrow sale; the carrier is under considerable financial stress.

United Airlines has maintained a relatively strong financial posture over the last five years. A four year period of high profits was followed by a small loss in 1990. United's Pacific route system is highly profitable and it hopes to achieve similar performance with the U.S.-London-Heathrow routes it acquired from Pan Am. United has large financial reserves and controls a major computer reservations system. Thus, it is well-positioned for the future.

USAir, which had been one of the financially stronger carriers, has seen its position erode since 1989. Some attribute this to integration problems emanating from its acquisition of Piedmont and PSA. Its Z-scores reflect the decline in its financial performance; USAir is now at the high end of the danger zone. USAir's retained earnings have declined by a factor of three. The carrier needs to significantly improve its current financial performance to strengthen its balance sheet.

Summary

A bankruptcy model was used to assess the current financial status of the U.S. airline industry. The objective was not to predict bankruptcy, per se, but rather to identify those carriers which are under financial stress. It appears that, when a Z-score falls below 1.0, a carrier enters the range of concern, and some type of financial reorganization (judicial or non-judicial) may be warranted. As the Z-score falls below 0.5, financial stress is much more severe and the need for financial restructuring is more pressing.

The recent period has not been good for the U.S. airline industry. The airline industry's financial performance deteriorated in 1990, even before the U.S. entered a recession. The Persian Gulf

war led to higher fuel prices and a further dampening of travel. The U.S. majors and nationals lost over \$2 billion in 1990 and the majors accounted for a large part of this loss. Three majors-- Continental, Pan Am, and America West--and Midway (a national) filed for bankruptcy between 1990 and mid-1991. Two other carriers, USAir and particularly TWA, are under significant financial stress.

Despite the fact that the U.S. airline industry is highly productive relative to the world's carriers (Windle), the high level of competition in the U.S. makes it difficult for the industry to be profitable when there is a downturn in traffic. Carriers reduce fares to stimulate travel and others follow to maintain market share. Airline capacity and costs are somewhat fixed in the short-run, although some carriers did remove aircraft from service in late 1990. Bankrupt carriers tend to be more aggressive in lowering fares to generate cash flow because they have a respite from meeting many financial obligations while under bankruptcy protection. In general, there may currently be too much capacity in relation to demand for the airline industry to sustain profitable operations.

While many assert that there is insufficient competition in the U.S. airline industry, any degree of market power has not manifested itself in the ability to maintain profitability during a downturn in traffic. Only Southwest and American achieved an operating profit in 1990, and after fixed charges only Southwest showed positive net income.

Looking forward into the 1990s, the U.S. airline industry faces a number of challenges. Principal among these will be compliance with proposed noise regulations requiring the retrofit or retirement of Stage II aircraft. The amount of capital needed to accomplish this will be large; however, to the extent that older aircraft are removed from service, it may solve some of the industry's present overcapacity problems. In turn, this could have a positive effect on the industry's finances. For those carriers with old fleets, it may portend a shrinkage in market share. In order for the industry to attract capital, it will have to demonstrate that 1990 was an aberration and that profitable operations are sustainable.

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