**Testing the Trade-Off Theory of Capital Structure.**

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Executive Summary

We test the trade-off theory of capital structure in a setting in which a crisis suddenly changes the probability of bankruptcy. In this setting, the trade-off theory of capital structure predicts that the optimum level of capital structure would shift to a lower level of debt, and thus would lead to a negative market reaction for a firm at its optimum level of debt. Because the optimum level of debt is unobservable, we predict that the level of debt affects the market reaction. In other words, we predict that firms with higher level of debt will experience greater negative stock returns.

We also predict greater negative stock returns for firms with lower capacity to service debt. We use stock price declines after the terrorist attacks of 2001 to test this prediction. Our sample consists of 2,137 U.S. manufacturing firms. For our analysis, we use both portfolio and individual cumulative abnormal returns for three days after the terrorist attacks. Findings of the study support our predictions: firms with high level of debt (especially long-term debt) and a lower capacity to service debt experienced greater negative abnormal returns in the three days after the terrorist attacks.

1. Introduction

There are two main sources of financing for a business: debt and equity. The choice of debt and equity (the capital structure decision) is one of the most important financial policy decisions, and one of the most researched topics in finance. Because owners of a business need to contribute some equity, the decision narrows down to the amount of debt.

The prevalent range of debt in business is between zero and (nearly) one hundred percent. The range varies with industries, but also varies within an industry, indicating that there is no universal rule for determining the right level of debt. The choice of capital structure is important because it has an impact on the value of the firm. While it is evident that the level of debt affects the value of the firm, it is not clear at what level of debt the value of the firm is highest.

Modigliani and Miller (1963) theorize the relation between financial leverage and stock returns. Their proposition (referred to as the MM II proposition) states that an increase in financial leverage (debt) will lead to an increase in the value of the firm because of debt advantages such as tax shield. A popular graphical presentation of this theory follows:

In Exhibit 1, [V.sub.L] is the value of a levered firm (firm with debt), [V.sub.U] is the value of an unlevered firm (firm with no debt), and TD is tax shield because of debt.

[GRAPHIC OMITTED]

The MM II proposition suggests a linear relation between leverage and firm value, but we do not observe many (nearly) 100 percent debt-financed businesses. This disagreement of prediction and real experience led to the evolution of the trade-off theory. The tradeoff theory argues for an optimal level of debt where marginal benefit of adding debt is equal to the marginal cost of bankruptcy risk. Restated, an increase of debt until this optimum level increases the value, but any increase after that is value destroying. A popular graphical presentation of this theory is:

In Exhibit 2, the value of the firm rises and then falls as the level of debt is increased. The point at which the value is maximized is the optimum level of debt.

[GRAPHIC OMITTED]

The bankruptcy-related cost depends on two things: the probability of bankruptcy, and the bankruptcy-related costs. A higher probability of bankruptcy should lower the level of debt [Harris and Raviv (1991), Frank and Goyal (2003)]. Our study tests this prediction of the trade-off theory in a setting in which a crisis suddenly changes the probability of bankruptcy. A sudden increase in bankruptcy cost will shift the optimum level downward [Bradley, Jarrell and Kim (1984)], and thus would lead to a negative market reaction for a firm at an optimum level of debt. Because the optimum level is unobservable (Zhao and Susmel, 2008), we predict that the level of debt affects the market reaction. Thus, our primary empirical prediction is that high-debt firms should suffer a more negative market reaction to the crisis than low-debt firms.

This study adopts an event study design to test this prediction of the trade-off theory. First, we calculate the abnormal returns of manufacturing firms after the September 11, 2001 terrorist attacks. Second, we compare the returns of low-debt firms and high-debt firms. Finally, we compare returns of firms with low times-interest-earned ratio with firms with high times-interest-earned ratios. Times-interest-earned is a measure of the capacity of a firm to meet its debt obligations.

The 2001 terrorist attacks were tragic events that led to a significant decline in the stock market. The event changed risk levels from every possible perspective: social, economic, and geo-political. It is reasonable to assume that this event led to an increase in the probability of financial distress for our sample firms. In case of an increase in distress probability, the trade-off theory predicts that the optimum level of debt will shift to a lower level of debt. We predict that high-debt firms and firms with lower capacity to service debt suffered a bigger decline in stock prices in reaction to the terrorist attacks.

