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HOW ENVIRONMENTAL LIABILITIES AFFECT FIRM VALUATION AND INVESTOR DECISIONS

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Abstract

This study examines the impact of environmental liabilities on the stock price and market value of a firm. The authors specifically investigate the effect of the designation of a company as a potentially responsible party (PRP) on the National Priority List (NPL) for the Superfund site. The study aims to determine if this designation generates more negative abnormal returns after listing the NPL, as it increases regulatory costs such as cleanup costs and disclosure requirements. The empirical results support the hypothesis that the market reacts negatively to the bad news that the firm has been designated as a PRP on the Superfund site.

The study provides investors with useful information about contingent environmental liabilities, allowing for more reliable investment decisions and better judgments on the firm's future performance. Moreover, the article highlights the significant potential liabilities of firms under the Superfund Act's provisions and the uncertainty and timing issues associated with accounting for environmental liabilities.

The article concludes that environmental liabilities have a substantial impact on firm value, and investors consider such information when making investment decisions. This study underscores the importance of monitoring and disclosing environmental liabilities to avoid negative market reactions and economic losses.

INTRODUCTION

Environmental liabilities have received substantial attention in recent times. The economic significance of liabilities and concerns about financial reporting has become more intense issue (Johnson, 1993; Naj, 1988). Concerns about contingent liabilities imposed by laws related to environmental protection, especially the Superfund Act, have been continuously increasing. The Financial Accounting Standards Board (FASB), the American Institute of Certified Public Accountants (AICPA), and the Securities and Exchange Commission

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(SEC) recognized the importance of environmental issues. However, the uncertainty and timing regarding the recognition of environmental liabilities cause problems in determining both the amount and the timing of the actual realization of the liability. As such, these uncertainty and timing questions may cause the market to view environmental liabilities differently from conventional corporate liabilities and to put different weights on them in assessing firm risk.

Results of previous studies on environmental disclosure indicate that environmental information is helpful for investment decisions (Freedman & Jaggi, 1986). Within the context of firms' valuation, Barth and McNichols (1994) found that EPA-based estimates of environmental liabilities are viewed as corporate liabilities. If the environmental liabilities of a firm constitute corporate liabilities, it is expected that these liabilities would affect the firm's market value and marketperceived risk.

The Superfund process begins with the discovery of a potentially hazardous site. The EPA makes a preliminary assessment of the site. The information acquired from the assessment and site inspections is used to evaluate the potential risks to public health and the environment through a "Hazardous Ranking System" (*EPA*, 1992). Contaminated sites are listed in the National Priority List (NPL) based on scores marked by the Hazardous Ranking System. During this process, potentially responsible parties (PRPs) are also identified. A list of PRPs for each site includes all present and prior owners and operators of the site, as well as generators of and transporters of hazardous waste. If the liability is not divisible and identifiable to specific parties, all parties become jointly and severally liable.

The NPL sites and the Superfund Act-related activity are readily available through public databases, such as the Record of Decision (ROD) and Consent Decrees issued by the EPA and the Site Enforcement Tracking System database by the National Technical Information Service.

This study examines the effect on the security returns of a company named on the National Priority List (NPL) for the Superfund site. Specifically, it investigates if the designation as a potentially responsible party (PRP) generates more negative abnormal returns after listing the NPL. Since this designation of firms as PRPs increase regulatory costs such as cleanup costs and disclosure requirements, a negative market reaction is expected. The empirical results support the hypotheses that the markets react negatively to the bad news that the firm has been designated as a PRP on the Superfund site. The findings of this study provide financial statement users with useful information about contingent environmental liabilities. By understanding the effect of a firm's listing on the NPL, investors should be able to make more reliable investment decisions. Results may also enable investors to make better judgments on the f irm's future performance.

Background of the Research

The Superfund Act and Environmental Liability

Companies are subject to potential liability for environmental cleanup under various federal, state, and local environmental laws and regulations. Environmental laws extend to the normal operations of businesses, the acquisition of businesses (including real estate), the timing of deductions, and allowing tax deductions. Management must assess two issues while preparing for audited financial statements: 1) whether environmental and potential liabilities are correctly reflected in the company's financial statements, and 2) whether these liabilities are reported in accordance with generally accepted accounting principles (GAAP). FASB Statement 5 and AICPA SOP 96-1 offer guidance for measuring the effectiveness of environmental liabilities on a firm's financial statement.

