



NEW YORK UNIVERSITY  
STERN SCHOOL OF BUSINESS  
FINANCE DEPARTMENT

**Working Paper Series, 1996**

*The Equity Performance of Firms Emerging from Bankruptcy*

Eberhart, Allan C., Edward I. Altman and Reena Aggarwal

FIN-96-22



# **The Equity Performance of Firms Emerging from Bankruptcy**

by

Allan C. Eberhart  
School of Business  
Georgetown University  
Washington, D.C. 20057  
(202) 687-4584

Edward I. Altman  
Stern School of Business  
New York University  
New York, NY 10012  
(212) 998-0709

Reena Aggarwal  
School of Business  
Georgetown University  
Washington, D.C. 20057  
(202) 687-3784

February 1997

---

We received helpful comments from seminar participants at the Hong Kong University of Science and Technology, University of North Carolina at Chapel Hill and the University of British Columbia. We would like to thank the Georgetown University Center for Business-Government Relations for providing support. Aggarwal and Eberhart received support from a Georgetown University Summer Research Grant. Eberhart also received support from a Goldman, Sachs Fellowship and worked on parts of this paper as a visiting assistant professor at the New York University Stern School of Business. We thank Edie Hotchkiss of Boston College and Christopher McHugh of New Generation Research (Boston, MA) for generously supplying part of the data for this study. Scott Humphrey provided excellent research assistance.



## **The Equity Performance of Firms Emerging from Bankruptcy**

### **Abstract**

This study assesses the stock return performance of 131 firms emerging from Chapter 11 between 1980 and 1993. Though there are some important differences, a firm issuing equity upon emergence from bankruptcy is analogous to an initial public offering (IPO). In contrast to the IPO literature, we find significant evidence of underpricing in the long-term. We also investigate reasons for cross-sectional differences in the returns. For example, we find that there is a positive relationship between the willingness of institutional investors to accept equity in the emerging firm (in exchange for their old claim on the formerly bankrupt firm) and the subsequent long-term equity returns. The results provide an interesting contrast, but not a contradiction, to previous work in this area that has documented poor operating performance for firms emerging from Chapter 11. Our results suggest that, although these firms may not achieve strong operating performance, they appear to do better than the market expected at the time they emerged from Chapter 11.



## The Equity Performance of Firms Emerging from Bankruptcy

With large corporate bankruptcies becoming commonplace during the late 1980s and early 1990s, there has been a notable increase in the number of firms emerging from bankruptcy (Altman (1993)). When public firms emerge from bankruptcy, they often cancel the old stock and distribute an entirely new issue of common stock.<sup>1</sup> In addition, the "new" firm's capital structure and, often its asset structure, is different from that of the prior bankrupt firm. In this sense, the emergence of a firm from Chapter 11 of the Bankruptcy Code is analogous to a firm undergoing an initial public offering (IPO). The stocks of firms emerging from Chapter 11 are often called "orphan" equities among practitioners.<sup>2</sup>

Many papers have documented systematic underpricing of traditional IPOs in the short term. Investors who purchase the stocks at the offer price and sell them at the close of the first trading date typically earn returns of 16.4 percent (Ritter (1991)). Long term, however, IPO stocks appear to be overpriced; for example, Ritter (1991) measures monthly returns from the closing price to three years later and reports negative excess returns of 29.1 percent. Aggarwal and Rivoli (1990) examine the long term performance using daily data and report excess returns of -13.7 percent (excluding initial returns) and -5.5 percent (including initial returns) over the first year following the IPO.

Though the performance of IPO stocks has been extensively studied, there is a dearth of work on the stock performance of firms emerging from bankruptcy.<sup>3</sup> In the past, there have been reports in the popular press about spectacular returns in this market. For example, as Sandler (1991, p. C1) states:

---

<sup>1</sup>See Betker (1995), Brown, James and Mooradian (1993), Eberhart, Moore and Roenfeldt (1990), Eberhart and Sweeney (1992), Franks and Torous (1989), Gilson (1997), Hotchkiss (1995) and Weiss (1990) for discussions of the reorganization process.

<sup>2</sup>Examples of funds that specialize in these investments include Tower Investment's Trophy Hunter Investments, L.P.; Murray Capital's ReCap Equities, L.P.; Brokers from BDS Securities.

<sup>3</sup>Wagner and Van de Voorde (1995) conduct a cursory examination of 30 stocks of firms emerging from bankruptcy.

While initial public offerings have been grabbing all the glory, there's a shadow market for new stocks that is doing nicely too. It's where people trade shares of companies coming out of bankruptcy or reorganization.

In recent months, some investors have made 50% to 100% on their money by trading the new shares of Republic Health, Southland Corp. and Maxicare Health Plans after those companies finished reorganizing their business.

The primary purpose of this paper is to examine if stocks of firms emerging from bankruptcy are efficiently priced at the time of emergence. Following the tradition of the IPO literature, we examine the short-term and long-term performance of these stocks. Our sample includes 131 firms emerging from Chapter 11 between 1980 and 1993. We define the short term as the first two days of returns after emergence from bankruptcy and the long term as the first 200 days of returns after emergence.

For the short-term, there is an important difference between IPOs and firms emerging from bankruptcy. When firms emerge from bankruptcy there is no formal offer price for the stocks. In fact, there may not be an issue of new stock; the firm may issue additional stock or just maintain its current amount of common stock. Our starting point is thus from the closing price on the first day of trading after the firm has emerged from Chapter 11. We find positive average cumulative abnormal returns (ACARs) over the first two return days. The two-day ACAR, depending on how the expected returns are estimated, is between 2.7 percent and 3.3 percent (the medians are smaller with a range of 0 to 0.3 percent). Though the average and median CAR results are mixed for the first two return days, a cross-sectional regression of actual returns on conditional expected returns (that we call the price-unbiasedness test) reveals significant evidence of mispricing.

In the IPO literature, long-term returns are measured from the closing price on the first day of trading. Thus, the starting point for this study is the same as for the IPO literature but the results are dramatically different. Over the 200-day period following Chapter 11 emergence, we find significant ACARs that range from 33.6 percent to 138.8 percent (the median CARs, though lower, are also significant and range from 5.1 percent to 9.4 percent). The price-unbiasedness test results also reject efficiency.

Our results are of broad interest for three main reasons. First, they cast doubt on the informational efficiency of this market. This finding is of particular interest to investors in formerly bankrupt firms,



primarily bondholders, that liquidate their equity position (given in exchange for their old claim on the formerly bankrupt firm) in the newly emerged firms. Second, the results are in stark contrast to the long-term underperformance observed in the IPO market. Finally, the results provide an interesting contrast, but not a contradiction, to prior work that suggests the Chapter 11 process does not efficiently screen out economically inefficient firms (e.g., Hotchkiss (1995)).<sup>4</sup> Our results suggest that, although these firms may not achieve strong operating performance, their stocks appear to do better than the market expected at the time they emerged from Chapter 11.

We investigate several explanations for these findings. For instance, we may have mismeasured the riskiness of these stocks. The robustness of the results with respect to different ways of estimating expected returns (i.e., benchmarks) casts doubt on this explanation, however.

We also investigate whether there are risk factors our measures of expected returns do not pick up. For example, Barry and Brown (1984) argue that differential information, or estimation risk, may not be fully captured with traditional methods of estimating expected returns (e.g., the market model).<sup>5</sup> A stock's estimation risk is inversely related to the amount of information available on it. Barry and Brown argue that a firm's period-of-listing (POL) on a stock exchange is a proxy for estimation risk; specifically, as the POL increases, the estimation risk falls. Small firms usually have a shorter POL and they find that the POL explains much, though not all, of the small firm effect observed in earlier studies (e.g., Banz (1980)).

We examine different proxies for differential information or estimation risk. First, a dummy variable that equals one if the firm's stock trades continuously throughout the bankruptcy process, zero otherwise. Firms with continuous trading might be expected to have less estimation risk because recent market prices can

---

<sup>4</sup>Alderson and Betker (1996) argue that by focusing on cash flows and the costly alternative of liquidation, the performance of firms emerging from bankruptcy is abnormally good.

<sup>5</sup>They focus on a traditional method of forming portfolios based on betas and assigning the same beta to each firm in the portfolio. Though this is not the exact method we use, their insights motivate our tests of risk factors that may not be fully captured in our expected return estimates.

be helpful in assessing the stock value at emergence. Second, a dummy variable that equals one if the firm switches stock exchanges from just before filing for Chapter 11 to just after it emerges, zero otherwise. Firms that switch stock exchanges might have greater estimation risk because this factor may be associated with a change in the firm's size, line(s) of business change(s), etc. No significant effect is found for the coefficient estimate of the change in exchange dummy variable or the continuous trading dummy variable.