Our findings support this prediction. We find that high-debt firms (especially those with high levels of long-term debt) have a greater negative abnormal stock returns after the terrorist attacks. We also find that firms with higher times-interest-earned ratios (indicating higher debt servicing capacity) suffered lower stock price declines than firms with lower times-interest-earned ratio.

This study contributes to the body of knowledge by providing a new test of a widely held theory on a very important topic in finance. The research setting allows for a clean test of predictions of the trade-off theory and provides strong results favoring its predictions. The findings of this study are important for managers as they determine capital structure, especially in times where there is higher uncertainty and distress probabilities. Thus, we believe our findings are particularly important in this period of great financial instability.

The rest of paper is organized as follows: Section 2 presents a literature review; Section 3 develops our hypotheses; Section 4 describes data and methodology; Section 5 provides a discussion of results, and Section 6 presents the conclusion.

2. Literature Review

The seminal article on capital structure is Modigliani and Miller (1958, hereafter MM). They argue that in absence of a few (but strong) assumptions, capital structure does not affect the firm value. Numerous studies followed this paper, and many theories have evolved as an outcome of relaxing one or more of MM assumptions. While there are several theories on the topic, finance textbooks highlight two theories: the trade-off theory and the pecking order theory. In a horse race, the trade-off theory has more supportive empirical evidence. In this section, we present a brief review of literature focusing on tradeoff theory, and a brief description of the other main theory.

The trade-off theory evolved as a result of relaxing the 'no tax' and 'no bankruptcy costs' assumption in MM. Debt provides a tax shield, but increases the risk of bankruptcy. Tax shield and bankruptcy risk both increase with the level of debt. Bankruptcy costs depend on two sources: probability of bankruptcy and costs related to actual bankruptcy. The trade-off theory predicts that the value of a levered firm is equal to the value of an unlevered firm plus the net of leverage cost and benefits. In addition, firm value is maximum at the point at which marginal benefit of leverage is equal to the marginal cost of leverage; the optimal level of debt.

An incomplete list of studies that contributed to the development of this theory include DeAngelo and Masulis (1980), Bradley, Jarrell and Kim (1984), and Myers (2003). For a survey of this literature, refer to Harris and Raviv (1991) and Hart (1995). Graham and Harvey (2001) in a survey of CFO's find evidence of a target debt ratio for most firms. However, there are empirical studies that challenge predictions of the trade-off theory. For example, Graham (2000) argue that tax savings are much bigger than bankruptcy costs, and Fama and French (2002) find evidence contrary to the prediction that more profitable firms are more levered.

The dynamic trade-off theory is an important spin-off of the trade-off theory. It predicts that firms will actively make changes to remain close to the target debt ratio predicted by the trade-off theory. Hovakimian, Opler and Titman (2001) argue that leverage deficit can be used to predict capital raising, Flannery and Rangan (2006) find evidence that firms tend to return to target debt ratio when shocked away, and Kayhan and Titman (2007)] find that stock price changes and financial deficits explain capital structure changes.

The pecking order theory is the other dominant theory on capital structure. Myers (1984) and Myers and Majluf (1984) contradict the trade-off theory by arguing that information asymmetry between managers and outside investors produces a "pecking-order" of capital financing. Managers, who know more, use internal funds first, followed by debt, and use equity only as the last resort. Findings in support of the pecking-order theory include Shyam-Sunder and Myers (1999) and Frank and Goyal (2003), and studies arguing against the theory include Chirinko and Singha (2000).

3. Hypotheses

Our primary objective is to study the effect of a sudden increase in the probability of bankruptcy on stock returns of firms with different levels of debt. A crisis that increases the bankruptcy probability should hurt high-debt firms more than low-debt firms. Restated, firms with higher debt would experience higher negative stock returns in a crisis. Thus, our first hypothesis is:

[H.sub.0] (1): The stock market reaction to the September 11, 2001 terrorist attacks is more pronounced (negative) for high-debt firms than for low-debt firms.