However, the uncertainty and timing issues cause problems in accounting for environmental liabilities. Financial statement disclosure of contingent environmental liabilities (including those associated with Superfund) is often limited and varies across firms (Campbell et al., 1994). Regardless of the financial statement

disclosure, Superfund liabilities may be relevant to investors' assessment of firm risk. Information facilitating evaluation of firms' potential liability under the Act is publicly available even if not disclosed.

The Securities and Exchange Commission (SEC) has recognized the significance of environmental liabilities. The SEC's Financial Reporting Release No. 36 specifies contingent liability reporting standards that exceed those required for financial statement disclosure purposes. It applies to the Management's Discussion and Analysis (MD&A) section of Form 10K. In addition, the Environmental Protection Agency (EPA) provides the SEC with information about the designation of a firm as a Potentially Responsible Party (PRP). Thus, contingent Superfund liabilities are ascertainable despite uncertainty regarding the timing and amount of payments.

Congress authorized the EPA to pursue the cleanup of hazardous material sites when it passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980. The Superfund Amendments and Reauthorization Act of 1986 (SARA) further expanded and clarified the EPA's authority. The acts authorize a Superfund Trust Fund of $8.5 billion used to finance site remediation (cleanup) when responsibility for the cleanup cannot be assigned or when a responsible party (potentially responsible party or PRP) is unwilling to take action. Under the Superfund act, the EPA has the authority to negotiate settlements, order PRPs to take remediation actions, or sue PRPs when site remediation is financed through the Superfund trust fund.

The remediation process involves several steps. First, the EPA stabilizes sites that pose immediate threats to human health, welfare, or the environment. Long-term actions are taken to eliminate or substantially reduce hazardous substance emissions. To plan for long-term remediation, the EPA performs a preliminary assessment on each site to determine if further investigation is warranted. Then, sites are ranked numerically according to their potential environmental and public health hazards and listed accordingly on the National Priorities List (NPL). Once potentially responsible parties (PRPs) are identified on an NPL site, the EPA sends a letter general letter of notice (GLN)) to all the PRPs. When required, extensive site investigations and feasibility studies are conducted to assess the level, the nature of the contamination, and the potential risks to humans and the environment before identifying feasible remediation techniques. After a public comment period, the EPA selects a specific remediation plan. Its decision is outlined in a Record of Decision (ROD). Site cleanup commences after the remediation designs, including engineering plans and specifications, are finalized. The EPA continues to monitor the site after cleanup to ensure that appropriate maintenance and response activities are ongoing (Campbell et al., 1994).

The liability imposed by the Superfund Act is considered retroactive, strict, joint, and several. A list of PRPs for each site includes all present and prior owners and operators of the site, as well as generators of and transporters of hazardous waste. The cost of cleanup for Superfund sites is substantial, and the potential liabilities of firms under the Act's provisions are very significant. Total cleanup costs could reach $1 trillion over the next 50 years (Voorst & Woodbury, 1993). Sites where a firm is identified as a PRP and Superfund Act-related activity at all sites, are available through public databases such as the Record of Decision (ROD) and Consent Decree by the EPA and Site Enforcement Tracking System (SETS) database by the National Technical Information Service. Cleanup costs for PRP firms are also available in the ROD, Consent Decree, and Unilateral Administrative Order. Therefore, environmental liabilities estimated through these public databases should assist investors in assessing firm risk by providing incremental information in addition to firm disclosures about environmental liabilities.

LITERATURE REVIEW

Previous studies on environmental liabilities have mostly taken a social responsibility perspective, with corporate environmental disclosures being voluntary and unaudited (Rockness, 1985). The paper by Braiotta Jr (1994) shows that firms increase environmental disclosures mainly due to regulatory requirements. Cole et al. (1994) indicate that environmental reporting is inconsistent and potentially misleading. Shane and Spicer (1983) found

evidence of a security price effect from environmental disclosure. The Barth and McNichols study (1994) developed estimates of Superfund liabilities and tested the association of different estimates with the firm's market value. Their findings show that environmental liability information, provided under the Superfund Act, is value relevant to investors and has incremental value over the information disclosed in the financial statements. Campbell et al. (1994) suggest that Superfund liability and settlement data may be relevant to firm valuation. The results of these studies indicate that investors use environmental liability information in their investment decisions, resulting in security price and firm value changes.

