

# Bankruptcy protection and stock market behavior in the US airline industry

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## Abstract

This study examines the effects of bankruptcy protection on the stock market behavior of US airlines and their domestic rivals. We find that Chapter 11 airlines experience both statistically and economically significant adverse price changes at the time of filing for bankruptcy. During the close-to-3 years after filing, however, these airlines experience significantly positive price changes. Their rivals experience significantly positive price reactions both at the time of the filing and up to 3 years post-filing. The evidence is consistent with substantial improvement in the financial condition of the bankrupt airlines after the reorganization, and with rivals gaining from the failures of other airlines.

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## 1. Introduction

If debates about the role of Chapter 11 bankruptcy protection in influencing the airline industry created a controversy in the nineties, this controversy has only escalated ever since. When they filed for Chapter 11 protection within minutes of each other on September 14, 2005, Delta Air Lines and Northwest Airlines, two of the largest US carriers, joined the long list of US airlines seeking the shelter of the bankruptcy courts. At the time of their filing, United Airlines was poised to exit and join US Airways, a two-time Chapter 11 bankruptcy filer, in the unprotected world. Since airline deregulation in the US in 1978, as many as 160 carriers have filed for bankruptcy (Government Accountability Office, 2005; Air Transport Association, 2006). Some, like Continental Airlines, another double-dip filer, are still in business, while others like twice-in twice-out Braniff, or thrice around TWA, are not.

This revolving door scene in the US airline industry has fueled the continuing debate, both at home and overseas, about the influences that lenient US bankruptcy laws have

on the industry's competitive landscape.<sup>1</sup> Many, not limited to those outside the US, hold that Chapter 11 reorganization is an artificial and indirect subsidy, giving weak companies unfair advantages and allowing them to continue predatory pricing, to the detriment of their competitors. Some industry experts liken the bankrupt carriers to a virus that will eventually infect the entire industry, citing the example of Delta which, from 1988 to 1991, frittered away about \$700 million trying to match Eastern's low fares during that now defunct airline's final years of operation (*Fortune*, June 14, 1993). Martin Broughton, British Airways Chairman, said that the "iniquitous US bankruptcy laws prop up the walking dead" (*Airline Business*, October 2005). Government financial assistance (especially in the wake of the September 11 Terrorist Attacks), debts write-off and cost savings from renegotiating labor and other contracts, are often cited as major advantages enjoyed by US airlines under bankruptcy protection vis-à-vis their competitors. To date, however, there is at best mixed evidence on whether or not airlines under bankruptcy protection contribute to industry

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<sup>1</sup>For a comparison of the bankruptcy laws in major jurisdictions, see Altman and Hotchkiss (2006).

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over-capacity, or gain an advantage over rivals, for example, by lowering fares and thus gaining traffic.

## 2. Bankruptcy protection and airline pricing behavior

In the US, bankruptcies were very rare in the regulated US airline industry before the Air Deregulation Act of 1978. Since 1978, however, there have been well over 160 bankruptcy filings. Compared to the average failure rate for all types of businesses, airlines have failed more often than other businesses. In some years, airline failures were several times more common than for businesses overall (Government Accountability Office, 2005). Since 2000, 20 bankruptcies in the US airline industry have been declared, and half of these have been for airlines with more than \$100 million in assets, indicating an increase in the size of bankrupt airlines. In contrast, 50 bankruptcies among all European airlines have been reported during the period 2000–2005. While it appears the European airlines that enter into bankruptcy have all ceased operations, a number of their US counterparts have survived after Chapter 11 reorganization.

Under Chapter 11, the debtor continues to operate the business while a bankruptcy court supervises the reorganization of the company's contractual and debt obligations (Altman and Hotchkiss, 2006). The court can grant complete or partial relief from most of the company's debts and its contracts, including unsecured loans, union contracts, and long-term real estate leases. The substantial cost savings and flexibility that result from the canceling of debts and contracts, it is often argued, give airlines operating under bankruptcy protection an "unfair" advantage over their competitors.