Acceptance of [H.sub.0] (1) supports the prediction that an increase in the probability of bankruptcy leads to a lower optimum level of debt and value declines for firms with high levels of debt. We use three different debt ratios to test this relation:

\* Table 2 uses two portfolios of firms sorted based on total debt/total assets ratio. Total debt is the sum of short-term debt (compustat # 34) and long-term debt (compustat # 9) less cash and cash equivalents (compustat # 1).

\* Table 3 uses two portfolios of firms sorted based on short-term debt/total assets ratio. Short-term debt is short-term debt (compustat # 34) less cash and cash equivalents (compustat # 1).

\* Table 4 uses two portfolios of firms sorted based on long-term debt/total assets ratio. Long-term debt is long-term debt (compustat # 9) less cash and cash equivalents (compustat # 1.)

If high-debt firms suffer more in a crisis, the relation should also manifest itself in a firm's capacity to service debt. Thus, our second hypothesis is:

[H.sub.0] (2): The stock market reaction to the September 11, 2001 terrorist attacks is more pronounced (negative) for low times-interest-earned ratio firms than for high times-interest-earned ratio firms.

Acceptance of [H.sub.0] (2) implies that a higher debt servicing capacity leads to a lower negative stock market reaction when a crisis suddenly increases the probability of bankruptcy. To examine this relation. Table 5 uses two portfolios sorted based on the times-interest-ratio. We define the times-interest-earned ratio as operating income before depreciation (compustat # 13) divided by interest expense (compustat # 15).

4. Data and Methodology

a. Data

We use a sample of U.S. manufacturing firms (SIC code 2000-3999). We obtain accounting information from Compustat database and stock returns from the Center for Research in Securities Prices (CRSP) database. We exclude firms that have an asset size of less than $10 million and firms that did not have required variables for the financial year 2000.

Table 1 reports descriptive statistics for our 2137 sample firms. The mean (median) asset size is $3068.74 ($251.49) million. The mean (median) market-to-book ratio is 2.92 (1.72) times. The mean (median) total debt / total assets ratio is 0.08 (0.15). The mean (median) short-term debt/total assets ratio is -0.11 (-0.02). The negative numbers are a result of deducting cash holdings from debt levels in calculating all ratios. The mean (median) long-term debt / total assets ratio is 0.01 (0.05). The mean (median) times-interest-earned ratio is -10.47 (4.86). A negative number for the times-interest-earned ratio indicates a loss-making firm. The mean (median) three-day cumulative abnormal return (CAR) is -2.57% (-3.02%). This indicates a strong negative market reaction to the event.

b. Methodology

In a research design where the event date is common for all sample firms, the standard market model is not suitable for the calculation of abnormal returns. The market model assumes independence of errors, but a common event date can lead to cross-correlation in errors. Since Schipper and Thompson (1983), it has been common practice to use a multivariate regression model to calculate the abnormal returns around important dates in this setting.

We follow the extant literature [for example, Johnson, Kasznik, and Nelson (2000) and Howe and Jain (2004)] and employ a multivariate regression method using portfolio returns to calculate abnormal returns. The regression equation is:

[R.sub.pt] = [[alpha].sub.p] + [[beta].sub.p] [R.sub.mt] + [[gamma].sub.p] [D.sub.t] + [[epsilon].sub.pt] (1)

where [R.sub.pt] is the daily return from January 2, 2001 to Dec 31, 2001 on a portfolio of US manufacturing firms. [R.sub.mt] is the CRSP value-weighted index, and [D.sub.t] is equal to 1/3 for each day in the three-day window and zero otherwise. Thus, [[gamma].sub.p] represents the cumulative abnormal return (CAR) for the three-day window.

Panel A in Table 2 - Table 5 reports results using portfolios created using equal weights (hereafter, referred as equally weighted portfolios) for each firm.

Panel B in Table 2 - Table 5 reports results using portfolios created using weights calculated in two steps.

First, we run Equation (1) for each firm and obtain residuals. Second, we use the inverse of the variance of these residuals as weights to create the portfolio. This weighting process asymptotically controls for cross-sectional heteroscedasticity (Thompson, 1985). We refer to these as "variance-weighted" portfolios. We use heteroscedasticity and autocorrelation consistent standard errors (Newey-West, 1987) in testing for statistical significance.