Many financial accounting researchers have investigated environmental accounting issues in security valuation. Ilinitch et al. (1998) suggest that existing environmental performance rankings weigh process-oriented and outcomeoriented factors differently and that no single ranking scheme adequately incorporates the full range of dimensions comprising the theoretically-based measures of environmental performance. Barth and McNichols (1994) results indicate that environmental liability information disclosed under the Superfund Act provides additional explanatory power in determining firms' market value of equity.

The study by Little et al. (1995) investigates whether there is a relationship between the market reactions to hazardous waste lawsuits (market assessment) and the subsequent treatment of the suits in the financial statements (firm assessment). They find no systematic relationship between the two assessments.

Blacconiere and Northcut (1997) examine the stock market reactions of chemical firms to announcements of legislative events leading to the adoption of the Superfund Amendments and Reauthorization Act (SARA). As predicted, an overall negative market reaction to SARA was observed. In addition, there is evidence that firms with less extensive environmental disclosures and greater exposure to Superfund costs had a more negative market reaction. In comparison, firms with more extensive environmental disclosures and less exposure to Superfund costs had a less negative market reaction. These results suggest that financial statement disclosures and EPA data were incrementally value-relevant. Konar and Cohen (2001) found that bad environmental performance negatively correlates with firms' intangible asset value. It was concluded that legally emitted toxic chemicals significantly affect the intangible asset value of publicly traded companies. A 10% reduction in emissions of toxic chemicals results in a $34 million increase in market value. These effects vary across industries, with larger losses accruing to the traditionally polluting industries.

Elbannan (2003) investigates whether polluting firms manage earnings in the year a material environmental remediation expense (ERE) is recognized (the event year) and whether the market reacts to the ERE recognition (measured through the effect on the earnings response coefficients of polluters). Overall, results suggest that polluters take income-decreasing accruals in year −1, income-increasing accruals in year 0 (the event year), and income-increasing accruals in year +1; the practice of earnings management is uniform across firms regardless of the level of the materiality of the ERE.

Bae and Sami (2004) suggest that good financial performers are more likely to report and disclose information about environmental liabilities. The results of this study also indicate that high-leveraged firms tend to make less recognition/disclosures on environmental matters than low-leveraged firms. The findings also suggest a negative correlation between executive bonus amounts and the reporting/disclosing of environmental liabilities.

Bae and Sami (2005) investigate the implication of potential environmental liabilities for the reliability (noisiness) of accounting information as it manifests itself in the magnitude of an earnings response coefficient (ERC). The results show that the ERCs for potentially responsible party (PRP) firms are lower than those of non-PRP firms. In addition, the results indicate that as firms are named as PRP for more sites, their ERCs decline, which is an indication that the market perceived increased noise in their earnings.

Moneva and Cuellar (2009) examine the relationship between environmental management and the value relevance of different types of financial and non-financial environmental disclosures. Their results suggest a significant market valuation of environmental and financial disclosures, not non-financial ones. The results also suggest an increase in the relevance of required environmental information.

Chava (2014)'s findings suggest that investors demand significantly higher expected returns on stocks excluded by environmental screens (such as hazardous chemicals, substantial emissions, and climate change concerns) compared to firms without such environmental concerns.

However, no study has investigated the effect of Superfund site listing in the National Priority List (NPL) database, identified and designated under the Superfund Act, on stock returns and firm valuation. This study addresses this issue and provides evidence about the effect of NPL listing as PRPs on a firm's valuation.

MATERIALS AND METHODS Model Development

The National Priorities List (NPL) is a publicly available database that investors can access for information about Superfund sites and PRPs. Once a firm is identified as a PRP at a Superfund site, it is listed in the NPL database and notified by the General Letter of Notice (GLN). Assuming an efficient market and low transaction costs, the market is expected to impound future remediation costs' potential risk and uncertainty.

In the case of environmental liabilities, the potential future cost of environmental remediation makes estimating the firm's earnings more difficult. This implies that PRP firms' earnings may not persist, resulting in noisier accounting information. It is expected that due to the effect of noise in accounting information, there would be negative abnormal returns for PRP firms with contingent environmental liabilities. Thus, the first hypothesis examined in this study is:

H_1: The stock prices of the PRP firms are reduced following their GLN dates in that the firms are identified and designated as PRP by the EPA.

