Assessing the Financial Impacts of the World Trade Center Attacks On Publicly Held Corporations

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KeyWords: World Trade Center, Corporate Crisis Management, Business Continuity, Financial Impacts

Abstract

The attack on the World Trade Center was an attack on corporate America. Never have so many publicly held corporations been so significantly impacted by a catastrophic event. The market performance of twenty three publicly held companies that suffered severe financial and physical impacts was analyzed to determine the immediate and long term effect of the attacks on the market capitalization of the firms. The most significant finding was that the market performance of these companies in the eighteen month period after September 11, 2001 was comparable to (and in many cases exceeded) the performance of their market/industry sector. This implies that mechanisms exist that allow large corporations to absorb or to transfer the impacts of large scale disasters. The analysis also identified a extremes in behavior (fast recoverers, non recoverers) implying that corporate strategies and processes can effect outcomes.

Introduction

On September 11, 2001, nineteen terrorists armed with box cutters hijacked four aircraft operated by two U.S. corporations (American and United airlines), and used these aircraft as weapons to attack the World Trade Center and Pentagon. These actions resulted in unprecedented human and economic losses. Of the almost 3000 people killed, most were employees of private corporations. In downtown Manhattan, a staggering 34.5 million square feet of office space was destroyed. Totaling $50-70 billion dollars in insured losses, the WTC attack became the most catastrophic economic disaster in U.S. history. Most of these direct economic losses were incurred by the private sector. In addition to the physical resources and systems lost by businesses in the WTC, changes in public behavior following the attacks severely impacted travel, tourism, and other businesses.

The Institute for Crisis, Disaster, and Risk Management at the George Washington University, in conjunction with the University of Pittsburgh, received a National Science Foundation (NSF) grant award in September of 2002 to directly address these financial impact issues. Specifically, the project team proposed to answer the following research questions:

1. How did the September 11 attacks affect the long-term economic and financial performance of corporations directly or indirectly impacted?
2. What unanticipated inter-organizational adaptive responses involving large publicly held corporations emerged during the recovery from the September 11 attacks?
3. How have management perceptions changed toward the requirements for investment in disaster recovery, security, and crisis management as a result of these attacks?
4. How has the terrorist threat changed the perceived crisis management, security, and disaster recovery best practices for large publicly held corporations?
5. What skills and knowledge are required for corporate crisis managers?

64

6. Can corporate preparedness for extreme events be evaluated based on internal and inter-organizational factors?

While the research team has embarked on this two-year project focused on establishing answers to all of these questions, their scope and objectives have dictated that four interrelated sub-projects be conducted simultaneously. This paper focuses on the development, application, and preliminary findings of one of those sub-project teams that has been working to develop a system to measure the performance of large, publicly traded corporations that were directly affected by the September 11th terrorist attacks. Specifically, this paper addresses the first of the six general focus questions posed above; 'How did the September 11 attacks affect the long-term economic and financial performance of corporations directly or indirectly impacted?' The paper also describes the methods used by the research team to select twenty-three companies for detailed analysis (from a possible list of hundreds), explains the analysis used to measure financial and economic impact caused by the September 11th terrorist attacks and provide descriptive examples, and discusses the preliminary observations derived from findings to-date.

Background - The impacts of Extreme Events on the Private Sector

The long-term economic and social impacts of extreme events on the private sector have not been a subject of significant in-depth research and there is a general lack of data and models that describe impacts at a corporate or organizational level. Much of the research related to the business impacts of disasters has been tied to particular events. Suarez-Villa and Walrod and Wallace (1999) examined the disruption of high technology industries in the Los Angeles Basin. University of Delaware Disaster Research Center researchers investigated the business impacts of the Loma Prieta Earthquake, Hurricane Andrew, and the Northridge earthquake (Tierney, 1997, Webb, Tierney and Dahlhamer 1999, 2000). Alesch et al (2000) in a study conducted for the Public Entity Risk Institute (PERI) examined the impact of thirteen natural disasters over a 9-year period on small businesses and not for profits. Knight and Pretty (2002) looked at the impact of catastrophes (extreme events) on large, publicly held corporations fifty days after the event. They concluded that firms experiencing catastrophic events fell into two categories: "recoverers" whose stock value recovered initial losses within 50 days and "non recoverers' whose stock value continued to plunge.