As a robustness check, we also calculate individual cumulative-abnormal-returns (CARs) and perform a multivariate analysis. The regression equation to calculate individual (not portfolio) CARs is:

[R.sub.it] = [alpha] \_ [[beta].sub.i][R.sub.mt] + [[gamma].sub.i][D.sub.t] + [[epsilon].sub.it] (2)

where [R.sub.it] is the daily return from January 2, 2001 to Dec 31, 2001 of an individual firm. [R.sub.mt] is the CRSP value-weighted index, and [D.sub.t] is equal to 1/3 for each day in the three-day window and zero otherwise. Thus, [[gamma].sub.i] represents the cumulative abnormal return (CAR) for the three-day window for an individual firm.

We use individual CARs (%) as the dependent variable and debt-related variables (three measures for the level of debt and one measure of capacity to service the debt) as explanatory variables in four separate models. We include two firm-level control variables, firm size and market-to-book ratio. Table 6 reports results of this multivariate analysis.

We use robust standard errors in testing for statistical significance.

5. Discussion of Results

We present our empirical results in five tables. Table 2 -table 5 report results using portfolio returns, and Table 6 reports results of a multivariate analysis. In Table 2 - Table 5, we divide our sample firms in two parts: firms with the lower subject ratio and firms with higher subject ratio. Panel A reports results of an equally weighted portfolio, and panel B reports results of variance-weighted portfolios. We report the number of days used in the regression, the coefficient on the market index, and the coefficient on the event dummy. The coefficient on the event dummy captures the abnormal stock market return for the three-day window after the terrorist attacks.

Table 2 reports results using the total debt/total assets ratio:

\* For equally weighted portfolios, the coefficient on event dummy for low-debt firms is -0.014 and the coefficient on event dummy for high-debt firms is -0.042. The low-debt firm coefficient is not significant at the 10 percent level, and the high-debt firm is statistically significant at the one percent level.

\* For variance-weighted portfolios, the coefficient on the event dummy for low-debt firms is -0.023 and the coefficient on the event dummy for high-debt firms is -0.024. Both are significant at the one percent level.

\* The equally weighted portfolio results show a clear higher negative market reaction for high-debt firms; in the case of the variance-weighted portfolios, results are not as clear.

\* Overall, these results indicate a discriminating market reaction based on debt level. Because debt maturity can have an effect, in the next two tables we look at the level of short-term debt and long-term debt separately.

Table 3 reports results using the short-term debt/total assets ratio:

\* For equally-weighted portfolios, the coefficient on the event dummy for low-debt firms is -0.015 and the coefficient on the event dummy for high-debt firms is -0.041. The low-debt firm coefficient is significant at the ten percent level, and the high-debt firm is statistically significant at the one percent level.

\* For variance-weighted portfolios, the coefficient on the event dummy for low-debt firms is -0.022 and the coefficient on the event dummy for high-debt firms is -0.024. Both are significant at the one percent level.

\* Again, equally weighted portfolio returns indicate a greater negative market reaction for firms with high level of short-term debt. Returns for variance-weighted portfolios are not different for the two groups of firms.

Table 4 reports results using the long-term debt/total assets ratio:

\* For equally-weighted portfolios, the coefficient on event dummy for low-debt firms is -0.012 and the coefficient on event dummy for high-debt firms is -0.045. The low-debt firm coefficient is not statistically significant, and the high-debt firm coefficient is statistically significant at the one percent level.

\* For variance-weighted portfolios, the coefficient on the event dummy for low-debt firms is -0.020 and the coefficient on event dummy for high-debt firms is -0.025. Both are significant at the one percent level. These results suggest a much clearer discrimination on the part of the market based on long-term debt level.

Results reported in Table 2 to Table 4 indicate that market reaction was more negative for high-debt firms, and that the effect is accentuated for high levels of long-term debt. These results support the first hypothesis.

We report results of the test of our second hypothesis in Table 5, i.e., the effect of the capacity to service debt on the market reaction. Table 5 uses two portfolios of firms sorted on times-interest-earned ratio. The ratio is operating income before depreciation divided by interest expense. A lower ratio indicates a lower capacity to service debt. In a crisis, firms with a lower capacity to service debt should suffer more. The results support this prediction and thus support our second hypothesis that the ability to service debt does affect stock market reaction.