Once Chapter 11 is filed, the company may "emerge" from bankruptcy within a few months or within several years; some may simply be converted into liquidation (under Chapter 7 of the US Bankruptcy Code) or be acquired by another company, as in the case of America West's acquisition of US Airways in 2005. If the company's stock is publicly traded, a Chapter 11 filing generally causes it to be delisted from its primary stock exchange. Many stocks that are delisted quickly resume listing as over the counter (OTC) stocks. However, once a publicly traded company emerges from Chapter 11, the stock is typically nullified by the order of the bankruptcy court rendering the shares worthless. Nevertheless, the common stocks of some Chapter 11 companies continuously trade throughout the bankruptcy, and it is not unusual for investors to still actively trade in stocks of companies under bankruptcy protection, in the hope of benefiting from swings in price when circumstances change during or after the reorganization. Eberhart et al. (1999), for example, find evidence of large, positive excess returns, with the average cumulative abnormal return varying from 24.6% to 138.8%, in the 200 days following firms' emergence from bankruptcy. Altman (1999) and Altman and Hotchkiss (2006) provide a detailed discussion of bankruptcy-related finance studies.

Existing studies have found mixed evidence in respect of the influences of bankruptcies on airline's pricing behavior in the product market. Borenstein and Rose (1995) examine changes in the fares charged by bankrupt US airlines and their competitors on domestic routes during the 1-year period (6 months prior to, and 6 months after, filing for Chapter 11). Their analysis indicates that airlines on average reduce their prices by 5–6% prior to a bankruptcy filing, but do not further cut fares after entering Chapter 11. Despite the price cutting, however, the bankrupt airlines experience statistically significant declines in market share on routes they continue to serve.<sup>2</sup> Their competitors, on the other hand, are found to exhibit little price response to the bankruptcy filing. The competitors experience modest price declines when the to-be-bankrupt airlines cut their prices, but this decline appears to be more than offset by price increases over the subsequent months.

Somewhat contradictory evidence is provided by Barla and Koo (1999), who examine the airfare changes on dense city-pair routes served by US airlines under bankruptcy protection. They find that, within 12 months of being declared bankrupt, an airline does not charge significantly different prices than those charged in markets where no financially weak carrier is present. Its rivals, in contrast, appear to cut their prices slightly. Once bankruptcy is declared, the Chapter 11 airline lowers prices after achieving cost savings. The rivals of a Chapter 11 airline are found to react to the bankruptcy by further lowering their prices, with the extent of the price cutting being greater than that of the bankrupt airline. Such aggressive pricing by rivals, Barla and Koo suggest, may have contributed, in part, to the huge financial losses of the US airline industry in the early 1990's. A recent study by Government Accountability Office (2005), however, finds no evidence that bankruptcy protection has led to over-capacity and under pricing that have harmed healthy airlines, either in individual markets or to the industry overall.

Under the maintained hypothesis of efficient capital markets (Fama, 1970), this study examines the "abnormal" price behavior of airlines seeking bankruptcy protection, as well as that of their rivals, at the time of the filing and during up to 3 years subsequent to the filing. To the extent that bankruptcy signals the imminent failure of a company, and assuming a "fixed pie" view of total market demand, it is expected that a bankruptcy filing is associated with negative stock price reactions for the filer, and positive stock price reactions for their rivals. Once bankruptcy is declared and an airline operates under bankruptcy protection (giving it various costs and pricing advantages, as is often alleged), the filer's stock price may be expected to rebound as the (perceived) benefits of the reorganization begin to show up. In contrast, their rivals may experience

<sup>2</sup>Borenstein and Rose (2003) find that airline bankruptcies induce modest declines in service level, particularly at midsize airports.

either favorable or adverse stock price changes, depending on whether, and the extent to which, they are expected to benefit from a weakened competitor, or suffer from a “desperate” competitor put into an advantageous position by the bankruptcy courts. The empirical results from the stock market, therefore, provide independent evidence on the perceived change in the competitive position of the airline seeking bankruptcy protection, relative to that of their rivals, during different time periods surrounding the bankruptcy filing.

### 3. Data and methodology

A list of all US airlines that have filed a bankruptcy since 1978 is first obtained. In the absence of a publicly available, official compilation, we have relied mainly on Air Transport Association (2006) and LoPucki (2006).<sup>3</sup>

A company must meet the following criteria to be selected:

1. It is an independent US passenger airline both prior to and subsequent to the filing of bankruptcy.
2. It has emerged within 5 years after filing for bankruptcy or, in the case of the two most recent cases (Northwest and Delta in September 2005), are expected to emerge from bankruptcy protection (they are at least not expected to fail yet). The exclusion of airlines that subsequently fail (e.g. are liquidated) focuses our attention on companies that have survived on the back of bankruptcy protection (among other factors), and on the potential effects of these successful rescues on rivals. Note, however, that the time periods under investigation are periods before the companies emerge from bankruptcy. This requirement thus excludes such companies as Eastern, Braniff International, Braniff Inc., Pan America, Western Pacific, and Midway.
3. It files for Chapter 11 on a known date and is a publicly listed company with daily stock return data available from the University of Chicago’s Center for Research in Security Prices (CRSP) database for at least 110 days prior to the bankruptcy filing and for the day of the filing. This requirement enables the identification of the event date (i.e. the date on which bankruptcy is filed) and the associated abnormal returns to be calculated. A number of companies are thus excluded by this requirement, including Air Florida System Inc., Air One, Capitol Air, Frontier, Mid Pacific, Presidential, Metro, TWA, Tower Air, National Airlines, Vanguard, ATA, and Aloha.
4. At least one publicly listed rival can be identified for the filer, with daily return data available from CRSP during

the relevant event windows. A rival is identified with reference to the aforesaid news reports and trade journals or, in some cases, by referring to the company’s websites and published stock market reports.<sup>4</sup> A rival is excluded if it is operating under bankruptcy protection or has undergone other major corporate events (e.g. mergers and acquisitions, major strikes) during the relevant event period. Thus, Mid Pacific, CCAir, Kitty Hawk, and Mair/Mesaba are excluded by this requirement, either because they are not publicly traded, or because they have no identifiable rival or because the rival has confounding events during the relevant time period.

Although these criteria substantially reduce the sample size to only eight firm events, the nature of this kind of study dictates that the quality of data be emphasized over sample size. The Chapter 11 filers, the date on which each filing was made, the date each emerged from bankruptcy, and their corresponding rivals, are listed in Table 1.

Following the standard event study methodology in finance research (Brown and Warner, 1985), the stock price reaction of a company in response to a Chapter 11 filing is measured by the abnormal return surrounding the announcement, which is calculated as

$$AR_{jt} = R_{jt} - \hat{\alpha}_j - \hat{\beta}_j R_{mt}, \quad (1)$$

where  $R_{jt}$  is the realized return to the security  $j$  at time  $t$ ,  $\hat{\alpha}_j$  and  $\hat{\beta}_j$  are the security-specific market model parameters estimated in a period prior to the date of bankruptcy filing (defined as event date 0), and  $R_{mt}$  is the realized market return at time  $t$ . Alternative estimation windows are used for a sensitivity check.

The sample average abnormal return at time  $t$  ( $\overline{AR}_t$ ) for  $N$  firms is computed as

$$\overline{AR}_t = \frac{1}{N} \sum_{j=1}^N AR_{jt}. \quad (2)$$

Assuming time-series independence, the average cumulative abnormal return from event time  $p$  up to event time  $q$ ,  $ACAR(p, q)$  is given by

$$ACAR(p, q) = \sum_{t=p}^q \overline{AR}_t. [0, 1] \quad (3)$$

If an announcement does not affect the share prices at time  $t$ , the average abnormal returns  $\overline{AR}_t$  should be statistically close to zero. The test statistics for  $\overline{AR}_t$

<sup>3</sup>These filings, as well as the status of the airlines after each filing, are cross-checked with Borenstein and Rose (1995, 2003), Barla and Koo (1999), Government Accountability Office (2005), Kennedy (2000), and various newspapers and trade journals including Aviation Week & Space Technology, Aviation Daily, Regional Aviation News, Flight International, and Airline Business.

<sup>4</sup>As an example, Airline Financial News (December 26, 1994) reports that “America West has always faced tough cost competition out of its Phoenix and Las Vegas hubs: Southwest. Furman Selz fears United’s effort to reclaim western markets may also ripple through to America West. Elsewhere, America West competes with USAir and other majors.” The names of competitors are cross-checked in different publications.