These studies provide a valuable baseline for the proposed research. They do not, however, adequately address issues critical in the post September 11 corporate strategic environment such as:

- The long term effect of extreme events on large, publicly held corporations
- The effectiveness of pre-planned and professional corporate crisis management and disaster recovery activities on the long-range economic impact.
- The impact of the terrorist threat on best practices for corporate crisis management, security, and disaster recovery, and business continuity.
- The evolution of new inter-organizational relationships necessary for preparedness and response to terrorism.

Our findings to-date suggest that, when major disasters strike large corporations, the bulk of the financial impacts are sustained not by the individual company but by industries, sectors, or the economy as a whole, implying the existence of financial and market mechanisms that facilitate this transfer of financial impacts. Patterns of individual recovery rates are not uniform, however. Among the twenty-three companies selected for investigation in this project, there were three basic patterns of recovery behavior based on historical stock values;

1. Company sustained no discernible financial impact
2. Recovered – Company sustained financial impact, but had returned to average pre-attack growth sixty days following the 9/11 attacks

65

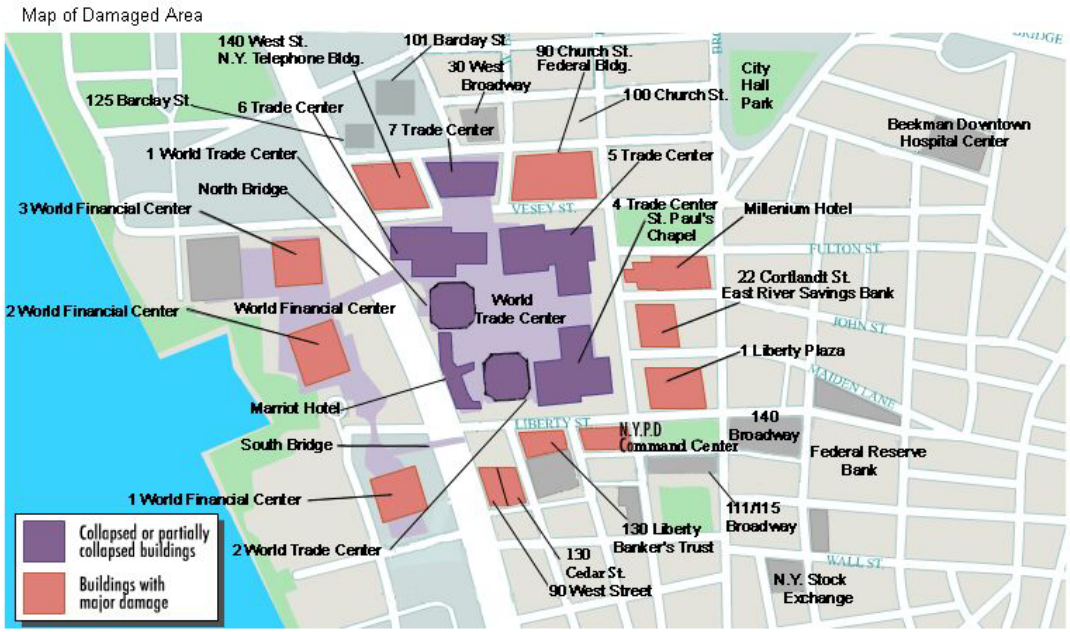
3. Did not recover – Company was still below average levels of pre-attack growth sixty days following the 9/11 attacks.

The results of this analysis will be used in the next stages of the research to determine if corporate strategies and processes affect the ability to recover from extreme events.

Theory and Method

The goal of our selection process was to sort through the thousands of companies that had been directly affected by the attacks in order to formulate a list of between twenty and twenty-five companies to be studied. To perform this task, we had to first develop a standard list of selection criteria that suited the goals of the project. There were two initial criteria for which there could be no exceptions. First, we looked only at companies that sustained a direct impact from the September 11th attacks in New York City. This meant that the companies selected could come from the twin towers of the World Trade Center (North and South Towers, WTC 1 and 2), or from any building within the zone determined to be severely impacted. In order to determine which buildings sustained a severe level of impact, we referred to the map of damaged areas displayed below found on the TenantWise.com website.

Figure 1. Map of Damaged Area



Secondly, we limited our choices to only those companies that were publicly traded on the New York Stock Exchange since, in order to perform comprehensive performance-based analyses, we needed to have access to current and historical stock prices, annual reports, and other financial information that is rarely provided by privately- owned companies.