Although environmental liabilities are contingent, previous studies suggest they are relevant in firm valuation and assessment of firm risk (Barth & McNichols, 1994). Prior research indicates that financial leverage proxies a firm's ability to obtain external funds and its closeness to debt covenant violations (Duke & Hunt, 1990; Press & Weintrop, 1990). The debt hypothesis predicts that more highly levered firms will lower stock prices due to potentially increased contracting costs. Hence, this assertion leads to the second hypothesis:

H_2: The stock price reaction to the Superfund listing (PRP designation) of the firm is negatively related to the firm's debtto-equity ratio.

A firm’s political costs proxy for costs and benefits associated with political and regulatory scrutiny (Watts & Zimmerman, 1986, 1990). The political cost hypothesis predicts that politically-sensitive firms choose accounting methods that reduce reported profits (Watts & Zimmerman, 1986). Johnson (1995) found that a firm's decision to disclose environmental capital expenditures was associated with its political costs. The study also indicated monopolistic firms tend to be more sensitive to political costs. Furthermore, Cahan et al. (1997) indicate that firms potentially affected by the Superfund Act took significant income-reducing discretionary accruals in 1979 when Congress considered legislation leading to the Superfund Act. Their findings are consistent with the political cost hypothesis. Since Superfund listing may potentially increase recognition of contingent liabilities resulting in lower income, it will have a more significant stock price effect on larger firms subject to increased scrutiny. This leads to the third hypothesis:

H_3: The stock price reaction to the Superfund listing (PRP designation) of the firm is positively related to the firm’s size.

This study uses a matched-pair sample to compare the experimental firms (PRPs) to the control firms (non-PRPs) and to examine whether the experimental firms show significantly negative abnormal returns for the event period. PRP firms are matched with the non-PRP firms closest in size in the same industry.

Empirical Models

The methods used by Espahbodi and Tehranian (1989) are employed to test the first hypothesis. The market model generates and evaluates abnormal returns (prediction errors). For each sample firm, calendar days are converted to an event timeline by calculating the event date (day 0) as the date of the GLN of the firm in the NPL database. A regression model is estimated over a 300-day estimation period ranging from -305 to -6 days. The analysis period covers the 11 days from -5 to + 5 days surrounding the event day 0, which is the GLN date.

Abnormal returns (AR_{it}) are computed by subtracting the firm's expected return derived from a conventional market model from the firm's actual return. The market model is:

$$Rit = \alpha i,0 + \beta i,1 Rmt + \varepsilon i \qquad (1)$$

Where

R_{it} = the stock return for firm i on day t,

R_{mt} = the CRSP value-weighted index on day t,

$\alpha i,0, \beta i,1$ = the parameters that are estimated using 300 observations prior to the day each GLN date for firm i, and

εI = the disturbance term for firm i.

And abnormal returns, AR_{it}, are calculated as follows:

$$ARit = Rit - (\alpha i,0 + \beta i,1 Rmt)$$

To analyze abnormal returns, prediction errors were calculated for each day in the analysis period, and the daily prediction errors were used as a proxy for the information content of the NPL data as interpreted by the market. The abnormal returns represent excess returns over those predicted by the market model. The prediction errors are averaged (APE) and accumulated (CAPE) to yield a total abnormal return over the analysis period. Thus,

$$APE_I = 1/N \sum_{i=1}^{N} PE_{it}$$

$$CAPE_k = \sum_{i=-5}^{k} APE$$

Where:

PE_{it} = prediction error of firm i on day t,

APE_i = average prediction error for the sample for a given day t;

N = the number of firms in the sample;

$CAPE_k$= the cumulative average prediction error for the sample to day k in the analysis period.

The APE and CAPE are tested for statistical significance using the time-series standard deviation, s(APE). The average prediction error in the samples is estimated over the 300 days of the estimation period.

$$s(APE) = [\, 1/(299) \sum_{t=1}^{n} (APE_t - APE) \,]^{1/2}$$

where APE is the mean average prediction error for the sample over the 300-day estimation period. The test statistics are

$$\frac{APE_t}{S(APE_t)} \sim t_{299} \text{ for APE and } \frac{CAPE_k}{[ks^2 (APE_t)]^{1/2}} \sim t_{299} \text{ for CAPE}$$

The null hypotheses are that the APE and CAPE are zero. The statistical significance of each CAPE for the sample compared to zero and determining if there are significant negative abnormal returns during the analysis period is evaluated using t-tests.