Table 1  
Sample description

Bankrupt firm	Date of filing (emergence)	Rivals <sup>a</sup>	Remarks
Continental	1983/09/24 (1986/06/30)	UAL, Northwest, AMR, Delta, US Air <sup>b</sup>	Rivals exclude Pan American (major strike).
America West	1991/06/27 (1994/08/23)	AMR, Delta, Southwest, Mesa, UAL, US Air <sup>b</sup>	Rivals exclude TWA and Northwest (no return data) and Continental (operating under bankruptcy protection).
Continental Delta <sup>c</sup>	1990/12/03 (1993/04/27) 2005/09/14 (N/A)	Delta, UAL, AMR, US Air <sup>b</sup> AirTran, Southwest, AMR, Continental, US Airways Group <sup>b</sup>	Rivals exclude TWA and Northwest (no return data). Rivals exclude UAL and Northwest (operating under bankruptcy protection).
Hawaiian	2003/03/21 (2005/06/02)	Mesa, UAL, Continental, Delta, Northwest, AMR	
Northwest <sup>c</sup> US Air <sup>b</sup>	2005/09/14 (N/A) 2002/08/11 (2003/03/31)	N/A Northwest, Hawaiian, Continental, Delta, Southwest, AirTran	Rivals exclude UAL (operating under bankruptcy protection).
United Airlines	2002/12/09 (2006/02/01)	Southwest, Frontier, America West, Northwest, AMR, Delta, Continental	Rivals exclude US Air (operating under bankruptcy protection).

<sup>a</sup>Rivals are identified as such in news reports and other publications and are subject to stock market data availability.

<sup>b</sup>US Air merged with America West in September 2005 and formed the US Airways Group. Prior to this, each company is treated as a separate entity.

<sup>c</sup>Northwest and Delta filed for bankruptcy on the same date and share essentially the same rivals. Although the stock price behavior of both firms is analyzed, the stock price behavior of their rivals is analyzed only once in order to avoid double counting.

and  $ACAR(p,q)$  are

$$t(\overline{AR}_t) = \frac{\overline{AR}_t}{\hat{S}(\overline{AR})}$$

$$t(ACAR) = \frac{ACAR(p,q)}{\hat{S}(\overline{AR}) \times \sqrt{q-p+1}},$$

where

$$\hat{S}(\overline{AR}) = \sqrt{\frac{\sum_{t=-T}^{-l} (\overline{AR}_t - \overline{\overline{AR}})^2}{T-l+1-2}}$$

$$\overline{\overline{AR}} = \frac{1}{T-l+1} \sum_{t=-T}^{-l} \overline{AR}_t,$$

where  $T$  is the beginning (in event time) of the estimation window and  $l$  is the end of the estimation window, within which security-specific parameters are estimated. This time-series standard deviation test (Brown and Warner, 1985) avoids the potential problem of cross-sectional correlation of security returns. Alternative test statistics, including the comparison period mean adjusted method, Patell's (1976) standardized abnormal return test, Boehmer et al.'s (1991) standardized cross-sectional test, and the generalized sign test, are also computed for a check of robustness.

#### 4. Results

Table 2 reports some financial characteristics of the sample Chapter 11 airlines in the 2 years prior to, throughout 1 year subsequent to the filing of bankruptcy. Also reported are the financial characteristics of a group of healthy airlines, consisting of all publicly listed passenger

airlines which have never entered bankruptcy and which have data from Compustat.

The average price-to-book ratio of the bankrupt firms declines from 1.55 two years prior to the filing, to  $-0.18$  one year prior to the filing. The ratio drops to  $-0.19$  during the year of filing for bankruptcy, before climbing back up to 0.04 one year subsequent to the filing. Not surprisingly, the stock prices of the to-be-bankrupt firms fall substantially below book value of equity, to only a factor of 0.31, in the 4-year period surrounding the filing. This compares with a value of 1.28 for the healthy airlines.

The systematic risk or beta of the bankrupt firms appears to increase slightly during the 4 years surrounding the filing. The 4-year average beta of 1.73 is not significantly lower than that of the healthy firms, which stands at 1.93. The beta values for both groups of firms appear to be higher than those reported for the airline industry in Turner and Morrell (2003) and Gong et al. (2006).

In terms of operating and financial performance, the Chapter 11 airlines have extremely low or, in most cases, negative return to assets (ROA) and earnings-per-share (EPS) during the relevant period. These magnitudes of heavy losses may have either caused or precipitated their failures. The ROA (EPS) for the healthy airlines is also low at 2.7% (close to zero), indicative of the industry's overall dismal performance.