The remaining criteria remained qualitative in nature, and served as rough guidelines for the final selection process. The team recognized early in the process that because of the varied nature of the businesses located within the impacted area, a highly stringent criteria would limited our data set considerably and prevent us from reaching our target study group size of twenty to twenty-five companies. However, we also recognized that depth of our analysis would allow for us to compensate for these differences over the long-term scope of the study.

We were solely interested in examining the impact on large businesses and the first step in the selection process was the elimination of any business that could be classified as 'small'. We

66

further limited our list to those companies that maintained at least one additional office outside of the impacted area (interestingly, while many of the large companies located in the World Trade Center maintained their international headquarters in the city of New York, few if any used their WTC space for that purpose,) that maintained a significant employee base, and exhibited significant annual revenues. The selected companies ultimately ranged in size from 231 to 443,808 employees (average 86,476), with annual revenues falling between $279.7 million and $87.981 billion (average $17.123 billion).

We were ideally looking for companies that had maintained a significant level of operation within the World Trade Center itself, in regards to both the amount of office space leased and the number of employees located there. Our justification was that there had to be considerable amount office space and/or employees lost for that company to be considered to have been significantly impacted by the September 11th attacks. This criterion was met by most, but not by all companies. Additionally, we often had trouble obtaining data or found conflicting reports regarding space leased or employees located in the impacted area. Lastly, we attempted to limit our list to companies that located their headquarters within the United States. We felt that it would be impossible to achieve the level of access necessary to conduct a thorough investigation of initial results without being able to visit the company headquarters, and likewise a representative sample of the executive leadership, in person. This criterion was met by all but four of the selected companies. Once the preliminary list was completed, we eliminated companies for which we determined we could not, through all available means, gather sufficient information to perform a thorough analysis. This elimination process left us with twenty-three companies, shown in Table 1:

Table 1. Companies Selected for Analysis

Company	Total Employees Worldwide	Revenue ($ Millions)	Space Lost (Sq. Feet – if known)	Employees lost/ Total Employees Working at WTC (if known)
Company 1	180,066	87,981	10,000	0 of ?
Company 2	84,417	23,810	1,041,817	5 of ?
Company 3	51,000	8,820	460,000	176 of 1,100
Company 4	132,583	3,111	338,000	3 of 400
Company 5	250,000	20,537	7WTC	3 of ?
Company 6	77,442	3,817	273,991	2 of 360
Company 7	19,739	3,253	344,558	0 of ?
Company 8.	1,474	1,059	105,000	2 of 215
Company 9.	95,812	20,630	?	2 of ?
Company 10	12,300	1,399	115,000	1 of 700
Company 11	57,800	10,400	600,000	295 of 1,900
Company 12	57,402	28,500		3 of ?
Company 13	55,726	4,720	843,156	6 of 3,700
Company 14.	689	2,670	?	0 of ?
Company 15	32,724	4,410	?	4 of ?
Company 16	60,792	26,760	32,847	0 of ?
Company 17	87,200	16,760	48,800	4 of ?
Company 18	1,345	4,312	59,000	0 of ?
Company 19	231	279	2,582	0 of 3
Company 20	443,808	38,475	4,584	0 of 7
Company 21	39,100	12,496	89,000	0 of 340
Company 22.	10,900	2,086	2,289	0 of 8
Company 23	236,408	67,630	207,000	2 of 482

67

The value of a public corporation is its market capitalization—the total value of its publicly held stock. The analysis of economic impact and recovery, therefore, required a detailed analysis of the market performance of these 23 companies and their respective market and sectors. In order to provide an adequate historical data base of stock performance, we chose to analyze financial performance on the focus companies for 18 months before and after the 9/11 terrorist attacks. Therefore we selected March 10th, 2000 as our starting date and March 11th, 2003 as our final day for the analysis.

Stock Data Collection Process

Yahoo Finance (http://finance.yahoo.com), and Bigcharts.com (http://www.bigcharts.com) were the two primary sources for the collection of financial data. Yahoo Finance was used as the source of historical daily stock prices of the companies, their market and sector indices and for company summaries. Bigcharts.com was used to gather sector and market information about focus companies and to check the stock data we collected from Yahoo Finance.

The biggest challenge after the data collection was the cleaning and standardization of the data. For each focus company we collected stock price data for the 36 month study period, as well as the price data for the sector and market indices. The problem was that data was not homogenously available for the selected time interval for each company or index that we considered. There may have been several reasons for the unavailability of the data, such as days when the stock of the company was not traded for company specific reasons, or simply due to technical problems in the source database used. This fact forced us to define a standard set of dates, which were considered valid and reshape the collected data with respect to that standardized date range. The standardization of the date range was accomplished by finding the largest valid date range for the considered companies, where the stocks of at least one company were traded in the NYSE exchange. This procedure led us to a standard data range, however we also ended up with several gaps of stock price data for each company. We employed linear interpolation to fill up the data gaps we encountered.