For equally-weighted portfolios, the coefficient on the event dummy for low times-interest-earned firms is -0.032 and the coefficient on event dummy for high times-interest-earned firms is -0.024. Both coefficients are significant at the one percent level. For variance-weighted portfolios, the coefficient on event dummy for low times-interest-earned firms is -0.034 and the coefficient on event dummy for high times-interest-earned firms is -0.020. Both are significant at the one percent level. These results clearly indicate a greater negative market reaction for low times-interest-earned firms, thus supporting the second hypothesis.

Finally, Table 6 reports results of a multivariate analysis using individual CARs (%) as the dependent variable and debt level (or capacity to service debt) as the explanatory variable. Firm-level control variables are firm size and the market-to-book ratio.

Model 1 uses the total debt / total assets ratio, and the coefficient is -2.376, significant at the one percent level. This result indicates a strong negative relation between market reaction and the total debt level. Restated, a higher debt level is associated with a lower (or more negative) CAR.

Model 2 uses short-term debt / total assets ratio, and the coefficient is -1.819. The coefficient is not significant at the 10 percent level. This result indicates that there is no relation between market reaction and the short-term debt level.

Model 3 uses long-term debt/total assets ratio, and the coefficient is -2.801. The coefficient is significant at the one percent level. This result indicates a negative relation between market reaction and the long-term debt level. Overall, the results indicate a stronger negative market reaction for high long-term debt level firms, and are supportive of our first hypothesis.

Model 4 uses times-interest-earned ratio, and the coefficient is 0.001. The coefficient is significant at the five percent level. This result indicates that there is a positive relation between market reaction and the capacity to service debt. In other words, a higher times-interest-earned ratio (or capacity to serve debt) means a more positive (or less negative) market reaction. This result is supportive of our second hypothesis.

To conclude, these empirical results indicate that firms with higher long-term debt and a lower capacity to service debt suffered a more negative stock market reaction after the terrorist attacks.

6. Conclusion

The 2001 terrorist attacks had a significant effect, especially an adverse economic effect that led to a steep decline in the stock prices. Thus, the probability of financial distress increased for businesses. We use this setting to test prediction of an important theory related to an important financial decision: the trade-off theory of capital structure. This theory predicts that the value of the firm is highest at the level of debt where the marginal benefit of tax shield equals the marginal cost of bankruptcy. An increase in bankruptcy risk will shift this optimum point to a lower level of debt. Thus, firms with higher level of debt will suffer a greater decline in their values.

We find that high-debt (especially high long-term debt) firms and firms with a lower capacity to service debt experienced higher negative abnormal returns in the days after terrorist attacks. This finding supports the trade-off theory and contributes to our understanding of an important financial decision, especially when there is higher distress risk.

Table 1

Descriptive Statistics

This table reports descriptive statistics for variables used in our analysis. A total of 2137 firms are included in the sample. Total debt is the sum of short-term debt (compustat # 34) and long-term debt (compustat # 9) less cash and cash equivalents (compustat # 1). Short-term debt is calculated as short-term debt (compustat # 34) less cash and cash equivalents (compustat # 1). Long-term debt is calculated as long-term debt (compustat # 9) less cash and cash equivalents (compustat # 1). The times-interest-earned ratio is operating income before depreciation (compustat # 13) divided by interest expense (compustat # 15). The three-day Cumulative Abnormal return is calculated for a three-day window after the terrorist attacks of September 11, 2001. The abnormal returns are calculated using the following regression:

[R.sub.it] = [[alpha].sub.p] + [[beta].sub.i] [R.sub.mt] + [[gamma].sub.i] [D.sub.t] + [[epsilon].sub.it] (2)

where [R.sub.it] is the daily return from January 2, 2001 to Dec 31, 2001 for an individual firm. [R.sub.mt] is the CRSP value-weighted index, and [D.sub.t] is equal to 1/3 for each day in the three-day window and zero otherwise. Thus, [[gamma].sub.i] represents the cumulative abnormal return (CAR) for the three-day window.