The total debt to capitalization ratio, or debt ratio, of the bankrupt airlines is moderate, at 55.7% two years prior to the filing, but climbs quickly to 96.5% one year prior to the filing. The drop back to 18.3% at the end of the year of filing for bankruptcy most likely reflects the result of the reorganization (e.g. debts write-off or elimination of

Table 2  
Financial indicators of bankrupt firms before and after filing for bankruptcy

	Bankrupt firms fiscal year relative to year of bankruptcy (0Y)					Healthy firms
	–2Y	–1Y	0Y	1Y	Average (–2Y to 1Y)	Average over all years
Price-to-book	1.55	–0.18	–0.19	0.04	0.31	1.28
Beta	1.54	1.62	1.87	1.91	1.73	1.93
ROA (%)	0.34	–14	–666	–88	–192	2.67
EPS	–0.58	–20.80	–27.34	–7.86	–14.14	–0.0005
Debt ratio (%)	55.66	96.54	18.27	27.15	49.40	56.18
Current ratio	0.77	0.66	0.88	0.71	0.76	1.10
Pretax interest coverage	2.88	–11.45	–33.22	–1.31	–10.78	3.83

Source: Compustat.

Notes: Price-to-book, monthly market value divided by quarterly common equity; beta, fundamental beta, calculated for a 60-month (minimum 24 months) time period; ROA, return on assets, which is income before extraordinary items available for common stockholders, divided by total assets; EPS, earnings per share basic including extraordinary items; debt ratio, total debt/capitalization; current ratio, total current assets/total current liabilities; pretax interest coverage, pretax income plus interest expense, divided by interest expense.

defined-pension contributions). The debt ratio of the bankrupt firms, averaged over all 4 years, is comparable to that of the healthy airlines.

There is little change in the current ratio of the troubled airlines during the period under examination, but the average of 0.76 over all years is still lower than that of the healthy airlines, which is 1.1, a figure that conforms to the textbook “benchmark” of being about adequate. More revealing than the current ratio, however, is the pretax interest coverage, which measures a company’s ability to meet its debt obligations (total interest payable on bonds and other contractual debt), failing which they could be forced into bankruptcy. This ratio is 2.88 two years prior to the filing, but deteriorates rapidly to –11.45 and –33.22 one year prior to and during the year of the filing, respectively. The average interest coverage ratio during the 4 years surrounding the filing for bankruptcy is –10.78, compared with a value of 3.83 for the healthy firms. The failure to meet the debt obligations may just be a symptom, rather than the cause, of their business failure.

The key focus of this study is on the stock market performance of the bankrupt airlines and their rivals in response to the filing of bankruptcy. Table 3 reports the unadjusted raw returns and betas of the Chapter 11 firms and their rivals during various event windows. During the 150-day period ending 50 days before the filing of bankruptcy (i.e. [–200, –50]), the bankrupt firms (rivals) experience an average total raw return of –46% (–7%). Thus, the to-be-bankrupt companies’ stock prices appear to reflect or anticipate their poor product market performance well before they subsequently fall into bankruptcy. Their rivals, in contrast, do not suffer particularly obvious adverse effects, although this conclusion must await further evidence based on risk-adjusted stock returns.

During the 200-day period starting 50 days subsequent to the bankruptcy filing (i.e. [50, 250]), the bankrupt firms reverse their stock market performance (after substantial falls at the time of the filing) and experience strong positive

Table 3  
Average raw returns and systematic risk of bankrupt firms and their rivals

Group	Event window	Bankrupt firms ( <i>n</i> = 8) <sup>a</sup>	Rivals ( <i>n</i> = 35) <sup>b</sup>
Average total raw return	[–200, –50]	–46%	–7%
	[50, 250]	32%	48%
	[50, 600]	298%	100%
Average beta <sup>b</sup>	[–390, –300]	1.49	1.71
	[–290, –200]	2.00	1.68
	[50, 300]	0.25	1.96

<sup>a</sup>Number of observations varies across different event windows depending on data availability.

<sup>b</sup>Scholes and Williams (1977) beta calculated using CRSP value-weighted market index.

raw returns totaling 32% on average. Interestingly, the rivals also experience large positive returns totaling 48% on average. The magnitudes of these positive gains are even greater in the event window [50, 600], during which the stocks of airlines operating under bankruptcy protection experience close to 300% total raw return on average, and their rivals 100% raw return on average. The initial evidence, therefore, is consistent with the hypothesis (and reports in the popular press about spectacular returns for such firms—see Eberhart et al., 1999) that the bankrupt firms are perceived to benefit from Chapter 11 protection.