Charts / Diagrams – Company profiles

In the analysis we performed with each individual company, we first calculated the daily percent changes in stock price with respect to March 10th, 2000 (our analysis start date) and with respect to September 11th, 2001. We did the same calculations for the market the company was in, and finally we subtracted the market behavior from the stock price behavior of the company, in order to get a purer pattern of the companies stock price, free from the market behavior. Using percent changes rather than absolute stock prices gave allowed relative comparisons without normalization of the data.

We also used the analysis of daily percent change to calculate the stock beta values of companies, which can be used as a predictor of stock risk. The calculation of the percent changes with respect to March 10th, 2000 provided a general picture of the company's stock price behavior in the whole period, whereas the analysis with respect to stock price as of September 10th, 2001 provided a clearer picture of the activity in stock prices in response to the September 11th, 2001 attacks.

After making these calculations we generated two time series graphs for each company. One graph covers the behavior of the company's stock price in the whole period, whereas the other one only covers the behavior after 9/11. To eliminate random fluctuations from the behavior of the stock, we fitted different regression lines via Microsoft Excel into these graphs. Figure 2 shows one of the graphs that developed for a company (Company 21) during the complete analysis period. Figure 3 shows the stock performance of Company 21 after September 11th, 2001. The purpose of this analysis was to detect any abnormal or potentially interesting change of stock price behavior for individual companies before and after September 11th and try to find out what caused these abnormal behavior. While defining abnormal behavior, our focus was

68

detecting significant changes, positive or negative, after the disaster, so that we may conduct more research on the best practices of the fast recoverers, and the reasons for the disability of non-recoverers to recover during our company interviews. After we generated these graphs we acquired preliminary findings about how each company performed in the period we were investigating. Details of these findings will be provided in the preliminary findings section. Performing the same analysis for different companies gave us the opportunity to compare these companies, and generate common statistics about potential performance indicators.

Figure 2. Company 21 Stock Performance in the complete Analysis Period

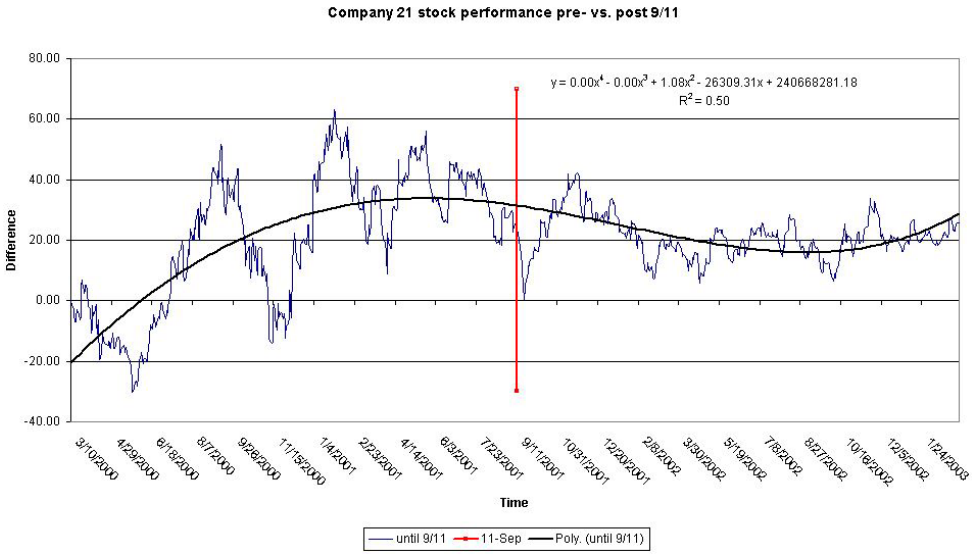
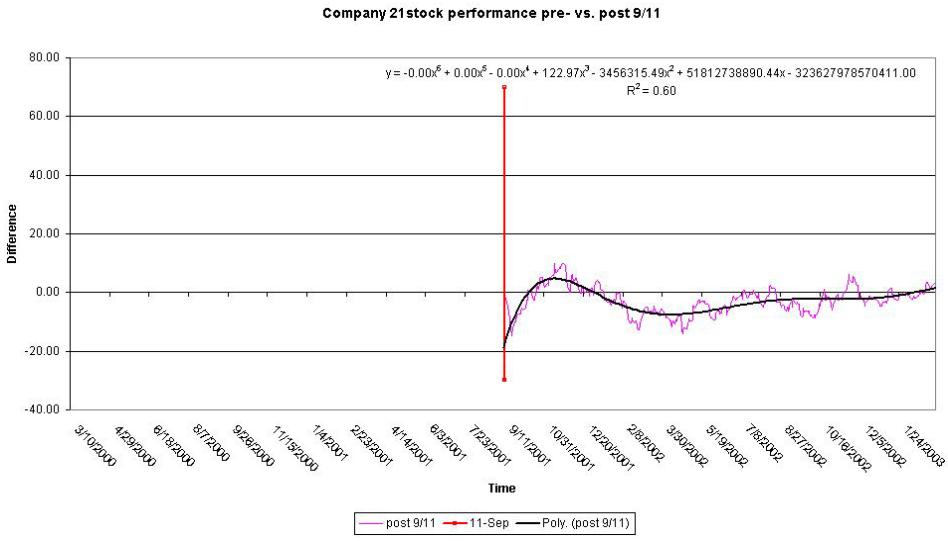