Another variable we examine is the relationship between the time in bankruptcy and returns. Firms that take a long time to reorganize may have greater estimation risk because they may be expected to have a longer readjustment period (where there is great uncertainty over the firm's value) after emergence. The results show that longer periods in Chapter 11 are associated with lower excess returns after emergence from bankruptcy for the first two return days, *ceteris paribus*. This result is not consistent with the estimation risk effect we have in mind and suggests the market may have been too pessimistic in valuing firms upon emergence from a brief bankruptcy. This variable, however, also becomes insignificant when the event period is expanded to the first 200 days.

We find no consistent evidence of a significant negative relationship between returns and the level of the first day's closing price. Small priced stocks are usually small firms and the estimation risk is typically higher for these firms, *ceteris paribus* (e.g., Barry and Brown (1984)). So, the excess returns do not appear to be driven by small price stocks that may have risks beyond that captured in our estimates of expected returns, or have higher transaction costs.<sup>6</sup>

Besides factors that may proxy for estimation risk, we also examine whether other factors known to the market at the time of emergence from Chapter 11 are properly reflected in the stock prices on the first trading day upon emergence. We have two subsamples of data. In the first subsample of 72 firms (as supplied by Hotchkiss), we test whether a change in management affects the stock returns. Hotchkiss (1995) finds that

---

<sup>6</sup>Because our primary method of estimating expected returns is based on a comparable firm in the same industry as the sample firm and of similar size, the transaction costs for these firms are likely to be similar anyway.

management changes positively affect the operating performance of firms emerging from bankruptcy. We generally find this variable insignificantly affects returns, implying that the market properly accounts for this information in the stock price upon emergence from Chapter 11.

In another subsample of 51 firms, we have information on the type of securities in the new firm accepted by banks and institutional investors (in exchange for their old claims on the formerly bankrupt firms). Brown, James and Mooradian (1993) argue that offering informed investors, such as banks, equity in a reorganized firm conveys favorable private information. We find a positive and significant relationship between the long-term returns and the proportion of common stock accepted by institutional investors. There is a negative and significant relationship between returns and a dummy variable that equals one if the banks demand some cash in exchange for the old debt claims, zero otherwise. Both results suggest the types of securities accepted by these investors reflect information on the stock's intrinsic value that is not fully reflected in the stock price upon emergence from Chapter 11.<sup>7</sup>

A brief review of the bankruptcy process and related literature is presented in the next section. The data and methodology are discussed in Sections II and III. Section IV outlines the estimation procedures. The empirical results are presented in Section V and the summary in Section VI.

## **I. The IPO and Bankruptcy Literature Connection**

### **A. The Chapter 11 Bankruptcy Process**

The Chapter 11 bankruptcy process is a unique type of corporate restructuring. Its formal, legalistic process gives the ailing firm a moratorium of payments, primarily to its non-operating debt claimants, and time to propose a reorganized asset, liability and ownership structure. Important asset restructuring is overseen by the bankruptcy court and can take place throughout the reorganization process. Liability and ownership

---

<sup>7</sup>Brown, James and Mooradian (1993) focus on the valuation effects around offer announcements. Therefore, they do not explicitly predict that the market fails to fully account for this information in the stock price after it is publicly known. Nevertheless, their model provides a useful motivation for our test of the market's ability to efficiently incorporate this information.

restructuring is proposed, debated and, if confirmed, the firm then often emerges with a new ownership and capital structure.

Often when the firm emerges as a public company, a new class of common shareholders replaces the old owners. The latter's equity is worthless if the value of the debt claims exceeds the value of the firm and the absolute priority rule (APR) is followed. In approximately 75 percent of corporate bankruptcy cases, however, the APR is violated.<sup>8</sup> Nevertheless, Altman and Eberhart (1994) show that, on average, higher seniority still implies higher payoffs upon emergence from bankruptcy, *ceteris paribus*. Creditors usually receive part of their payoff as new stock in the firm, frequently giving them majority ownership.

During the bankruptcy process, the estimate of the firm's going concern value that will be used to set the payoffs to each class of claimants is frequently hotly debated. Depending on its priority, each class of claimants has an incentive to present a biased estimate of the firm value. It is in the interest of junior claimants to argue for upwardly biased estimates of firm value. This will increase the proportion of the firm value they receive. Conversely, senior claimants (who are often the institutional investors or banks) will often push for a lower estimate of firm value so that they can retain a greater portion of the firm and reap the rewards if the firm's subsequent equity value is higher than would be expected given the riskiness of the stock. Also important is the bias of management; they have an incentive to value the firm above its liquidation value (to maintain their jobs) but below its true value (assuming its true value is above the estimate of its liquidation value). If the market is persuaded by the manager's forecast, then the post-emergence stock performance of the firm will seem superior relative to the equilibrium expected returns.<sup>9</sup>

---

<sup>8</sup>See Franks and Torous (1989), Eberhart, Moore and Roenfeldt (1990), Weiss (1990) and Eberhart and Sweeney (1992) for studies that document violations of the APR.

<sup>9</sup>Hotchkiss (1995) finds some support for this hypothesis in that her evidence suggests many firms emerging from bankruptcy would have been more highly valued in liquidation. However, for a subsample of her firms, the operating performance was below managers' forecasts.

## B. Studies Examining the Operating Performance of Firms Emerging from Bankruptcy

Hotchkiss (1995) documents the operating performance of firms emerging from bankruptcy that filed for Chapter 11 between October 1979 and September 1988. Overall, she finds the median operating performance to be positive. More than 40 percent of the firms, however, continue to experience operating losses in the three years after emergence and 32 percent subsequently file for bankruptcy again or restructure their debt. Moreover, the median operating performance relative to industry averages is negative.

As noted earlier, these firms could be generating abnormally high equity returns if the market had expected, at the time of emergence, that the accounting performance would be worse than what happened. In fact, the average accounting performance of the more traditional (i.e., non-formerly bankrupt) IPOs is, on average, poor despite the significantly positive average returns shareholders experience during the first 100 days (e.g., Jain and Kini (1994) and Rao (1993)).

More recent evidence by Alderson and Betker (1996) suggests that the operating performance of firms is abnormally positive following emergence from Chapter 11. They examine 89 firms emerging from Chapter 11 between 1983 and 1993. In contrast to the focus by Hotchkiss (1995) on accounting measures of performance, they focus on the total cash flows provided by the firm. They report that total cash flow returns for their sample of firms are significantly higher than the returns on the S&P 500 index.

In summary, Hotchkiss (1995) focuses on how accounting-based results provide evidence on the efficiency of the bankruptcy code. Her results suggest that the bankruptcy code is biased toward letting economically inefficient, or poorly restructured, firms reorganize (instead of liquidating). Alderson and Betker argue that total cash flow measures and comparisons to the alternative of liquidation are better means of assessing the success of firms emerging from Chapter 11. By their metrics, the Chapter 11 process looks more efficient.

Gilson (1997) shows that firms remain highly levered after emerging from Chapter 11 but he notes there may be rational reasons for this observation; for example, high leverage can allow creditors to more

effectively monitor managers. Moreover, he argues that Chapter 11 can reduce the cost of debt reduction and lead to lower debt ratios than when debt is restructured outside Chapter 11.

Equity returns can be viewed as another measure of the success of firms emerging from bankruptcy; specifically, the excess returns measure the unexpected success. By this measure, our results are at least indirectly supportive of Alderson and Betker (1996) and, more indirectly, supportive of Gilson (1997). In contrast to all three studies, however, the focus of this study is on the efficiency of the financial markets, not the efficiency of the Chapter 11 process.

### C. Similarities and Differences Between IPOs and Firms Emerging from Chapter 11

IPOs and firms emerging from Chapter 11 share two important characteristics. First, in Chapter 11, as mentioned earlier, firms typically restructure their assets and capital structure. The old stock is often canceled, and new stock is issued. In this sense, the firm emerging from bankruptcy may be considered a new publicly traded firm. The second common characteristic is relevant only for a subsample of our firms. For 55 (out of 131) cases, the stock of the firm stopped trading during the bankruptcy process. Thus, the firm was private before it emerged from bankruptcy (as with an IPO).

Though IPOs and firms emerging from Chapter 11 are similar, they also have important differences. We have six reorganization plans that mention an explicit estimate of the stock's intrinsic value (which is loosely similar to an offer price in a prospectus). The most typical case, however, is that no explicit estimate of a stock price is provided. As noted earlier, the lack of a price estimate/offer price means that our efficiency tests are entirely concentrated in the after-market performance of the stock (i.e., the first return is for the second day of trading for the short-term and long-term tests). Again, however, the starting point for our long-term tests is the same as for the long-term tests in the IPO literature.