Changes are observed in the systematic risk of the bankrupt firms. During the event window [–390, –300], the average beta of these firms is 1.49, but it climbs to 2.0 during [–290, –200], before dropping to only 0.25 during [50, 300]. The steep decline in beta after filing for bankruptcy is largely due to the idiosyncratic behavior of some of the bankrupt firms. Specifically, the beta of two firms falls to –2.37 (UAL) and –1.28 (America West) after filing for bankruptcy. In the normal circumstance (in equilibrium), negative beta values of such magnitudes cannot exist or are not sustainable. Essentially, these

abnormal beta values indicate that the stocks are out of sync with the general stock market after they fall into bankruptcy. The average beta of the rivals of the bankrupt firms, on the other hand, remains relatively stable during the relevant event periods.

Taken together, the evidence so far on the risk and return of the bankrupt firms and their rivals suggests that the stock prices of the bankrupt firms initially fall but, after the actual filing of bankruptcy, subsequently rebound. The rivals initially suffer a slight decrease in stock price but they seem to experience substantial gains after the filing of bankruptcy by their competitors.

Contemporaneous changes in the wider market also need to be considered. Since the performance of individual stocks may be differentially affected by movements in the overall stock market, and since the systematic risk of firms are likely to change after filing for bankruptcy, it is important to account for risk and to use different estimation methods that are not affected by or sensitive to possible shifts in systematic risk. Results, based on risk-adjusted returns, are reported in Table 4.

The market-model-based average cumulative abnormal return (*ACAR*) for the bankrupt firms during event window  $[-50, -5]$  is  $-10.2\%$ , which is not statistically different from zero. This rapidly falls to a highly significant  $-35.6\%$  and  $-14.6\%$  during event windows  $[-1, 1]$  and  $[-1, 0]$  respectively. On the date the bankruptcy is filed, i.e. window  $[0, 0]$ , the bankrupt firms on average only experience an abnormal return of  $-4.8\%$ , which is statistically significant. The evidence suggests that much of the change in stock price has occurred before the actual filing. During the 5 days centered on the filing, i.e.  $[-5, 5]$ , the *ACAR* is  $-40.3\%$ , which is both statistically and economically significant. This is, however, not surprising when a firm fails.

Table 4  
Average cumulative abnormal returns of bankrupt firms and their rivals surrounding filing of bankruptcy

Event window	Average cumulative abnormal returns ( <i>ACAR</i> ) %			
	Bankrupt firm ( $n = 8$ ) <sup>a</sup>		Rivals ( $n = 35$ ) <sup>a</sup>	
	Market model	SW <sup>b</sup> model	Market model	SW <sup>b</sup> model
$[-50, -5]$	-10.16	-11.89	1.64	1.19
$[-1, 0]$	-14.64***	-14.28***	3.22***	3.01***
$[0, 0]$	-4.82**	-4.36**	2.24***	2.19***
$[-1, 1]$	-35.59***	-35.47***	2.37**	2.03*
$[-5, 5]$	-40.29***	-39.48***	1.64	1.19
$[5, 50]$	25.56**	25.81**	8.87**	6.69*
$[15, 100]$	40.45**	39.55**	23.14***	19.71***
$[50, 250]$	117.76***	120.56***	29.14***	23.42***
$[50, 600]$	482.04***	512.92***	51.19***	34.55**

\*, \*\*, \*\*\* significant at the 0.05, 0.01, and 0.001 level, respectively.

<sup>a</sup>Number of observations varies across different event windows depending on data availability.

<sup>b</sup>SW, Scholes and Williams's (1977) model.

The bankrupt firms' stock market performance is largely reversed after the filing. The *ACAR* is 25.6% during  $[5, 50]$ , 40.4% during  $[15, 100]$ , and 117.8% during  $[50, 250]$ . All of these are statistically significant at the 1% level. More surprisingly, the *ACAR* rises to 482.0% during the event window  $[50, 600]$ , which is statistically significant at the 0.1% level. The *ACAR* is similar when calculated using other estimation methods such as the Scholes and Williams (1977) method, which adjusts for non-synchronous trading. The results, not reported for brevity, are even stronger when the *ACAR* is calculated using the comparison period mean adjusted method, under which abnormal returns are calculated with reference to the average return during the 90-day period ending 300 trading days before bankruptcy is filed. Presumably, this latter method is more reliable when there is a shift in the securities' systematic risk. Brown and Warner (1985) show that the results in event study are not sensitive to the choice of the estimation methods, especially when the magnitude of the abnormal returns is large.