Figure 3. Company 21 Stock Performance after September 11th, 2001



A final comparative analysis was made possible by the calculation of change in the stock beta values of the company's stocks. Stock beta values are frequently used to model the systematic risk of a single stocks or portfolios of stocks. In our analysis we used the approach as a potential methodology to measure the risk and systematic instability associated with individual stock prices, and then looked for abnormalities, or changes in the stock beta value before and after September 11th. Stock beta is the slope β of the fitted linear regression curve of the form $Y = \alpha + \beta * X + \varepsilon$, where the independent variable X is the average change in the market

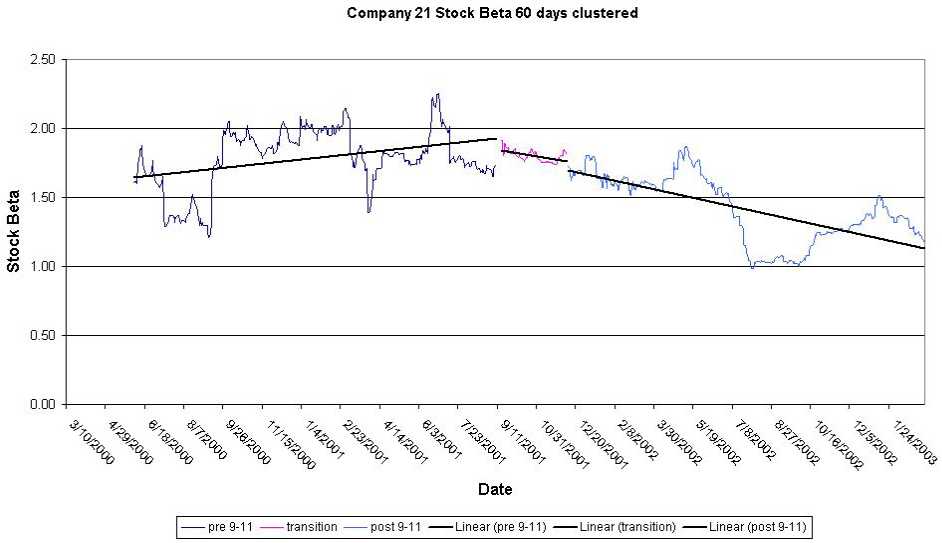
69

index, and the dependent variable Y is the average change in the company's stock price. We used daily stock prices in 60 days clusters to compute the stock beta for the period and then plotted the calculated stock beta values as time series to see whether there are changes in the company's systematic risk and instability.

$$\beta_t = \frac{\sum x_i y_i - \frac{1}{n}(\sum x_i)(\sum y_i)}{\sum (x_i)^2 - \frac{1}{n}(\sum x_i)^2} \quad \text{for i = t - 59 to i = t}$$

where t is the index for the time series, x_i is the daily percent change in the market index and y_i is the daily change in the stock price. We calculated these beta values for all available data points and analyzed them in three different time intervals, namely before, during (9/11 and the following 60 days) and after September 11th, to detect abnormal changes in stock price risk.