The other key difference is that there is no investment bank involved as the underwriter for firms emerging from Chapter 11. Investment bankers play an important role in the due diligence process of a new issue. In the IPO literature, the aftermarket performance of new issues is influenced by the reputation of the

investment banker (e.g., Carter and Manaster (1990)). It has also been suggested that in “firm-commitment” IPOs the underwriters may continue to provide price support/stabilization in the aftermarket for several weeks after the offering. This price support contributes to the initial excess returns (Rudd (1993)). Without the involvement of an investment banker, there is no such support for the equity of firms emerging from Chapter 11.

## II. Data

Our primary source of information on firms emerging from bankruptcy is from New Generation Research (Boston, MA). Because New Generation's list of firms emerging from bankruptcy becomes more thorough in the 1990s, we construct our sample in two phases.

The first phase is for a list of firms, provided by New Generation, that file and complete a Chapter 11 bankruptcy between January 1980 and December 1989. We supplement this list with a search on the *Dow Jones News Retrieval* using the key words bankruptcy and emerge. A total of 350 firms are in this sample. For the second phase, we use a more comprehensive list provided by New Generation. This list contains 196 firms that emerge from Chapter 11 between January 1990 and December 1993.

Of the total of 546 firms, 131 emerge with equity trading on the NYSE, AMEX or NASDAQ. When the firms emerge from bankruptcy, 71 begin trading on the NASDAQ, 37 on the NYSE and 23 on the AMEX; 76 of the stocks trade throughout the bankruptcy process (i.e., within a 5-trading day period preceding the emergence date). Though we cannot rule out the possibility that our sample is less than the population, we are confident that we have assembled the vast majority of firms.<sup>10</sup>

Table 1 provides some descriptive statistics on the sample. The average closing price on the first day of trading (event day 0) following emergence from Chapter 11 is \$6.32 whereas the median is \$3.75. Similar

---

<sup>10</sup>Hotchkiss (1995) has an overall sample that is larger than our sample but it must include many firms not listed on the NYSE, AMEX or NASDAQ. For instance, in an earlier version of her paper, she reports that only 41 of the firms in her sample have sufficient data on CRSP to compute returns for the first year following bankruptcy. Moreover, Alderson and Betker (1996) require some market data for their tests and their sample size is 89 firms.

to other studies (e.g., Altman (1993), Hotchkiss (1993)), we find that the average time spent in bankruptcy is close to two years with an average of 22.39 months and a median of 20.17 months.

For our sample, we estimate the alpha and beta coefficients in a market model regression for each stock with the NASDAQ value weighted index as a proxy for the market. We use the market model as one method of estimating expected returns. The market model parameters are estimated over three periods [(2, 274), (101, 274), (201, 274)]. In every period, the average (Scholes-Williams) beta coefficients are significantly less than unity and range from 0.464 to 0.575.<sup>11</sup> The alpha coefficients are positive in every estimation period.

There are 51 firms for which we have some information on the payoffs to each claimant in the formerly bankrupt firms (provided by New Generation). Over the entire subsample of 51 firms, institutional investors accept 10.2 percent (median = 0) of the stock in firms emerging from Chapter 11. Institutional investors are defined as funds specializing in bankruptcy investing and other non-bank institutions. Banks accept 12.2 percent of the stock, on average (median = 0). In seven cases, institutional investors receive some debt in the emerging firm; they receive some cash in seven cases. Banks accept debt in 35 cases and cash in 25 cases. The payoffs in stock, debt or cash are not mutually exclusive; banks or institutional investors can receive a combination of stock, debt and cash.

#### A. Definition of the First Trading Date

Because the emergence procedure varies across firms, so does the appropriate starting point for our efficiency tests. For example, as mentioned earlier, 76 of the sample firms' stocks trade during the Chapter 11 period (i.e., before the emergence date). The stock may trade up to the day the new stock is issued and the old stock is then canceled. Alternatively, additional shares may or may not be issued and the "new" stock will often trade under the old name. If no new stock is issued, then the first trading date is defined as the

---

<sup>11</sup>We also estimated the results with the assumption that the true beta equals unity and find qualitatively similar results to those reported below.



emergence date for the firms (recall that the first return day is for the second day of trading). Our initial source for the emergence date is the *Bankruptcy Datasource*. To confirm the accuracy of the date, we checked the *Capital Changes Reporter*, *Wall Street Journal Index* (if we did not have information from the *Dow Jones News Retrieval*), and the *Bloomberg* machine (when *Bloomberg's* historical information covered the emergence period).

If additional stock is issued, the CRSP database does not show the first date the stock begins trading with the newly issued shares. Therefore, we checked the *Standard and Poor's Daily Stock Price Record* (SPDSPR) because this source denotes the first trading date for the "new" stock.

If the old stock is canceled and an entirely new issue of common stock is distributed, the first trading date for the new stock is then the appropriate starting point. CRSP does not always pick up the firm when it first begins trading. So, we hand-collected data from the SPDSPR for the 28 firms where the first trading date in the SPDSPR precedes the first trading date on CRSP. For these firms, the difference in the first trading days is not trivial; the first trading date on CRSP occurs 36 days after the first trading date in the SPDSPR, on average (median = 27 days).

One (partial) explanation for the failure of CRSP to pick up the first trading date every time may be the "when-issued" trading (i.e., trading of stock before it is issued) that occurs with some of these stocks. Though there can be some liquidity and settlement day differences between when-issued and "regular" stock trading (e.g., Wansley and Lameruex (1989)), the when-issued trading period is the relevant starting point. Therefore, the first trading date can be for when-issued or regular trading, whichever comes first.<sup>12</sup> There are 13 firms that we know begin trading on a when-issued basis. To check if the use of when-issued prices was correlated with any difference in returns, we computed the abnormal return for each firm (using the NASDAQ

---

<sup>12</sup>There was one firm (Maxicare Health Plans, Inc.) that the *Capital Changes Reporter* states began trading on a when-issued basis on December 19, 1990 at \$4 per share. However, the SPDSPR and CRSP do not note any trading until April 30, 1991 and this is the date we used. The price on April 30 was \$8.875. Therefore, if the *Capital Changes Reporter* is correct, then we have biased downward our estimate of the short-term and long-term underpricing.

value-weighted index). We then averaged these abnormal returns and compared them with the average abnormal returns for the other 118 firms; they were insignificantly different.<sup>13</sup>

### III. Methodology

The first efficiency test we conduct is the well-known test of whether the average cumulative abnormal return (ACAR) is significantly different from zero. The ACAR tests whether the average actual return  $((1/N) \sum \prod (1+R_{it})-1)$  equals the average expected rate of return  $((1/N) \sum \prod (1+E(R_{it}))-1)$ .

$$ACAR = \left( \frac{1}{N} \right) \sum_{i=1}^N \left( \left( \prod_{t=1}^T (1 + R_{it}) \right) - 1 \right) - \left( \frac{1}{N} \right) \sum_{i=1}^N \left( \left( \prod_{t=1}^T (1 + E(R_{it})) \right) - 1 \right) = \left( \frac{1}{N} \right) \sum_{i=1}^N CAR_i \quad (1)$$

where

$R_{it}$  = actual rate of return for security  $i$  on day  $t$ ,

$E(R_{it})$  = expected rate of return for security  $i$  on day  $t$ ,

$T$  = number of days in event period,

$N$  = number of securities

$CAR_i$  = cumulative abnormal return for security  $i$ .

For the (1, 200) period, we also compute a closely related measure of abnormal performance called the wealth relative (WR) (e.g., Ritter (1991)):

$$WR = \left( \sum_{i=1}^N \frac{\left( \prod_{t=1}^{200} (1 + R_{it}) \right)}{\left( \prod_{t=1}^{200} (1 + E(R_{it})) \right)} \right) / N \quad (2)$$

A WR greater than 1 implies that the sample firms earned abnormal profits; less than one implies abnormal

---

<sup>13</sup>We cannot rule out the possibility, however, that there are more firms that began trading on a when-issued basis because the SPDSR, CRSP and the *Bloomberg* historical prices do not explicitly note when-issued trading except in two cases. We relied on news reports from *Bloomberg* and the *Wall Street Journal* to confirm that trading began on a when-issued basis. *Bloomberg* reports mentioned when-issued trading more frequently but historical information was not available (from this source) for every sample firm's emergence period.

losses.

A potentially more powerful test of efficiency is the price-unbiasedness test (e.g., Eberhart and Sweeney (1992)); it asks whether  $\beta_0 = 0$  and  $\beta_1 = 1$  in the following cross-sectional regression:

$$\prod_{t=1}^T (1 + R_{it}) - 1 = \beta_0 + \beta_1 \left[ \prod_{t=1}^T (1 + E(R_{it})) - 1 \right] + e_i \quad (3)$$

where the error  $e_i$  is the  $CAR_i$ . Under the null of efficiency, the true intercept  $\beta_0$  equals zero and the slope  $\beta_1$  equals unity, or

$$\prod_{t=1}^T (1 + R_{it}) - 1 = \left[ \prod_{t=1}^T (1 + E(R_{it})) - 1 \right] + e_i, \quad (4)$$

the  $E(e_i) = 0$  and the errors are serially uncorrelated and uncorrelated with the  $E(R_i)$ 's by assumption.<sup>14</sup> OLS estimates of the intercept and slope are unbiased and consistent and, under the assumption that the  $e_i$ 's are distributed normal iid, they are also efficient.