Variable N Mean 25th Median 75th   
 percentile percentile   
   
 Asset Size ($ 2137 3068.74 67.77 251.49 1161.35   
 million)   
   
 MB ratio 2137 2.92 0.83 1.72 3.47   
   
 Total debt/Total 2137 0.08 -0.13 0.15 0.33   
 assets   
   
 Short-term debt/Total 2137 -0.11 -0.21 -0.02 0.04   
 assets   
   
 Long-term debt /Total 2137 0.01 -0.16 0.05 0.24   
 Assets   
   
 Times-Interest-Earned 2137 -10.47 1.21 4.86 12.53   
 ratio   
   
 Three-day Cumulative 2137 -2.57 -8.41 -3.02 1.29   
 Abnormal Return (%)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Table 2 Stock Returns and Total Debt  This table reports abnormal return for a three-day window after the terrorist attacks of September 11, 2001. The abnormal returns are calculated using the following regression:  [R.sub.pt] = [[alpha].sub.p] +[[beta].sub.p] [R.sub.mt]+[[gamma].sub.p] [D.sub.t] + [[epsilon].sub.pt] (1)  where [R.sub.pt] is the daily return from January 2, 2001 to Dec 31, 2001 on a portfolio of manufacturing firms in the bottom half and top half based on total debt/total assets ratio. [R.sub.mt] is the CRSP value-weighted index, and [D.sub.t] is equal to 1/3 for each day in the three-day window and zero otherwise. Thus, [[gamma].sub.p] represents the cumulative abnormal return (CAR) for the three-day window. Panel A reports results of an equally weighted portfolio. Panel B reports results of a portfolio with weights calculated in two steps. First, Equation (1) is run for each firm and residuals are obtained. Second, the inverse of the variance of these residuals is used as the weight to create the portfolio. P-values reported in the parenthesis are based on heteroscedasticity and autocorrelation consistent standard errors (Newey-West, 1987). \*, \*\* and \*\*\* denote significantly different from zero at 10%, 5% and 1%.  Panel A: Equally weighted portfolios     VARIABLE Three-day CAR (%) Three-day CAR (%)   Lowest 50% Total Highest 50% Total   Debt/Total Assets Debt/Total Assets     No. of days 248 248     CRSP Value-Weighted Index 1.050 \*\*\* 0.555 \*\*\*     (0.000) (0.000)     Event (9/17/2001 to -0.014 -0.042 \*\*\*   9/19/2001)     (0.122) (0.000)     F-statistic 401.07 \*\*\* 280.32 \*\*\*     (0.000) (0.000)     Panel B: Variance-weighted portfolios     VARIABLE Three-day CAR (%) Three-day CAR (%)   Lowest 50% Total Highest 50% Total   Debt/Total Assets Debt/Total Assets     No. of days 248 248     CRSP Value-Weighted Index 0.537 \*\*\* 0.298 \*\*\*     (0.000) (0.000)     Event (9/17/2001 to -0.023 \*\*\* -0.024 \*\*\*   9/19/2001)     (0.000) (0.000)     F-statistic 610.08 \*\*\* 277.64 \*\*\*     (0.000) (0.000)   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | Table 3 Stock Returns and Short -term Debt  This table reports abnormal return for a three-day window after the terrorist attacks of September 11, 2001. The abnormal returns are calculated using the following regression:  [R.sub.pt] = [[alpha].sub.p] +[[beta].sub.p] [R.sub.mt]+[[gamma].sub.p] [D.sub.t] + [[epsilon].sub.pt] (1)  where [R.sub.pt] is the daily return from January 2, 2001 to Dec 31, 2001 on a portfolio of manufacturing firms in the bottom half and top half based on short-term debt/total assets ratio. [R.sub.mt] is the CRSP value-weighted index, and [D.sub.t] is equal to 1/3 for each day in the three-day window and zero otherwise. Thus, [[gamma].sub.p] represents the cumulative abnormal return (CAR) for the three-day window. Panel A reports results of an equally weighted portfolio. Panel B reports results of a portfolio with weights calculated in two steps. First, Equation (1) is run for each firm and residuals are obtained. Second, the inverse of the variance of these residuals is used as the weight to create the portfolio. P-values reported in the parenthesis are based on heteroscedasticity and autocorrelation consistent standard errors (Newey-West, 1987). \*, \*\* and \*\*\* denote significantly different from zero at 10%, 5% and 1%.  