Figure 4. Company 21 Stock Beta Time Series before, during the transition and after 9/11



The goal of the analysis was to find common, interesting, or unique behavior of individual company stock prices, if any, before and after the September 11th terrorist attacks and then focus the research on the potential reasons of those unique behavior. The next section will provide some more information about the general findings of the analysis.

Results

Comparative descriptive statistics were generated, providing the ability to compare and contrast the performance of the companies. We compared the market performance of the 20 selected companies for the 18 month period prior to 9/11, for the 18 month period post 9/11 and for the 36 month period between March 3, 2000 and March 11, 2003. Figure 4 describes the market performance post 9/11 and shows that the sample was almost evenly split between companies that out performed their market segment post September 11, and companies that under performed their market segment. What are the specific reasons for their behavior? The answer to this question lies in more depth research about these companies, which will be one of the next project tasks.

Another factor that we looked at was the number of consecutive negative change in the market-reduced stock price of the company. We used this statistic to generate a rough idea about, which companies recovered the initial impact of the disaster faster than others. This results of this analysis is shown in figure 5:

70

Figure 5. Ranked Average change in Stockpricce between 9/11/2001 – 3/11/2003

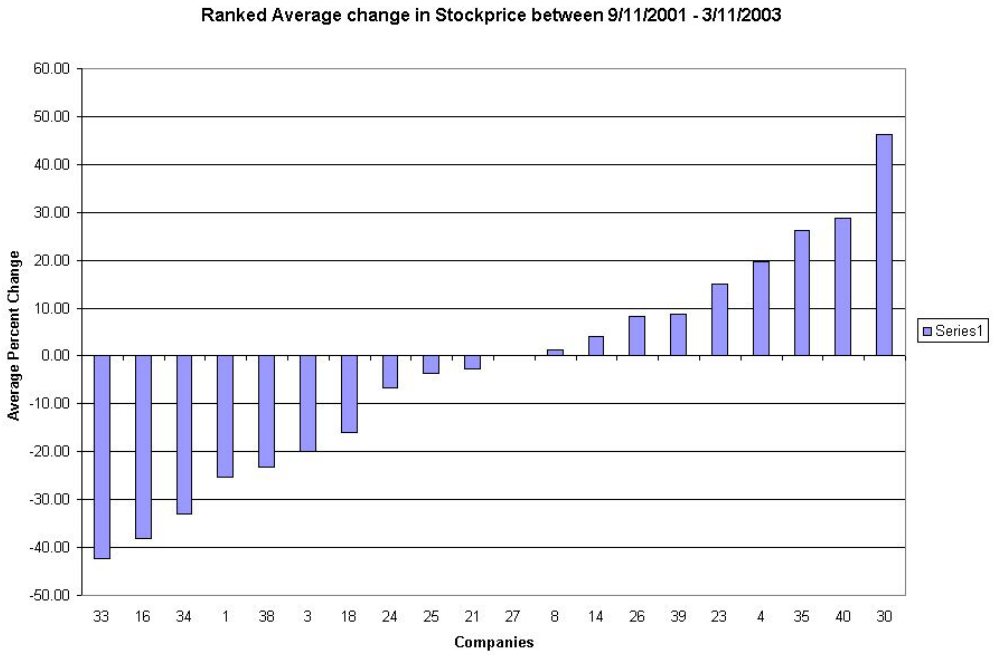
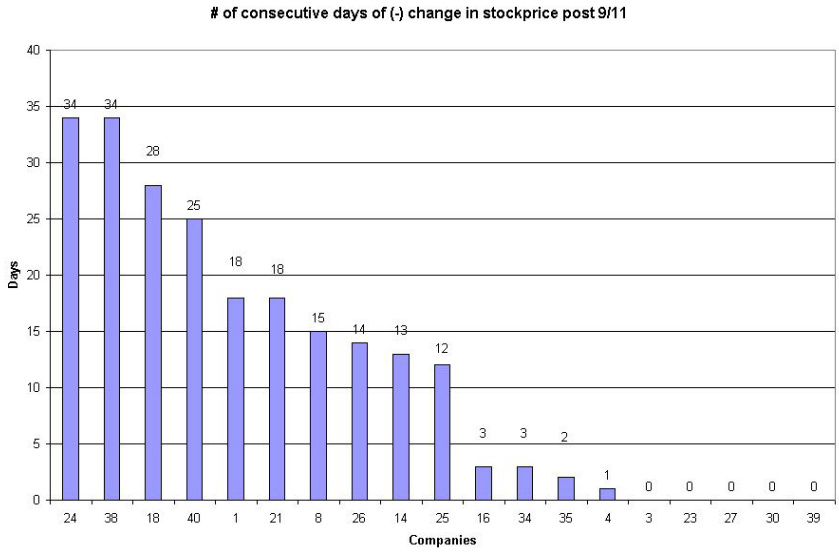