To test hypotheses 2 and 3, multiple regression analyses of abnormal stock returns on earnings surprise and other control variables are carried out following prior studies (Collins et al., 1981; Espahbodi et al., 1991). Unexpected earnings (UE) are measured as the actual earnings disclosed minus a measure of investors' prior expectation of earnings scaled by the stock price. Unexpected earning (UE) is computed as:

$UE_{it} = (AE_{it} - FE_{it}) / P_{it-2}$ (2)

Where

AE_{it} = i^{th} firm's actual earnings per share excluding extraordinary items announced at day t (Compustat Item No. A58),

FE_{it} = the mean of analysts' forecasts of i^{th} firm's EPS on I/B/E/S tapes in the month immediately prior to the earnings announcement (day t), and

P_{it-2} = the price of firm i's stock two days prior to the earnings announcement at t=0.

The Institutional Brokers Estimate System (I/B/E/S) database is used to determine the means of analysts' forecasts of earnings per share (EPS). The cumulative, continuously compounded abnormal return, CAR_{it}, is computed based on the market model. Abnormal returns are cumulated between day -1 and +1 surrounding a firm's earnings announcement date. Stock returns from the day of the consensus forecast to day -2 are used as control variables to minimize measurement error in the earnings surprise.

The data for the industry-matched sample is pooled across firms and years so that the following cross-sectional time-series regression is estimated using the OLS method:

CARit = □0 + □1 UEit LIST+ □2UEit DEit LIST+ □3UEit MBit LIST (3)

Where:

CAR_{it} = cumulative abnormal return for firms, continuously compounded between days -1 and +1 surrounding the GLN date of a firm;

UE_{it} = earnings surprise (unexpected earnings) for firm i;

$LIST_{it}$ = dummy variable taking 1 if PRP otherwise 0

DE_{it} = debt to equity ratio as a proxy for the existence and tightness of the debt covenant restrictions; MB_{it} = market value to book value of equity as a proxy for firm size;

□it = error term assumed to be distributed N (0, $□^2_i$).

Sample Selection

Data on the firms with environmental liabilities was obtained from the EPA listing of the PRP firms under the Superfund Act.

For a firm to be included in the sample, the following conditions were necessary:

1. The firm must be identified as a PRP by the EPA and listed in the NPL database by name.
2. Financial data for the firm must be available on COMPUSTAT tapes, CRSP tapes, and/or COMPUSTAT PC PLUS database for all the years 1991-2010.
3. Financial analysts' earnings forecasts must be available on I/B/E/S tapes.

The NPL database compiles the Superfund listing for each firm in the sample. The NPL is maintained by the National Technical Information Service (NTIS) that can be obtained by request or accessed through Lexis/Nexis. This database includes information relevant to Federal Superfund Potentially Responsible Parties and may be searched by site or PRP name.

To ensure whether the experiment firms show significant abnormal returns for the event period or not, these firms are compared to the control group. The control firms are matched with the experiment firms closest in total assets as a proxy for size in the same industry.

RESULTS AND DISCUSSION Sample Selection and Descriptive Statistics

Table 1 presents the sample selection procedures, which result in a sample of 243 firms consisting of 138 experiment firms and 105 firms in the control group. The initial sample of 378 experiment firms was selected for the analysis period by matching the Superfund listing firms identified from the NPL files with the COMPUSTAT firms over the 1991 to 2010 period. Checking for data availability on CRSP tapes, COMPUSTAT, and I/B/E/S databases reduces the total sample to 138 experiment firms. Panel B in Table 1 shows the control firms based on the matched-pair procedure. The control firms are matched with the experiment firms based on 2-digit SIC codes. Checking for data availability on CRSP, COMPUSTAT, and I/B/E/S databases reduces the number of firms in the control sample to 105. The final sample thus consists of 243 firms.

Table 1. Sample Selection

SELECTION CRITERION	FIRMS
Experiment Firms	
PRPs with GLN date in 1991-2010	378
Availability of CRSP data	212
Availability of COMPUSTAT data	174
Availability of I/B/E/S data	138
Subtotal	**138**
Control Firms	
Matching	138
Availability of CRSP data	125
Availability of COMPUSTAT data	114
Availability of I/B/E/S data	105
Subtotal	105
Total Firm	**243**

Table 2 shows descriptive statistics for the hypothesis's dependent and independent variables used in the regression analyses. It includes descriptive statistics for regression variables such as cumulative abnormal returns, earnings surprise, debtto-equity ratio, and market value to book value of equity (Panel A for experiment firms and Panel B for control firms).