Panel A: Equally weighted portfolios     VARIABLE Three-day CAR (%) Three-day CAR (%)   Lowest 50% Total Highest 50% Total   Debt/Total Assets Debt/Total Assets     No. of days 248 248     CRSP Value-Weighted Index 1.068 \*\*\* 0.538 \*\*\*     (0.000) (0.000)     Event (9/17/2001 to -0.015 \* -0.041 \*\*\*   9/19/2001)     (0.092) (0.000)     F-statistic 423.26 \*\*\* 284.67 \*\*\*     (0.000) (0.000)     Panel B: Variance-weighted portfolios     VARIABLE Three-day CAR (%) Three-day CAR (%)   Lowest 50% ST Debt/ Highest 50% ST Debt/   Total Assets Total Assets     No. of days 248 248     CRSP Value-Weighted Index 0.546 \*\*\* 0.291 \*\*\*     (0.000) (0.000)     Event (9/17/2001 to -0.022 \*\*\* -0.024 \*\*\*   9/19/2001)     (0.000) (0.000)     F-statistic 497.55 \*\*\* 249.39 \*\*\*     (0.000) (0.000)   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | Table 4 Stock Returns and Short-term Debt  This table reports abnormal return for a three-day window after the terrorist attacks of September 11, 2001. The abnormal returns are calculated using the following regression:  [R.sub.pt] = [[alpha].sub.p] +[[beta].sub.p] [R.sub.mt]+[[gamma].sub.p] [D.sub.t] + [[epsilon].sub.pt] (1)  where [R.sub.pt] is the daily return from January 2, 2001 to Dec 31, 2001 on a portfolio of manufacturing firms in the bottom half and top half based on long-term debt/total assets ratio. [R.sub.mt] is the CRSP value-weighted index, and [D.sub.t] is equal to 1/3 for each day in the three-day window and zero otherwise. Thus, [[gamma].sub.p] represents the cumulative abnormal return (CAR) for the three-day window. Panel A reports results of an equally weighted portfolio. Panel B reports results of a portfolio with weights calculated in two steps. First, Equation (1) is run for each firm and residuals are obtained. Second, the inverse of the variance of these residuals is used as the weight to create the portfolio. P-values reported in the parenthesis are based on heteroscedasticity and autocorrelation consistent standard errors (Newey-West, 1987). \*, \*\* and \*\*\* denote significantly different from zero at 10%, 5% and 1%.  Panel A: Equally weighted portfolios     VARIABLE Three-day CAR (%) Three-day CAR (%)   Lowest 50% Total Highest 50% Total   Debt/Total Assets Debt/Total Assets     No. of days 248 248     CRSP Value-Weighted Index 1.035 \*\*\* 0.537 \*\*\*     (0.000) (0.000)     Event (9/17/2001 to -0.012 -0.045 \*\*\*   9/19/2001)     (0.235) (0.000)     F-statistic 345.58 \*\*\* 487.21 \*\*\*     (0.000) (0.000)     Panel B: Variance-weighted portfolios     VARIABLE Three-day CAR (%) Three-day CAR (%)   Lowest 50% LT Debt/ Highest 50% LT Debt/   Total Assets Total Assets     No. of days 248 248     CRSP Value-Weighted Index 0.532 \*\*\* 0.306 \*\*\*     (0.000) (0.000)     Event (9/17/2001 to -0.020 \*\*\* -0.025 \*\*\*   9/19/2001)     (0.000) (0.000)     F-statistic 629.52 \*\*\* 322.16 \*\*\*     (0.000) (0.000)   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | Table 5 Stock Returns and Times-Interest-Earned  This table reports abnormal return for a three-day window after the terrorist attacks of September 11, 2001. The abnormal returns are calculated using the following regression:  [R.sub.pt] = [[alpha].sub.p] +[[beta].sub.p] [R.sub.mt]+[[gamma].sub.p] [D.sub.t] + [[epsilon].sub.pt] (1)  where [R.sub.pt] is the daily return from January 2, 2001 to Dec 31, 2001 on a portfolio of manufacturing firms in the bottom half and top half based on times-interest-earned