To test the efficiency of stocks across different dimensions, we employ two variants of the ACAR and price-unbiasedness test. First, we rank the firms based on the following criteria: (1) closing price on event day 0, (2) the time spent in bankruptcy, and (3) the stock exchange upon emergence from bankruptcy. For each criterion, the sample is split into 10 portfolios.

Second, we conduct a different version of the price-unbiasedness test that we call the generalized price unbiasedness (GPU) test. This test can detect inefficiencies that the price-unbiasedness test fails to pick up (e.g., see Golec and Tamarkin (1991)). It can also be more powerful than the portfolio version of the ACAR test because it employs the full sample.

We conduct three versions of the GPU test. The full sample test uses five pieces of information clearly known at the close of the first trading day upon emergence from Chapter 11,

---

<sup>14</sup> $R_i$  and  $e_i$  are uncorrelated if the model used to calculate abnormal returns is correct and if there is no estimation error in the parameters of the model used to calculate abnormal returns. These issues are discussed in Eberhart and Sweeney (1992).

$$\left[ \prod_{t=1}^T (1+R_{it}) - 1 \right] = \beta_0 + \beta_1 \left[ \prod_{t=1}^T (1+E(R_{it})) - 1 \right] + \beta_2 P_{i0} + \beta_3 CONT_i + \beta_4 TIME_i + \beta_5 CHEX_i + \beta_6 CONTIME_i + \epsilon_i \quad (5)$$

where

$P_{i0}$  = price of security  $i$  at the close of the first trading day upon emergence from Chapter 11 (period 0),

$CONT_i$  = dummy variable equal to 1 if firm trades continuously throughout Chapter 11, zero otherwise.

$TIME_i$  = number of months firm  $i$  spent in Chapter 11,

$CHEX_i$  = dummy variable equal to 1 if firm changes exchange from before Chapter 11 filing to emergence from Chapter 11, zero otherwise,

$CONTIME_i$  =  $CONT_i * (1/TIME_i)$ .

We conduct the last two GPU tests using two subsamples. With the first test, we use the subsample of 72 firms for which we have information on management changes,

$$\left[ \prod_{t=1}^T (1+R_{it}) - 1 \right] = \beta_0 + \beta_1 \left[ \prod_{t=1}^T (1+E(R_{it})) - 1 \right] + \beta_2 P_{i0} + \beta_3 CONT_i + \beta_4 TIME_i + \beta_5 CHEX_i + \beta_6 CONTIME_i + \beta_7 MGTCH_i + \epsilon_i \quad (6)$$

$MGTCH_i$  = dummy variable equal to 1 if there is a management change, zero otherwise.

Management changes are assessed on three different dates; the default date, the confirmation of the Chapter 11 plan date and the emergence from Chapter 11 date.

The second test is with the subsample of 51 firms for which we have information on the payoffs to each claimant,

$$\begin{aligned} \left[ \prod_{t=1}^T (1+R_{it}) - 1 \right] = & \beta_0 + \beta_1 \left[ \prod_{t=1}^T (1+E(R_{it})) - 1 \right] + \beta_2 P_{i0} + \beta_3 CONT_i + \beta_4 TIME_i + \beta_5 CHEX_i + \beta_6 CONTIME_i \\ & + \beta_7 INSTSTK_i + \beta_8 INSTDEBT_i + \beta_9 INSTCASH_i + \beta_{10} BANKSTK_i + \beta_{11} BANKDEBT_i + \beta_{12} BANKCASH_i + \epsilon_i \quad (7) \end{aligned}$$

where

- INSTSTK<sub>*i*</sub> = proportion of stock in the emerging firm that institutional investors own,
- INSTDEBT<sub>*i*</sub> = dummy variable = 1 if institutional investors accept any debt as compensation for their claims on the formerly bankrupt firm, zero otherwise,
- INSTCASH<sub>*i*</sub> = dummy variable = 1 if institutional investors receive any cash as compensation for their claims on the formerly bankrupt firm, zero otherwise,
- BANKSTK<sub>*i*</sub> = proportion of stock in the emerging firm that banks own,
- BANKDEBT<sub>*i*</sub> = dummy variable = 1 if banks accept any debt as compensation for their claims on the formerly bankrupt firm, zero otherwise,
- BANKCASH<sub>*i*</sub> = dummy variable = 1 if banks receive any cash as compensation for their claims on the formerly bankrupt firm, zero otherwise,

The null under the efficient market hypothesis is  $\beta_1 = 1$  and  $\beta_0 = \beta_2 = \dots = \beta_{12} = 0$ . More broadly, any information known as of the close of the first trading day should be reflected in the expected rate of return. There is, of course, a joint hypothesis of the model used to estimate expected returns and efficiency. Consequently, we estimate expected returns under differing assumptions. Moreover, as discussed earlier, some variables in equations (5), (6), and (7) may be proxies for risks not captured in the expected return estimate. Recall that firms with low stock prices may have higher returns because of estimation risk (e.g., Barry and Brown (1984)) or transaction costs. Firms that trade continuously throughout the Chapter 11 process (CONT<sub>*i*</sub>) or spend a short time in Chapter 11 (TIME<sub>*i*</sub>) may be expected to have less estimation risk (the combination of these two effects is captured in the variable CONTIME<sub>*i*</sub>). Finally, firms that change stock exchanges may have more estimation risk (CHEX<sub>*i*</sub>).

#### IV. Estimation Procedures

We estimate expected returns using two major methods. With the first method, we use a matched sample of firms. For each sample firm, we choose a matched firm that has the same primary 2-digit SIC code

as the sample firm and is closest in equity capitalization as of the first trading date for the sample firm.<sup>15</sup> Within the matched sample of firms, eight firms delisted during the 200-day period following emergence from Chapter 11 for the sample firms. When the firm delisted, we then filled the remaining days with the next closest firm based on the 2-digit SIC code and equity capitalization as of the first trading date for the sample firms.

We do not match firms with similar book-to-market ratios for two reasons. First, the book value of equity (as reported in the last 10-Q or 10-K before emergence) for most of these firms is meaningless before the first trading date because the sample firms typically restructure their operating and financial structure between the last reported 10-Q or 10-K and the first trading date. Second, we cannot use the book value as reported in the first 10-Q or 10-K following the first trading date because the market would probably not know that information on the first trading date.<sup>16</sup> Matching by industry and size, however, does appeal to the book-to-market and size effect identified by Fama and French (1992) because firms in the same industry will often have similar book-to-market ratios.

With the second major method of estimating expected returns, we use the market model with the NYSE/AMEX and NASDAQ value-weighted indices as the market returns. Because there is no trading for 55 of these stocks during the bankruptcy process (and even where there is trading, the business and financial risk of the firm often change dramatically after bankruptcy), we cannot use a benchmark period before the event period. An additional complication is the shifting of risk that can occur after emergence. Clarkson and Thompson (1990) find that IPO betas decline during the first few months of trading. We have 274 days of post-emergence returns for all but five of the firms. We, however, do not find a statistically significant decline

---

<sup>15</sup>Speiss and Weiss (1995) employ a similar methodology in their study of the performance of stocks subsequent to seasoned equity offerings.

<sup>16</sup>Sometimes the market has access to pro forma accounting statements that give estimates of the book value of equity but this information is not often available. For example, some bankruptcy reorganization plans provide this information but others do not.

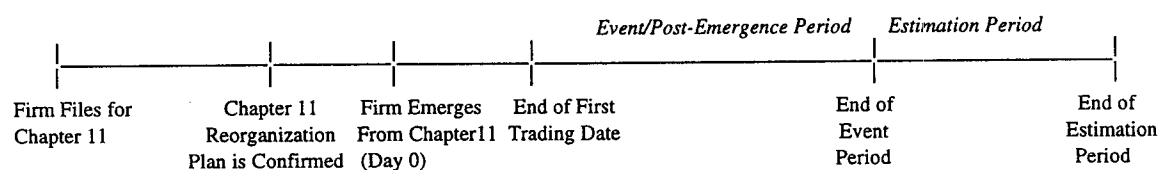
in the betas of our sample firms (based on betas calculated in the (2, 200) period and in the (201, 274) period). Therefore, we estimate them for day 201 through day 274.

To avoid any potential survivorship bias, we include the performance of the five firms that drop out of the sample in the ACAR tests (with both major methods of estimating expected returns) for every period. Because these firms do not trade during the benchmark estimation period of day 201 through day 274, we cannot estimate their market model parameters. In these cases, we use the average alpha and beta estimates from the other firms.