The cumulative abnormal returns for control firms range from -0.1345 (-0.0024) to 0.2530 (0.1450). The mean of CAR for experiment (control) firms is –0.0157 (-0.0023). Although the cumulative abnormal returns values may not be directly compared to those of other studies, they are similar to those displayed in prior studies. Unexpected earnings (UE_{it}) for experiment (control) firms range from –0.6544 (-0.0748) to 0.4232 (0.2378) with a mean score of 0.0122 (0.0247). The positive means suggest that a majority of firms have unexpected positive earnings. The values of unexpected earnings are somewhat consistent with previous findings regarding the effect of the quality of the financial statements on ERCs.

Table 2. Descriptive Statistics

Panel A: Experiment firms

Variable	N	Mean	Std Dev	Minimum	Maximum
CAR_{it}	138	-0.0157	0.0452	-0.1345	0.2530
UE_{it}	138	0.0122	0.0650	-0.6544	0.4232
DE_{it}	138	2.1455	1.6250	0.4144	15.8450
MB_{it}	138	2.2860	1.3427	0.3220	11.1787

Panel B: Control firms

Variable	N	Mean	Std Dev	Minimum	Maximum
CAR_{it}	105	-0.0023	0.0024	-0.0006	0.1450
UE_{it}	105	0.0047	0.0072	-0.0748	0.2378
DE_{it}	105	2.4385	1.8870	0.3248	12.7345
MB_{it}	105	1.7560	1.2152	0.2766	9.5871

Variable Definitions

CAR_{it} = cumulative abnormal return for firms, continuously compounded between days -1 and +1 surrounding the GLN date of a firm;

UE_{it} = earnings surprise (unexpected earnings) for firm i;

LISTit = dummy variable taking 1 if PRP otherwise 0

DE_{it} = debt to equity ratio as a proxy for the existence and tightness of the debt covenant restrictions; MB_{it} = market value to book value of equity as a proxy for firm size; $\square_{it}$ = error term assumed to be distributed N (0, $\square^2_i$).

T-test and Regression Analysis

Table 3 presents the results of *t*-tests using CAR (-5 to +5) as the dependent variable in equation 3. Panel A of Table 3 shows the results of the comparisons between the experiment and control firms. Cumulative abnormal returns for the experiment firms are significant and negative at the conventional levels, whereas those for the control firms are not. Thus, Panel A supports hypothesis 1 that the stock process of the experiment (PRP) firms is reduced following the NPL database and its GLN dates in that firms are identified and designated as PRP by the EPA. Panel B presents CAR mean difference of CARs between the experimental and control firms. It is statistically significant at p= 0.10.

Table 3. T-tests of CARs and mean the difference between the groups

Panel A: T-test Results of Cumulative Abnormal Returns

Firms	Car(-5 to +5)	T Value	P > |T|
Experiment Firms	-1.78	1.9238	.0591
Control Firms	0.73	0.5366	.1296

Panel B: Mean difference and t-statistics of CARs between experimental firms and control firms

No of Observations	Mean Difference	T Value	P >|T|
243	2.51***	-7.54	0.001

t-values are shown in parentheses.

*** Statistically significant at P □ 0.01(one-tailed)

**Statistically significant at P □ 0.05 (one-tailed)

*Statistically significant at P □ 0.10 (one-tailed)

Regression Equation

CARit = □0 + □1 UEit + □2UEit DEit + □3UEit MBit + □it (3)

Where:

CAR_{it} = cumulative abnormal return for firms, continuously compounded between days -1 and +1 surrounding the GLN date of a firm;

UE_{it} = earnings surprise (unexpected earnings) for firm i;

DE_{it} = debt to equity ratio as a proxy for the existence and tightness of the debt covenant restrictions;

MB_{it} = market value to book value of equity as a proxy for firm size;

$□_{it}$ = error term assumed to be distributed N (0, $□^2_i$).