The time trend of the *ACAR* of the bankrupt firms throughout the period from 110 days prior to the filing, until 600 days subsequent to the filing, is depicted in Fig. 1. The stock price of the to-be-bankrupt firms starts to decline in the period about 100 days prior to the filing. The *ACAR* then falls to  $-80\%$  on the date of the filing, and stays low until it begins to rise around 100 days subsequent to the filing. Starting from around 250 days subsequent to the filing, the Chapter 11 firms' stock price rises quickly, pushing the *ACAR* to 37% 290 days subsequent to the filing. This upward trend continues well into 600 trading days post-filing. The continuous improvement in the stock price performance of the bankrupt firms from 50 days up to 600 days after the filing is depicted in Fig. 2.

The stock price behavior of the rivals of the bankrupt firms is reported in the last two columns of Table 4. During the event window  $[-50, -5]$ , the rivals experience slightly positive abnormal returns, but these are not statistically significant. During the 2–3 days surrounding the filing (i.e.  $[-1, 0]$ ,  $[-1, 1]$ , and  $[0, 0]$ ), however, these rivals experience statistically significant and positive abnormal returns ranging from 2% to 3%. The rivals also experience positive, albeit not statistically significant, abnormal returns during  $[-5, 5]$ .

In the longer term, after the bankrupt firms file for bankruptcy, the rivals on average experience statistically positive and large abnormal returns. These steadily climb from 8.9% during event window  $[5, 50]$ , to 51.2% during  $[50, 600]$ . The abnormal returns of the rivals are similar when calculated using other estimation methods, and are thus omitted for brevity. It should also be noted that while the rivals' *ACARs* in the post-filing periods are generally much smaller in magnitude than those of the bankrupt firms, they are nevertheless large and represent potential profit-making investment opportunities.

Fig. 3 depicts the time trend of the *ACAR* of the rival firms. As is apparent, the rivals experience slightly positive

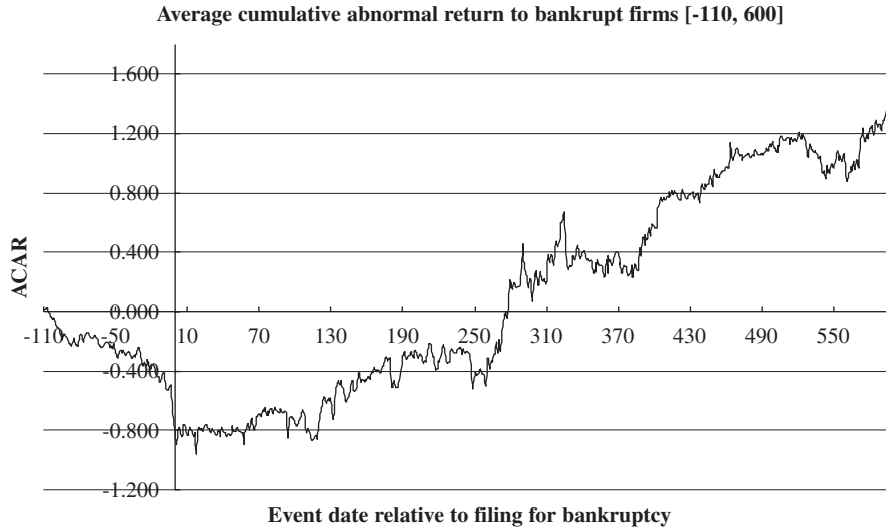


Fig. 1. Average cumulative abnormal returns to firms in bankruptcy protection.

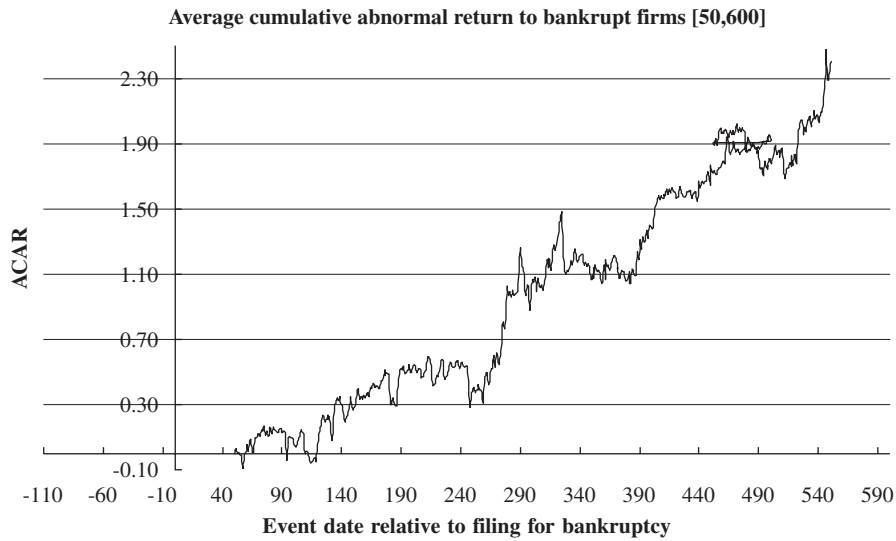


Fig. 2. Average cumulative abnormal returns to firms in bankruptcy protection.