Figure 1 summarizes the sequence of events.

**Figure 1**

**Typical Time Line for Sample Firms**



## V. Empirical Results

### A. ACAR Results

The ACAR results are presented in Table 2. The ACARs are computed for the short term (1, 2) and long term (1, 200) using the three different estimates of expected returns. Figure 2 provides a graphical illustration of the sample firm returns and the differing estimates of expected returns over the 200-day period. In the figure, the returns are averaged for each event day. These average returns are then summed (with daily compounding) over the 200-day event period.<sup>17</sup>

For the first two days of returns following emergence--event period (1, 2)--the ACAR ranges from 2.7 percent to 3.3 percent but the statistical significance is weak. Moreover, the median CARs are smaller (0

---

<sup>17</sup>Two positive sample firm return outliers are removed from the sample used to construct Figure 2.

percent to 0.3 percent) and insignificant.

The results become decidedly unambiguous when the post-emergence period is extended to day 200. Under every method of estimating expected returns, the ACARs are large, positive and highly significant (from 33.6 percent to 138.8 percent). Though lower, the median CARs are also positive and significant (from 5.1 percent to 9.4 percent). The wealth relatives are greater than unity every time for the (1, 2) and (1, 200) periods.

### B. Portfolio ACARs

To investigate possible explanations for the observed underpricing over the 2 and 200-day period following emergence from Chapter 11, we segment the sample into 10 portfolios. The portfolios are formed based on the price at the close of the first trading day, the time spent in Chapter 11 and the exchange the stock trades on after emergence.

Table 3 shows the portfolio results for the first two return days (1, 2). CARs are computed with the size and industry matched sample firms. This is done for the sake of succinctness; we find qualitatively similar results with the other methods of estimating expected returns.

For the price-sorted portfolios, the largest ACAR of 26 percent and median CAR of 6.9 percent is for the second smallest price portfolio. The next largest median CAR, however, is with the fourth largest price portfolio (range of \$5.50 to \$6.88). At most, the results imply a weak negative relationship between the excess returns and the price level at emergence. The GPU results reported below provide similar evidence.

There is an inverse relationship between the time spent in Chapter 11 and the ACARs. The largest ACARs are concentrated among firms that completed the Chapter 11 process within a year. For firms that spend between 4.2 months and 8.3 months in Chapter 11, the ACAR is 19.7 percent. Again, though, the median CARs tend to be lower. Here, the median CAR is negative (-2.6 percent).

With the sample sorted by exchange, the 71 firms listed in NASDAQ have the largest ACAR of 5.6 percent (median = 0.6 percent), consistent with the weak negative relationship between the excess returns and



price reported above. AMEX firms have a positive ACAR of 2 percent but the median CAR is -0.7 percent. NYSE firms have a negative ACAR (-1.7 percent) and a negative median CAR (-0.1 percent).

With the event period extended to the first 200 days in Table 4, the ACARs generally increase across all portfolios sorted by price, time in Chapter 11 and exchange. For the price-sorted portfolios, the weak negative relationship between the excess returns and price is weakened further when the period is extended. Though the largest ACAR (98.5 percent) is for the second smallest portfolio, the next two largest ACARs (59.2 percent and 50.9 percent) are for the third and fourth largest price portfolios. Moreover, the only negative ACAR (-7.9 percent) is for the third smallest price portfolio (though there are four negative median CARs).

When the event period is extended to 200 days, the inverse relationship between the time spent in Chapter 11 and the subsequent stock performance is also weakened. The larger ACAR of 75.9 percent is for the portfolio with the second shortest time in bankruptcy, but the median CAR for this portfolio is -5.5 percent. The largest median CAR of 66.7 percent is for the portfolio with the second longest time in bankruptcy.

For the NASDAQ stocks, the superior performance exhibited in the shorter windows is reversed when the event period expands to 200 days. Among firms on the NASDAQ, the ACAR is 25.7 percent (median CAR of 2.8 percent). NYSE and AMEX firms, however, have ACARs of 43.1 percent and 45.2 percent (median CARs of 27.7 percent to 13.3 percent).

### C. Price-Unbiasedness and GPU Results

In the interest of succinctness and consistency with the portfolio results, the price-unbiasedness and GPU results shown in Table 5 are for the case where the size and industry matched firms are used to estimate expected returns. Panels A and B show the results for the first two return days. The price-unbiasedness results reject efficiency, consistent with the prediction that this test can detect inefficiencies that the ACAR

test does not.<sup>18</sup>

Efficiency is also rejected with the GPU test; there is a negative and significant relationship between returns and TIME. Therefore, the more quickly firms complete their Chapter 11 reorganization, the greater the subsequent short-term stock returns (beyond what is expected given the returns on a stock of similar size in the same industry). This finding is difficult to attribute to a risk characteristic not captured by the expected return estimate because stocks that spend a short time in Chapter 11 should probably have less estimation risk and lower returns. The price at emergence, however, has a negative coefficient estimate that is significant at the 10 percent level. This result implies that some of the excess returns may be attributable to transaction cost or estimation risk effects.<sup>19</sup>

When the event period is extended to 200 days in Panels C and D, the price-unbiasedness and GPU test results reject efficiency at the 1 percent level using a two-tailed test. In the GPU test, however,  $P_0$  and TIME no longer have negative and significant effects on returns, as do none of the other variables (the conditional expected return is significantly different from unity). This finding suggests that the positive returns we observe over the first 200 days are not explained by the conditional expected returns or the other variables in the GPU test that may proxy for risk factors not fully captured by the conditional expected returns.<sup>20</sup>

The GPU results with the subsample of firms for which we have information on management changes are shown in Table 6. Management changes are measured at three different times; the default date; the bankruptcy filing date and the date the Chapter 11 plan is confirmed by the bankruptcy court. In one case

---

<sup>18</sup>The p-values are computed using White's (1980) correction for heteroskedasticity. We checked for outliers using the DFFITS criterion (Belsley, Kuh and Welsch (1980)). The results are qualitatively similar when outliers are removed.

<sup>19</sup>Supra 6.

<sup>20</sup>Because the null that  $\beta_1 = 1$  and  $\beta_0 = \beta_2 = \dots = \beta_6 = 0$  is rejected, however, we cannot rule out the possibility that the variables such as  $P_0$  and TIME (that may reflect estimation risk) are driving the rejection of the null (even though their individual t-statistics are insignificant). Again, though, the sign of the TIME coefficient estimate is the opposite of what would be expected if this was a proxy for estimation risk.

(Panel F), the management change variable (around the emergence date) has a weakly significant (at the 10 percent level) negative relationship with the 200-day returns. In every other case, the management change variable is insignificant. This implies that the positive relationship between management changes and operating performance after emergence that Hotchkiss (1995) documents is properly reflected in the stock prices at the time of emergence.

Table 7 shows the results with the subsample of firms with available payoff data. For the first two returns days (Panels A and B), only the continuous trading variable ( $CONT_i$ ) has a significant coefficient estimate (negative as in the previous test results). When the 200 day returns are examined, however, the proportion of stock accepted by institutional investors ( $INSTSTK_i$ ) has a positive and significant coefficient estimate. Moreover, if the banks demand cash as part of their payoff ( $BANKCASH_i$ ), this has a negative and significant effect. These findings suggest that the willingness of informed investors to accept equity in the firm (or, conversely, to demand cash for at least part of the payoff) portends future performance that is not fully reflected in the equity values at emergence.

## VI. Summary and Conclusions

The fallout from the record number of bankruptcies during the late 1980s and early 1990s has created a growing market for stocks of firms emerging from bankruptcy. Large returns earned by some stocks has heightened interest in this market.

We investigate the extent to which these stocks are efficiently priced on the first trading day after emergence. We find weak evidence of underpricing in the short-term and striking evidence of underpricing in the long term. Specifically, over the first 200 days of returns after emergence, the ACAR varies from 33.6 percent to 138.8 percent depending on how the expected returns are estimated. The median CARs, though lower, are significant and range from 5.1 to 9.4 percent.

Of course, transaction costs or risk-characteristics not captured in our expected return estimates could explain the results. We investigate these possibilities using differing estimates of expected returns and

checking for whether other risk or transaction cost proxies (e.g., the stock price at emergence from Chapter 11, length of time in Chapter 11, etc.) explain the excess returns. We continue to find excess returns after conducting these investigations.