ratio. [R.sub.mt] is the CRSP value-weighted index, and [D.sub.t] is equal to 1/3 for each day in the three-day window and zero otherwise. Thus, [[gamma].sub.p] represents the cumulative abnormal return (CAR) for the three-day window. Panel A reports results of an equally weighted portfolio. Panel B reports results of a portfolio with weights calculated in two steps. First, Equation (1) is run for each firm and residuals are obtained. Second, the inverse of the variance of these residuals is used as the weight to create the portfolio. P-values reported in the parenthesis are based on heteroscedasticity and autocorrelation consistent standard errors (Newey-West, 1987). \*, \*\* and \*\*\* denote significantly different from zero at 10%, 5% and 1%.  Panel A: Equally weighted portfolios     VARIABLE Three-day CAR (%) Three-day CAR (%)   Lowest 50% Total Highest 50% Total   Debt/Total Assets Debt/Total Assets     No. of days 248 248     CRSP Value-Weighted Index 0.786 \*\*\* 0.823 \*\*\*     (0.000) (0.000)     Event (9/17/2001 to -0.032 -0.024 \*\*\*   9/19/2001)     (0.000) (0.000)     F-statistic 185.39 \*\*\* 580.08 \*\*\*     (0.000) (0.000)     Panel B: Variance-weighted portfolios     VARIABLE Three-day CAR (%) Three-day CAR (%)   Lowest 50% Highest 50%   Times-Interest-Earned Times-Interest-Earned     No. of days 248 248     CRSP Value-Weighted 0.535 \*\*\* 0.334 \*\*\*   Index     (0.000) (0.000)     Event (9/17/2001 to -0.034 \*\*\* -0.020 \*\*\*   9/19/2001)     (0.000) (0.000)     F-statistic 1195.12 \*\*\* 979.72 \*\*\*     (0.000) (0.000)   |  |  |  | | --- | --- | --- | |  | Table 6 Multivariate Analysis  This table reports results of multivariate analysis using three-day cumulative abnormal returns (CAR) for a three-day window after the terrorist attacks of September 11, 2001, as the dependent variable. The explanatory variables include log of total assets, market-to-book ratio, and a measure of debt level. We use four models (Model 1 to Model 4) with four different measures to capture the effect of debt level: total debt/total assets, short-term debt / total assets, long-term debt/total assets, and times-interest-earned ratio. The three-day cumulative abnormal return for each firm is calculated using the following regression:  [R.sub.it] = [[alpha].sub.p] +[[beta].sub.j] [R.sub.mt]+[[gamma].sub.i] [D.sub.t] + [[epsilon].sub.it] (2)  where [R.sub.it] is the daily return from January 2, 2001 to Dec 31, 2001 on an individual firm. [R.sub.mt] is the CRSP value-weighted index, and [D.sub.t] is equal to 1/3 for each day in the three-day window and zero otherwise. Thus, [[gamma].sub.i] represents the cumulative abnormal return (CAR) for the three-day window. P-values reported in the parenthesis are based on robust standard errors. \*, \*\* and \*\*\* denote significantly different from zero at 10%, 5% and 1%. |  |   Model 1 Model 2 Model 3 Model 4   Dependent variable = Three-day CAR (%)     N 2137 2137 2137 2137     Total debt / Total -2.376 \*\*\*   assets   (0.005)     ST debt / Total -1.819   assets     (0.124)     LT debt / Total -2.801 \*\*\*   assets     (0.001)     Times-Interest-Earned 0.001 \*\*   Ratio     (0.025)     Log of Total assets -0.199 -0.264 \* -0.169 -0.319 \*\*     (0.171) (0.071) (0.242) (0.022)     MB Ratio 0.008 \*\* 0.009 \*\*\* 0.008 \*\* 0.010 \*\*     (0.025) (0.009) (0.028) (0.023)     Intercept -1.271 -1.276 -1.596 -0.754     (0.201) (0.235) (0.111) (0.441)     R-squared 0.0045 0.0026 0.0050 0.0020     F-Statistics 5.80 \*\*\* 4.27 \*\*\* 6.30 \*\*\* 4.66 \*\*\*     (0.0006) (0.0051) (0.0003) (0.0030)   |  |  | | --- | --- | |  | References Bradley, M., G. Jarrell, and E.H. Kim. 1984. 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