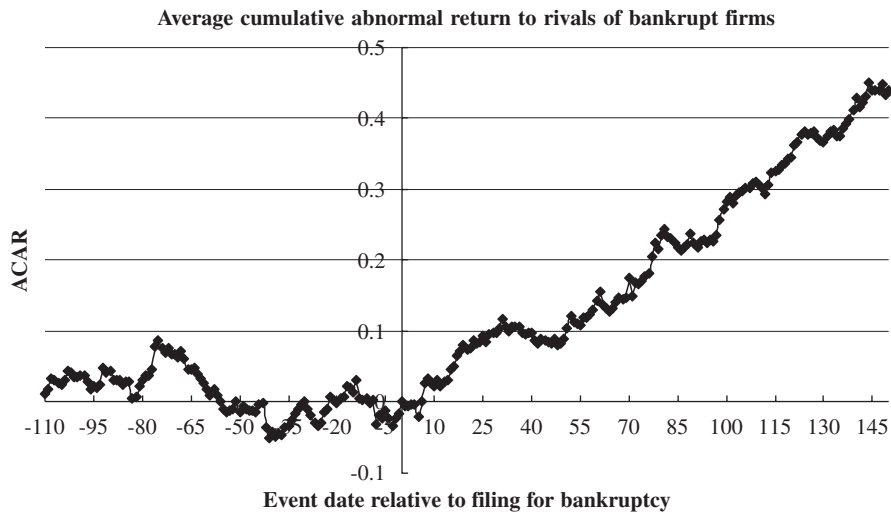


Fig. 3. Average cumulative abnormal returns to rivals of firms in bankruptcy protection.

stock price changes starting from 80 days prior to the filing of bankruptcy, but the most noticeable gains occur subsequent to the filing. The *ACARs* continues to trend up, until it reaches a value of 44% 150 days after the filing.

The positive stock price performance of rivals of the bankrupt airlines, both at the time of the filing for bankruptcy and in a relatively long period after the filing, suggests that investors perceive that the positive effects on the rivals (arising from a shift in competitive position) outweigh the negative effects (arising from “contagion” or spillover effects) associated with the bankruptcy of an industry competitor. This can happen, for example, when rivals gain traffic from the failing competitors (a phenomenon that is well documented in the popular press), or when the rivals are expected to increase their market power (and possibly fare prices) following the elimination of a competitor. In the context of airline mergers and acquisitions, Gong and Firth (2006) find that competitive effects dominate contagion effects, especially for close competitors.

## 5. Conclusion

This study examines the stock market behavior of US airlines entering bankruptcy protection, as well as that of their rivals. While bankruptcy is often considered bad news for all of existing shareholders of the bankrupt firm, rivals of the bankrupt firm, and the general public that hopes to fly on a safe and financially healthy airline, the evidence in this study suggests that filing for bankruptcy also offers potential profit-making opportunities to those investors who can time their investments and who can identify potential survivors. On average, buying the stocks of these survivors immediately after they file for bankruptcy earns a cumulative abnormal return as much as 500% during the close to 3 years subsequent to the filing. While this potential for huge gains must be viewed with caution due to the selection and survivor bias, it may be taken to be evidence of substantial improvement in the financial condition of the airlines operating under bankruptcy protection. Interestingly, rivals of the bankrupt airlines are found to benefit, rather than suffer, from the bankruptcy filings. While not necessarily refuting the argument that allowing airlines to file for bankruptcy adversely affects their rivals or the entire industry, the rivals’ large, positive stock price reactions upon the filing of bankruptcy by their competitors most likely reflect the stock market’s

evaluation that the rivals will benefit from the revealed weakness or imminent failure of firms in the same industry. In part, the benefit may arise from the industry consolidation that can result from the bankrupt airlines being acquired (or anticipated to be acquired) by the healthy rivals, a situation that is consistent with positive stock price performance for both the bankrupt firms and their competitors after the bankruptcy filings.

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