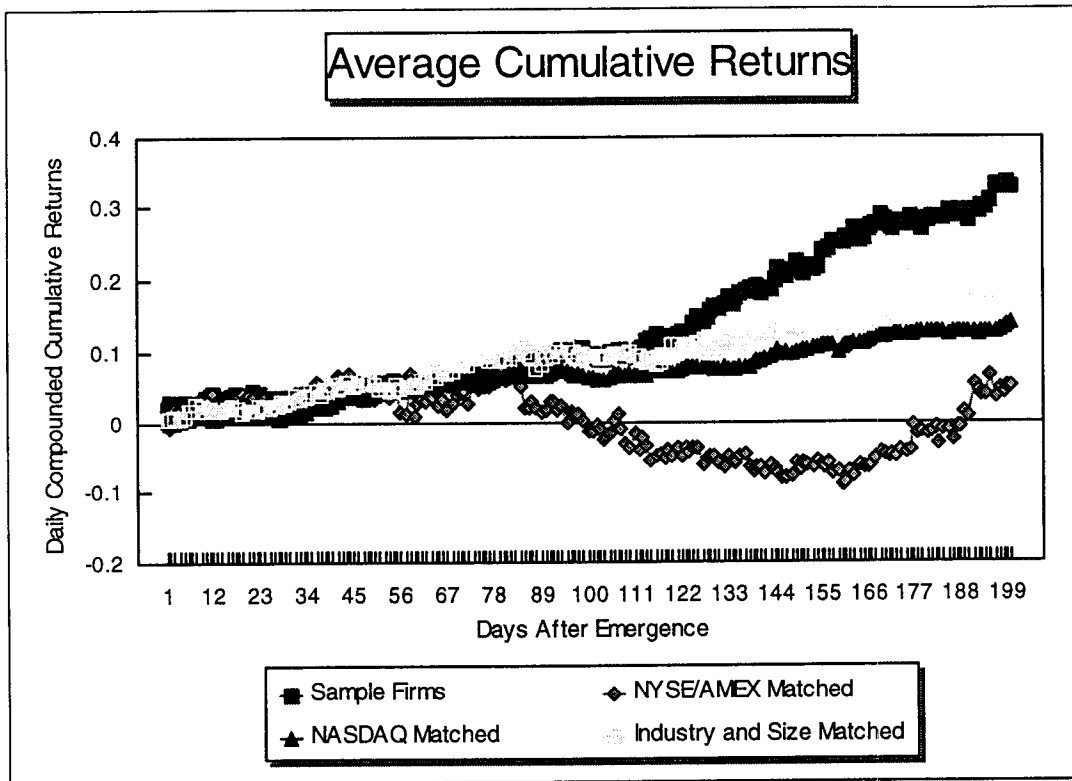
For our subsample tests, we do not find any consistent cross-sectional relationship between excess returns and management changes. The willingness of institutional investors to accept equity (in exchange for their old claims on the formerly bankrupt firm) in the newly emerged firm is positively associated with long-term returns, however. Moreover, if banks demand some cash in exchange for their old debt claim, then long term returns are lower. Both of the latter results suggest the type of securities accepted by these informed investors reflect information on the stock's intrinsic value that is not fully reflected in the stock price upon emergence from Chapter 11.

Our results cast doubt on the informational efficiency of this market. This finding is of particular interest to investors in formerly bankrupt firms who receive equity in the newly emerged firm in exchange for their old claims. The results also present an interesting contrast, but not a contradiction, to the poor operating results of firms emerging from bankruptcy as reported in previous studies. Our results suggest that, although these firms may not do well in their accounting performance, they appear to do better than the market expected at the time of emergence from Chapter 11.

## REFERENCES

- Aggarwal, Reena and Pietra Rivoli, 1990, Fads in the initial public offering market? Financial Management, 19, 58-67.
- Alderson, Michael J. and Brian L. Betker, 1996, Assessing postbankruptcy performance: An analysis of reorganized firms' cash flows, working paper, Saint Louis University.
- Altman, Edward I., 1991, Distressed Securities. Probus Publishing Company, Chicago, Illinois.
- \_\_\_\_\_, 1993, Corporate Financial Distress and Bankruptcy, John Wiley and Sons, New York.
- \_\_\_\_\_ and Allan C. Eberhart, 1994, Do seniority provisions protect bondholders' investments?, Journal of Portfolio Management, 20, 67-75.
- Banz, Rolf W., 1981, The relationship between return and market value of common stock, Journal of Financial Economics, 9, 3-18.
- Barry, Christopher B. and Stephen J. Brown, 1984, Differential information and the small firm effect, Journal of Financial Economics, 283-294.
- Belsley, D.A. E. Kuh and R.E. Welsch, 1980, Regression Diagnostics: Identifying Influential Data and Sources of Collinearity, New York, John Wiley.
- Betker, Brian L., 1995, Management's incentives, equity's bargaining power, and deviations from absolute priority in chapter 11 bankruptcies, Journal of Business, 68, 161-183.
- Brown, David T., Christopher M. James and Robert M. Mooradian, 1993, The information content of exchange offers made by distressed firms, Journal of Financial Economics, 33, 93-118.
- Carter, Richard and Steven Manaster, 1990, Initial public offerings and underwriter reputation, Journal of Finance, 45, 1045-1067.
- Clarkson, Peter and Rex Thompson, 1990, Empirical estimates of beta when investors face estimation risk, Journal of Finance, 45, 431-453.
- Eberhart, Allan C., William T. Moore and Rodney L. Roenfeldt, 1990, Security pricing and deviations from the absolute priority rule in bankruptcy proceedings, Journal of Finance, 45, 1457-1469.
- \_\_\_\_\_ and Richard J. Sweeney, 1992, Does the bond market predict bankruptcy settlements? Journal of Finance, 47, 943-980.
- Fama, Eugene F. and Kenneth R. French, 1992, The cross-section of expected stock returns, Journal of Finance, 47, 427-465.
- Franks, Julian R. and Walter N. Torous, 1989, An empirical investigation of U.S. firms in reorganization, Journal of Finance, 45, 747-769.

- Gilson, Stuart, 1997, Transaction costs and capital structure choice: evidence from financially distressed firms, Journal of Finance, forthcoming.
- Golec, Joseph and Maury Tamarkin, 1991, The degree of inefficiency in the football betting markets, Journal of Financial Economics, 2, 311-324.
- Hotchkiss, Edith S., 1993, Investment decisions under chapter 11 bankruptcy, Doctoral Dissertation, New York University Stern School of Business.
- \_\_\_\_\_, 1995, The post-emergence performance of firms emerging from chapter 11, Journal of Finance, 50, 3-21.
- Jain, Bharat A. and Omesh Kini, 1994, The post-issue operating performance of IPO firms, Journal of Finance, 49, 1699-1726.
- Lamoureux, Christopher G. and James W. Wansley, 1989, The pricing of when-issued securities, Financial Review, 24, 183-198.
- Rao, Gita, 1993, The relation between stock returns and earnings: A study of newly-public firms, working paper, Kidder Peabody and Company.
- Ritter, Jay R., 1991, The long-run performance of initial public offerings, Journal of Finance, 46, 3-48.
- Rudd, Judith S., 1993, Underwriter price support and the IPO underpricing puzzle, Journal of Financial Economics, 34, 135-151.
- Sandler, Linda, 1991, Post-bankruptcy shares: next big play?, Wall Street Journal, May 16.
- Spiess, D. Katherine and John Affleck-Graves, 1995, Underperformance in long-run stock returns following seasoned equity offerings, Journal of Financial Economics, 38, 243-267.
- Wagner, Herbert and Mark Van De Voorde, 1995, Post-bankruptcy performance of new equity securities issued in exchange for pre-petition debt, Journal of Fixed Income, 49-59.
- Weiss, Lawrence A., 1990, Bankruptcy costs and violation of claims priority, Journal of Financial Economics, 27, 2, 285-314.
- White, H., 1980, A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity, Econometrica, 48, 817-838.



**Figure 2. Equally weighted average cumulative returns for 200 days following emergence from bankruptcy.** Sample firm returns are for an equally weighted portfolio of the sample firms with daily compounding. The NYSE/AMEX and NASDAQ matched returns are for the market model estimates of expected returns using these indices. The industry and size matched returns are for the firms that are in the same 2-digit SIC code as the sample firm and are the closest in size (i.e., equity capitalization).

**Table 1****Descriptive Statistics of Sample**

The emergence price is for the first trading day (event period 0) of the common stock upon emergence from Chapter 11. Time in Chapter 11 is the number of months the firm spent in bankruptcy. The estimates of  $\alpha$  and  $\beta$  are from the market model regression where the value weighted NASDAQ index is used to estimate the market returns. INSTSTK is the proportion of stock in the emerging firm that institutional investors own. BANKSTK is the proportion of stock in the emerging firm that banks own. The estimation periods for the market model parameters are shown in parentheses.