Figure 6. Number of Consecutive Days with Negative Change of Stock Price with respect to companies after the 9/11 Attacks

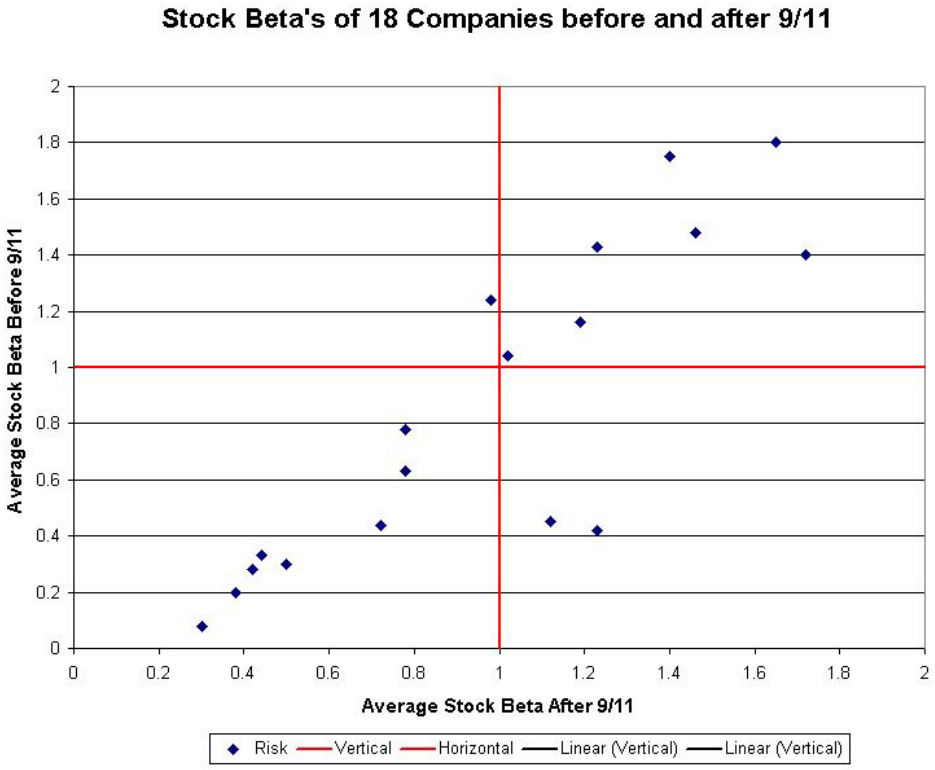


This graph shows a clearer picture of faster and slower recovering companies in the immediate aftermath of the attacks. Did the companies whose stock prices did not decline apply any special strategy to prevent the losses? If, yes, what are these best practices?

One last statistic that we looked at was the comparison of changes in the stock beta values of the companies. We did this in order to see whether the events of 9/11 affected the systematic market risk associated with each stock. In order to see the differences we plotted average stock beta values before and after September 11th, 2001.We created the following Scatter Plot:

71

Figure 7. Average Stock Beta's before and after 9/11



The findings from that figure are interesting because with the exception of a few companies behavior, companies who tended to have a riskier stock price behavior prior to 9/11 seem to be riskier after 9/11, and those who were less risky before 9/11 are still less risky afterwards. This can be a strong finding since it can be interpreted as suggesting that the 9/11 attacks didn't change the financial risk or instability behavior of these big companies.

Preliminary Findings and Discussion

The events of September 11th inflicted severe and immediate physical impacts to all businesses, government offices, and other types of organizations located in the World Trade Center and surrounding areas. These impacts exhibited included the loss of human life, disruption of business routines, and destruction of property, equipment, and office space. The sheer magnitude and scope of destruction ensured total physical losses for all involved, leaving no immunity from the emotional consequences of such a disaster. Affected companies needed to manage, primarily by themselves, an event that involved dead, injured, missing, physically displaced and traumatized employees, losses of data, information, and institutional knowledge, and an unprecedented uncertainty in market behavior.