Table 4 shows that the coefficient for the intercept is significant at conventional levels suggesting that there may be some omitted variables. The coefficient for earnings surprise (UE_{it}) is positive and significant at p=0.10. In addition, the debt to equity variable (UE_{it} DE_{it}) coefficient is significant and negative at p=0.10, which is consistent with hypothesis 2. The stock price reaction to the Superfund listing of the firm is negatively related to the firm's debt ratio. However, the market-to-book variable (UE_{it} MB_{it}) coefficient is not significant. Hence, hypothesis 3 is not supported.

Table 4. Cross-sectional Regression Analysis

INTERCEPT	UE_{it}	UEitDEit	UEitMBit
Expected sign	+	-	+
0.0025*	0.0717*	-0.0572*	0.0470
(-1.452)	(1.842)	(-1.728)	(0.675)

t-values are shown in parentheses.

*** Statistically significant at P □ 0.01(one-tailed)

**Statistically significant at P □ 0.05 (one-tailed)

*Statistically significant at P □ 0.10 (one-tailed)

Regression Equation

CARit = □0 + □1 UEit + □2UEit DEit + □3UEit MBit + □it (3)

Where:

CAR_{it} = cumulative abnormal return for firms, continuously compounded between days -1 and +1 surrounding the GLN date of a firm;

UE_{it} = earnings surprise (unexpected earnings) for firm i;

DE_{it} = debt to equity ratio as a proxy for the existence and tightness of the debt covenant restrictions;

MB_{it} = market value to book value of equity as a proxy for firm size;

$□_{it}$ = error term assumed to be distributed N (0, $□^2_i$)

Sensitivity Analyses

As additional tests, we also ran the model using net sales instead of the firm's market value. Table 5 shows the results of these additional tests. The results qualitatively remain unchanged. Table 5 shows that UE*it* still has a significant positive coefficient for unexpected earnings. The debt to equity variable (UEit DEit) coefficient is significant and negative at p=0.10. The stock price reaction to the Superfund listing of the firm is negatively related to the firm's debt ratio. However, the coefficient of the net sales (UEit NSit) is not significant.

Table 5. Sensitivity Analysis

INTERCEPT	UE_{it}	UEitDEit	UEitNSit
Expected sign	+	-	+
0.0047*	0.0534*	-0.0512*	0.0389
(-1.782)	(1.625)	(-1.717)	(0.585)

t-values are shown in parentheses.

*** Statistically significant at P □ 0.01(one-tailed)

**Statistically significant at P □ 0.05 (one-tailed)

*Statistically significant at P □ 0.10 (one-tailed)

Regression Equation

CARit = □0 + □1 UEit + □2UEit DEit + □3UEit MBit + □it (3)

Where:

CAR_{it} = cumulative abnormal return for firms, continuously compounded between days -1 and +1 surrounding the GLN date of a firm;

UE_{it} = earnings surprise (unexpected earnings) for firm i;

DE_{it} = debt to equity ratio as a proxy for the existence and tightness of the debt covenant restrictions;

NS_{it} = net sales as a proxy for firm size;

$□_{it}$ = error term assumed to be distributed N (0, $□^2_i$).

CONCLUSIONS

This study aims to examine the impact on security returns of listing on the National Priority List (NPL) for the Superfund site. More specifically, we investigate if the designation of a potentially responsible party (PRP) generated more negative abnormal returns before listing the NPL. Since this designation of firms as PRPs increase regulatory costs such as cleanup costs and disclosure requirements, an overall adverse market reaction is expected.

T-test and regression analysis were conducted to test the hypotheses. The *t*-test results support hypothesis 1. The regression results do provide support for hypothesis 2 but not for the third hypothesis. The empirical results support the hypotheses that environmental liabilities impact a firm's stock price and valuation.

This study is vital for the following reasons. First, the findings provide financial statement users with helpful information about contingent environmental liabilities. By understanding how environmental liabilities affect firms' stock prices in general, investors should be able to make more informed investment decisions. They may also enable investors to make better judgments on the firms' future performance.

Future Research and Limitations

The results support the proposed hypotheses and suggest that additional research into environmental liabilities is warranted. Using a larger sample size with cleanup cost data and extended analysis periods would increase the external validity of the findings. Future studies may also benefit from considering additional factors, such as firm type and industry. The study is not without limitations related to the assumptions on which the models are based and the measurement error associated with variables. The results may be confounded due to significant measurement errors associated with the variables.

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