<b>Variable</b>	<b>Mean</b>	<b>Median</b>	<b>Standard Deviation</b>
Emergence Price	6.32	3.75	3.92
Time in Chapter 11	22.39	20.17	18.24
$\hat{\alpha}$ (2,274)	0.001	0.001	0.003
$\hat{\beta}$ (2,274)	0.531	0.547	0.657
$\hat{\alpha}$ (101,274)	0.0002	0.0002	0.006
$\hat{\beta}$ (101,274)	0.575	0.473	0.884
$\hat{\alpha}$ (201,274)	0.002	0.001	0.007
$\hat{\beta}$ (201,274)	0.464	0.516	1.506
INSTSTK	0.102	0	0.264
BANKSTK	0.122	0	0.224



**Table 2****Average Cumulative Abnormal Returns**

Average cumulative abnormal returns (ACARs) are computed for the sample of 131 firms emerging from Chapter 11 from 1980 through 1993. Event/Post-emergence day 0 is defined as the first trading day upon emergence from Chapter 11. The size and industry matched (SIM) sample is the sample of 131 matching firms that have the same 2-digit SIC code as the formerly bankrupt firms and are closest in size (e.g., equity capitalization). The market model adjusted returns are based on alpha and beta coefficients estimated in the (201, 274) interval. The ACAR and Median CAR are based on daily compounded returns. The Wealth Relative is the average of the daily compounded actual rate of return divided by the daily compounded expected rate of return. P-values are in parentheses.

	Matched			
<u>Event Period</u>	<u>Firm Sample</u>	<u>ACAR</u>	<u>Wealth Relative</u>	<u>Median CAR</u>
(1, 2)	SIM	0.027 (0.189)	1.027	0 (0.920)
(1, 200)	SIM	0.336 <sup>A</sup> (0.000)	1.350	0.094 <sup>A</sup> (0.002)
(1, 2)	Mkt. Model (NYSE/AMEX)	0.033 (0.112)	1.033	0.002 (0.112)
(1, 200)	Mkt. Model (NYSE/AMEX)	1.385 <sup>B</sup> (0.016)	2.384	0.072 <sup>A</sup> (0.009)
(1, 2)	Mkt. Model (NASDAQ)	0.033 (0.114)	1.033	0.003 (0.497)
(1, 200)	Mkt. Model (NASDAQ)	1.388 <sup>B</sup> (0.028)	2.387	0.051 <sup>B</sup> (0.013)

<sup>A</sup> Significantly different from zero at the 1-percent level.

<sup>B</sup> Significantly different from zero at the 5-percent level.

**Table 3****Abnormal Returns for Event/Post-Emergence Period (1, 2)  
Sorted by Initial Price, Time in Chapter 11 and Exchange**

This table shows the performance of 131 firms emerging from bankruptcy between 1980 and 1993 for the first 2 return days following emergence from bankruptcy (event/post-emergence days 1 through 2). The expected returns are estimated using matched firms that have the same 2-digit SIC code as the formerly bankrupt firms and are closest in size (e.g., equity capitalization). The time in Chapter 11 is expressed in terms of months. The ACAR and Median CAR are based on daily compounded returns.

Price	ACAR	Median CAR	Sample Size	Time in Ch. 11	ACAR	Median CAR
0.17-0.69	0.070	0	13	1.23-3.73	0.039	0.012
0.69-1.13	0.260	0.069	13	4.20-8.28	0.197	-0.026
1.13-1.63	-0.008	0	13	8.40-11.93	0.068	0
1.63-2.75	0.008	-0.007	13	12.03-15.5	-0.026	-0.002
2.75-3.75	-0.009	0	13	16.1-19.3	0.007	0.022
3.75-5.25	-0.014	-0.024	13	19.87-23.3	0.056	0.049
5.5-6.88	0.011	0.049	13	23.7-26.47	-0.031	-0.033
7.06-9.63	0.008	0	13	26.53-32.6	-0.027	-0.005
10-14	-0.033	-0.010	13	32.9-37.6	0.020	0.011
14.3-62.9	-0.024	-0.006	14	38.1-132.8	-0.028	0

Exchange	Sample Size	ACAR	Median CAR
AMEX	23	0.020	-0.007
NYSE	37	-0.017	-0.010
NASDAQ	71	0.056	0.006

**Table 4**

**Abnormal Returns for Event/Post-Emergence Period (1, 200)  
Sorted by Initial Price, Time in Chapter 11 and Exchange**

This table shows the performance of 131 firms emerging from bankruptcy between 1980 and 1993 for the first 200 return days following emergence from bankruptcy (event/post-emergence days 1 through 200). The expected returns are estimated using matched firms that have the same 2-digit SIC code as the formerly bankrupt firms and are closest in size (e.g., equity capitalization). The time in Chapter 11 is expressed in terms of months. The ACAR and Median CAR are based on daily compounded returns.

Price	ACAR	Median CAR	Sample Size	Time in Ch. 11	ACAR	Median CAR
0.17-0.69	0.498	0.800	13	1.23-3.73	0.363	0.342
0.69-1.13	0.985	0.925	13	4.20-8.28	0.759	-0.055
1.13-1.63	-0.079	-0.428	13	8.40-11.93	0.206	0.021
1.63-2.75	0.231	0.125	13	12.03-15.5	0.278	-0.099
2.75-3.75	0.262	0.073	13	16.1-19.3	0.241	0.028
3.75-5.25	0.082	-0.038	13	19.87-23.3	0.152	0.136
5.5-6.88	0.509	0.094	13	23.7-26.47	0.194	-0.038
7.06-9.63	0.592	0.380	13	26.53-32.6	0.322	0.133
10-14	0.199	-0.118	13	32.9-37.6	0.552	0.667
14.3-62.9	0.002	-0.013	14	38.1-132.8	0.343	0.113

Exchange	Sample Size	ACAR	Median CAR
AMEX	23	0.452	0.133
NYSE	37	0.431	0.277
NASDAQ	71	0.257	0.028

Table 5

Price-Unbiasedness and Generalized Price-Unbiasedness Test Results With Full Sample

Regression estimates of the models,

$$[\prod_{t=1}^T(1 + R_{it}) - 1] = \beta_0 + \beta_1[\prod_{t=1}^T(1 + E(R_{it})) - 1] + e_i \quad (1)$$

$$[\prod_{t=1}^T(1 + R_{it}) - 1] = \beta_0 + \beta_1[\prod_{t=1}^T(1 + E(R_{it})) - 1] + \beta_2 P_{i0} + \beta_3 CONT_i + \beta_4 TIME_i + \beta_5 CHEXCH_i + \beta_6 CONTIME_i + \epsilon_i \quad (2)$$

where  $R_{it}$  = actual rate of return for security  $i$  on day  $t$ ,  $E(R_{it})$  = expected rate of return for security  $i$  on day  $t$ ,  $T$  = number of days in the event/post-emergence period,  $P_{i0}$  = price of security  $i$  at the close of the first trading day upon emergence from Chapter 11 (event/post-emergence period 0),  $TIME_i$  = number of months firm  $i$  spent in Chapter 11,  $CHEXCH_i$  = dummy variable equal to 1 if firm changed exchange from before Chapter 11 filing to emergence from Chapter 11, zero otherwise,  $CONT_i$  = dummy variable equal to 1 if firm traded continuously throughout Chapter 11, zero otherwise,  $CONTIME_i = CONT_i * (1/TIME_i)$ . The p-values (corrected for heteroskedascity using White's (1980) method) of the coefficient estimates and F-statistics are shown in parentheses.

Post Emergence Periods

	(1, 2)	(1, 2)	(1, 200)	(1, 200)
Coef. Est.	A	B	C	D
$\beta_0$	0.030 (0.140)	0.106 <sup>B</sup> (0.017)	0.174 <sup>A</sup> (0.005)	0.478 (0.135)
$\beta_1$	0.146 <sup>D</sup> (0.000)	0.203 (0.293)	0.205 <sup>D</sup> (0.000)	0.210 <sup>E</sup> (0.096)
$\beta_2$		-0.003 <sup>C</sup> (0.081)		-0.010 (0.147)
$\beta_3$		-0.059 (0.267)		-0.194 (0.190)
$\beta_4$		-0.002 <sup>B</sup> (0.030)		-0.001 (0.781)
$\beta_5$		0.050 (0.298)		-0.204 (0.519)
$\beta_6$		-0.181 (0.125)		0.356 (0.466)
F-Test	3.559 <sup>A</sup> (0.000)	2.324 <sup>A</sup> (0.001)	61.114 <sup>A</sup> (0.000)	17.955 <sup>A</sup> (0.000)
$\bar{R}^2$	-0.007	0.024	0.052	0.048

<sup>A</sup>Significantly different from zero at the 1 percent level.

<sup>B</sup>Significantly different from zero at the 5 percent level.

<sup>C</sup>Significantly different from zero at the 10 percent level.

<sup>D</sup>Significantly different from unity at the 1 percent level.

<sup>E</sup>Significantly different from unity at the 10 percent level.