For small businesses directly impacted in the September 11th events, especially those with a single place of business, the immediate and lasting impacts of the attacks can quite easily be secured, measured, and grouped into two broad categories that include those that survived and those that are no longer in business. However, for the large businesses there exists such a great number of confounding external and internal influences that such clear-cut measurements of impact are virtually impossible to attain. Despite these facts, it is possible to measure increases and decreases in the financial value of large, publicly traded companies as compared to the behavior of all similar impacted and non-impacted companies within individual markets. The analyses we used allowed us to isolate trends in post-event behavior that focus most specifically on the influence of the September 11th attacks on each company's market performance.

72

Our most significant finding was that for the vast majority of large, publicly traded companies directly impacted by the attacks on the World Trade Center, it appears that the bulk of the financial impacts were absorbed by the markets and industries rather than the individual companies themselves and therefore transferred quickly to the economy as a whole. From these analyses, we also discovered that there existed group trends in behavior. Using the beta analyses we have seen that the risk behavior of the majority of companies in our focus group was not individually altered to a significant degree. Those companies that were more stable than their market before the attack tended to be more stable than the market following the attacks. Likewise, those that were less stable continued to be so after September 11th as well. Our analysis of the stock performance before and after the attacks displayed results indicating that there were two primary groups of behavior as well. For many of the companies in our study group, their growth exceeded the market average, suggesting that the company was recovering at a rate faster than the economy as a whole, despite severe physical and financial impacts. The existence of these "fast recoverers" and "non recoverers" may imply that corporate strategies and process can effect outcomes. For another group of companies, growth rates were below those of their markets, suggesting that they were recovering more slowly than their similar counterparts. In both types of analysis, there existed performance outliers that did not perform in a similar way to any of the other companies in the study group. For instance, there were a few companies that were more stable than their market before the attacks, and less thereafter. More surprisingly, there was one company that was less stable than its market before the attacks, and more stable after they occurred.

From these initial findings, we believe there have emerged implications showing that there exist mechanisms to absorb or transfer severe economic and financial impacts of large-scale disasters affecting large businesses. Whether this is a matter of shareholder trust in companies and institutions, the benefit of insurance, crisis, disaster, and consequence management, continuity of operations plans, or other reasons, will be the subject of further study. Our focus will remain on the initial six questions posed in our project proposal, addressing the absolute impact to large companies. We now have a much more descriptive picture of what happened during the days, weeks, and months following September 11th. Through a deeper investigation involving personal interviews, surveys and questionnaires, our team will determine what caused discrepancies between the outliers, and confirm our findings regarding market absorption of financial loss.

The tragic events of September 11th provided practical and academic research a unique opportunity to observe and document the effects of a large-scale disaster over a wide spectrum of business types never before seen. Understanding the mechanisms of by which companies insulated themselves from the effects of such a disaster may provide insight into the ways in which resilience from similar future events can be built into our financial systems. Our team has established a concise view into what happened to several of these large companies. We now seek to find how and why such outcomes are possible.

Acknowledgment

The research described in this paper was funded by the National Science Foundation grant CMS 0219953

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73

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References

Alesch, Daniel J., J. N. Holly, E. Mittler, and R. Nagy. (2000). *Organizations at Risk: When Small Business and Not for Profits Encounter Natural Disaster.* Public Entity Risk Institute. Fairfax, VA.

Harrald, John. R. (1998). A Strategic Framework for Corporate Crisis Management. *Proceedings, 1998 Conference of the International Emergency Management Society*. pp. 389-398.

Knight, Rory R. and D.J. Pretty. (2000). *The Impact of Catastrophes on Shareholder Value. Sedgwick Group Research Report*. University of Oxford. 22 pp.

Suarez-Villa and W. Wallace. (1999). "Losses from the Northridge Earthquake: Disruption to High-technology Industries in the Los Angeles Basin". *Disasters*. 23:1, pp. 19-44

Tierney, Kathleen J. (1997). "Business Impacts of the Northridge Earthquake. *Journal of Contingencies and Crisis Management* 5:2. pp. 87-97.

Webb, Gary R., Kathleen J. Tierney, James. M. Dahlhamer. (1999). "Predicting Long Term Business Recovery from Disaster: A comparison of the Loma Prieta Earthquake and Hurricane Andrew". *Preliminary Paper #292,* University of Delaware Disaster Research Center.

Webb, Gary R., Kathleen J. Tierney, James. M. Dahlhamer (2000) "Business and Disasters: Empirical Patterns and Unanswered Questions". Natural Hazards Review. Vol 1. pp. 83-90.

74