**Table 6**

**Generalized Price-Unbiasedness Test Results With Subsample**

Regression estimates of the model,

$$\prod_{t=1}^T (1+R_{it}) - 1 = \beta_0 + \beta_1 [\prod_{t=1}^T (1+E(R_{it})) - 1] + \beta_2 P_{i0} + \beta_3 CONT_i + \beta_4 TIME_i + \beta_5 CHEXCH_i + \beta_6 CONTIME_i + \beta_7 MGTCH_i + \epsilon$$

where  $R_{it}$  = actual rate of return for security  $i$  on day  $t$ ,  $E(R_{it})$  = expected rate of return for security  $i$  on day  $t$ ,  $T$  = number of days in the event/post-emergence period,  $P_{i0}$  = price of security  $i$  at the close of the first trading day upon emergence from Chapter 11 (event period 0),  $TIME_i$  = number of months firm  $i$  spent in Chapter 11,  $CHEXCH_i$  = dummy variable equal to 1 if firm changed exchange from before Chapter 11 filing to emergence from Chapter 11, zero otherwise,  $CONT_i$  = dummy variable equal to 1 if firm traded continuously throughout Chapter 11, zero otherwise,  $MGTCH_i$  = dummy variable equal to 1 if there is a management change, zero otherwise,  $CONTIME_i = CONT_i * (1/TIME_i)$ . In Panels A and B, the management change is measured around the Chapter 11 filing date; Panels C and D measures the change around the confirmation date of a plan of reorganization; measurement of a change in management around the emergence date is shown in Panels E and F. The p-values (corrected for heteroskedascity using White's (1980) method) of the coefficient estimates and F-statistics are shown in parentheses.

**Post-Emergence Periods**

	(1, 2)	(1, 200)	(1, 2)	(1, 200)	(1, 2)	(1, 200)
Coef. Est.	A	B	C	D	E	F
$\beta_0$	0.066 (0.467)	0.909 <sup>C</sup> (0.060)	0.126 (0.208)	0.736 (0.148)	0.161 <sup>B</sup> (0.034)	0.706 (0.112)
$\beta_1$	-0.058 (0.918)	0.530 <sup>D</sup> (0.086)	-0.111 (0.843)	0.528 <sup>D</sup> (0.087)	-0.057 (0.920)	0.543 <sup>D</sup> (0.071)
$\beta_2$	-0.004 (0.294)	-0.015 (0.243)	-0.004 (0.234)	-0.014 (0.302)	-0.005 (0.192)	-0.015 (0.284)
$\beta_3$	-0.129 <sup>C</sup> (0.066)	-0.499 <sup>B</sup> (0.016)	-0.127 <sup>C</sup> (0.073)	-0.506 <sup>B</sup> (0.018)	-0.126 <sup>B</sup> (0.068)	-0.486 <sup>B</sup> (0.018)
$\beta_4$	-0.002 (0.137)	0.005 (0.293)	-0.002 (0.208)	0.004 (0.264)	-0.003 <sup>C</sup> (0.100)	0.004 (0.311)
$\beta_5$	0.080 (0.281)	-0.337 (0.418)	0.061 (0.418)	-0.275 (0.486)	0.071 (0.325)	-0.248 (0.533)
$\beta_6$	-0.211 (0.415)	-0.031 (0.952)	-0.265 (0.344)	-0.185 (0.703)	-0.340 (0.198)	0.145 (0.773)
$\beta_7$	0.084 (0.174)	-0.258 (0.139)	0.049 (0.535)	-0.167 (0.425)	-0.033 (0.652)	-0.369 <sup>C</sup> (0.066)
F-Test	1.778 (0.284)	3.248 <sup>A</sup> (0.003)	1.456 <sup>C</sup> (0.065)	3.187 <sup>A</sup> (0.004)	1.406 (0.236)	3.383 <sup>A</sup> (0.002)
$\bar{R}^2$	0.046	0.202	0.038	0.198	0.033	0.212

<sup>A</sup>Significantly different from zero at the 1 percent level. <sup>B</sup>Significantly different from zero at the 5 percent level.

<sup>C</sup>Significantly different from zero at the 10 percent level. <sup>D</sup>Significantly different from unity at the 10 percent level.

Table 7

## Generalized Price-Unbiasedness Test Results With Subsample of Payoffs

Regression estimates of the model\*,

$$\begin{aligned} [\prod_{t=1}^T (1+R_{it}) - 1] = & \beta_0 + \beta_1 [\prod_{t=1}^T (1+E(R_{it})) - 1] + \beta_2 P_{i0} + \beta_3 CONT_i + \beta_4 TIME_i + \beta_5 CHEX_i + \beta_6 CONTIME_i \\ & + \beta_7 INSTSTK_i + \beta_8 INSTDEBT_i + \beta_9 INSTCASH_i + \beta_{10} BANKSTK_i + \beta_{11} BANKDEBT_i + \beta_{12} BANKCASH_i + \epsilon_i \quad (2) \end{aligned}$$

## Post-Emergence Periods

	(1, 2)	(1, 2)	(1, 200)	(1, 200)
Coef. Est.	A	B	C	D
$\beta_0$	0.112 (0.181)	0.118 (0.170)	1.326 (0.174)	1.163 (0.222)
$\beta_1$	-0.332 <sup>c</sup> (0.084)	-0.283 (0.128)	0.461 <sup>c</sup> (0.054)	0.478 <sup>c</sup> (0.063)
$\beta_2$	-0.007 (0.131)	-0.007 (0.128)	-0.037 (0.216)	-0.033 (0.269)
$\beta_3$	-0.127 <sup>c</sup> (0.057)	-0.117 (0.126)	-0.524 <sup>b</sup> (0.048)	-0.744 <sup>a</sup> (0.009)
$\beta_4$	0.00003 (0.856)	0.00009 (0.954)	0.009 (0.162)	0.013 <sup>c</sup> (0.069)
$\beta_5$	0.030 (0.553)	0.034 (0.535)	-0.591 (0.408)	-0.636 (0.372)
$\beta_6$		-0.091 (0.643)		2.059 <sup>c</sup> (0.091)
$\beta_7$	0.240 (0.212)	0.234 (0.228)	0.845 <sup>a</sup> (0.008)	0.961 <sup>a</sup> (0.003)
$\beta_8$	-0.029 (0.711)	-0.023 (0.775)	-0.239 (0.572)	-0.387 (0.359)
$\beta_9$	0.031 (0.660)	0.027 (0.694)	0.252 (0.627)	0.367 (0.460)
$\beta_{10}$	0.047 (0.619)	0.035 (0.756)	-0.122 (0.827)	0.106 (0.855)
$\beta_{11}$	-0.028 (0.655)	-0.033 (0.621)	-0.044 (0.829)	0.048 (0.815)
$\beta_{12}$	-0.023 (0.708)	-0.021 (0.745)	-0.322 <sup>c</sup> (0.096)	-0.372 <sup>b</sup> (0.050)
F-Test	0.890 (0.370)	0.807 (0.189)	2.049 <sup>b</sup> (0.046)	2.039 <sup>a</sup> (0.000)
$\bar{R}^2$	-0.042	-0.068	0.118	0.130

<sup>a</sup>Significantly different from zero at the 1 percent level. <sup>b</sup>Significantly different from zero at the 5 percent level.

<sup>c</sup>Significantly different from zero at the 10 percent level. <sup>d</sup>Significantly different from unity at the 1 percent level.

\*where  $R_{it}$  = actual rate of return for security  $i$  on day  $t$ ,  $E(R_{it})$  = expected rate of return for security  $i$  on day  $t$ ,  $T$  = number of days in the event/post-emergence period,  $P_{i0}$  = price of security  $i$  at the close of the first trading day upon emergence from Chapter 11 (event period 0),  $TIME_i$  = number of months firm  $i$  spent in Chapter 11,  $CHEXCH_i$  = dummy variable equal to 1 if firm changed exchange from before Chapter 11 filing to emergence from Chapter 11, zero otherwise,  $CONT_i$  = dummy variable equal to 1 if firm traded continuously throughout Chapter 11, zero otherwise,  $INSTSTK_i$  = proportion of stock in the emerging firm that institutional investors own,  $INSTDEBT_i$  = dummy variable = 1 if institutional investors accept any debt as compensation for their claims on the formerly bankrupt firm, zero otherwise,  $INSTCASH_i$  = dummy variable = 1 if institutional investors receive any cash as compensation for their claims on the formerly bankrupt firm, zero otherwise,  $BANKSTK_i$  = proportion of stock in the emerging firm that banks own,  $BANKDEBT_i$  = dummy variable = 1 if banks accept any debt as compensation for their claims on the formerly bankrupt firm, zero otherwise,  $BANKCASH_i$  = dummy variable = 1 if banks receive any cash as compensation for their claims on the formerly bankrupt firm, zero otherwise. The p-values (corrected for heteroskedascity using White's (1980) method) of the coefficient estimates and F-statistics are shown in parentheses.