ERASMUS UNIVERSITEIT ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS

Natural disasters and the stock market

The effect of a natural disaster on a firm's stock price

Master Thesis Financial Economics

Jaap-Jan Slothouber

371034

Supervisor : Dr. E. Smajlbegovic

Second Assessor : Dr. X. Zhan

Date : August 2017

Abstract

This research goes into depth in terms of the underlying drivers of a stock impact in the event of a natural disaster. Via statistical analysis, the effect of a natural disaster on a firm, industry and state level in the United States from 1980 to 2016, is tested. A significant negative abnormal return is found during natural disasters, this negative abnormal return is stronger when the firm affected is either older or smaller. Furthermore, the industry in which the firm operates affects the impact of the natural disaster on an individual firm's stock return, but it remains uncertain how and why. The same holds for the state in which a firm is located. With all these findings firms and investors are better able to understand which firms are vulnerable to the damage of natural disasters and why. Furthermore, this research provides insights on firm returns during a natural disaster that can be helpful for future research.

Table of contents

1 Introduction

In last few decades, there has been a lot of research about the stock market impact of certain events. Also, the impact of natural disasters has been studied in multiple articles. Despite all this research, there is still a lot to be learned about the impact of natural disasters on the stock market. Most research till now studied the effect of a natural disaster on a global economy or the effect on the gross national product of a region hit by a natural disaster. What makes this research stand out is the sort of effect that is measured. This research will go into depth in terms of firm stock returns during natural disasters. What firm and natural disasters characteristics cause the effect found on the stock market during periods of natural disasters? This research will be based on the research question: "how are firm's stock prices affected by natural disasters?"

This research is beneficial for in several ways . First of all investors, this research will give answer to the question which sort of firms are vulnerable to natural disasters. This could help in assessing the risk of a firm and thus a portfolio for investment strategies. Furthermore, it gives useful insights for firms located in regions where natural disasters occur. Firms located in high-risk area's in terms of natural disasters could decide to create more reserves for their business if they are prone to the effects of a natural disaster.

A panel data event study will be used to find the effects named above. This means analyzing a data set over the course of multiple years, with multiple firms that have multiple different observations within the dataset. Statistical analyses are conducted to find clear, robust and significant effects. The statistical methods used are a Wilcoxon matched-pairs signed-rank test, OLS regressions and regressions with a fixed effects model.

Using the methods described above, this research finds evidence that natural disasters cause a negative price shock for firms located in the region of the natural disaster. The underlying characteristics like damage and amount of people that were killed by the natural disaster, do not have a significant effect on the firm stock returns in the region. Furthermore, the research shows that bigger firms cope better with the effects of a natural disaster than smaller firms whereas older firms are more affected during natural disasters. For the other firm variables used no significant an robust results were found. The industry in which a firm operates does have an effect on the stock market impact, but it remains uncertain and unclear which underlying characteristics cause this. The same holds for the state in which a firm operates.

With these new findings, several new possibilities for research come up. There is still a lot to learn in terms of firm returns during natural disasters. Still, the question remains what characteristic of the natural disaster exactly drives the stock returns during these disasters, although all research until this point cancelled out some possibilities. For the firm variables some clear evidence is found, but more research could lead to more firm variables that influence the stock market effect. Furthermore, will more research lead to more certainty and robustness on this topic. Therefore there is still a lot of research that could be done.

This research added the confirmation to the existing literature that natural disasters cause a negative stock impact. Furthermore, it confirmed that older and smaller firms face bigger impacts during natural disasters. New to the literature is the effect of industries and states. Never before industries classifications were tested with 48 different industries in a single research. This research found significant evidence which industries exactly outperform agriculture as an industry, during natural disasters. Lastly, evidence is found for differences between states in terms of stock market reaction during natural disasters. Therefore it is possible to say which states cope better with natural disasters. However it remains unclear why firms in some states have less impact during a natural disaster than firms in other states.

The practical contributions of this thesis are pointed at firms and investors. Investors now have more possibilities to assess the risk of a firm in an area that suffers a lot from natural disasters. Furthermore, the firms itself have more insight in what causes their negative or maybe not so negative stock return during natural disasters. Therefore firms can act upon this, by improving those characteristics or by taking other measures to ensure they can deal with a decline in stock prices.

2 Literature

Natural disasters are well-known phenomena that receive a lot of attention due to the possible catastrophic aftermath of those. Only for Hurricane Katrina multiple types of research were conducted (Shughart, 2006; Sobel & Leeson, 2006). This shows the attention given to these catastrophic events. The economic understanding of natural disasters, however, remains limited. The existing literature mainly covers the consequences of natural disasters on the national economy. This is mostly done in terms of Gross Domestic Product (GDP) and economic growth and inflation. This section is divided into two parts, of which the first sets forth the existing literature on national economic impact, the second sets forth the firm level impact of natural disasters.

2.1 National economic impacts

In the process of trying to find what impacts natural disasters have on firm-level, it is important to understand which natural disasters in which situations cause the most damage. A survey that contains a wide variety of literature up till 2009 finds that not only the severity of the natural disaster will describe the amount of damage (Cavallo & Noy, 2009). Evidence showed that richer countries do not suffer from less severe natural disasters although, they do suffer less from the deaths of these tragic events (Kahn, 2005). The explanation for this lies in the resources spent on the prevention of the effects of a natural disaster. This can be captured with higher quality building codes, land-use planning and engineering (Jaramillo, 2009). Furthermore, country size could also have an effect on the damage (Cavallo, Powell & Becerra, 2010). Bigger countries in terms of both size and GDP are likely to have more wealth exposed, therefore the amount of damage can be greater. On the other hand, larger more developed countries have the ability to better absorb the damage than smaller less developed countries (Auffret, 2003). To extend this country like characteristics, politics also seem to be important for the damage caused due to natural disasters (Healy & Malhotra, 2009). This research points to the importance of political accountability in terms of prevention measures instead of post-disaster aid.

One of the first cross country studies about the economic impact of natural disasters was published in the early nineties (Albala-Bertrand, 1993). The authors used before-after statistical analysis to find the impact of 28 disasters in 26 different countries in the period of 1960-1979. The main finding of this paper was an increase in GDP by 0,4 percent. Later more advanced econometric models including regressions were used to find the effects of natural disasters. With a panel vector auto regression, an attempt was done to find effects of external shocks including natural disasters (Rabbatz, 2007). Although the effect was small, a negative effect of natural disasters on output dynamics was found. In contrary to Rabbatz, Noy only studied the effects of natural disasters (Noy, 2009). Furthermore, he extended the model by adding interaction terms of the impact of the natural disaster in combination with macroeconomic, institutional or demographic or geographic characteristics. In doing so Noy comes with characteristics that decrease the negative effect of a natural disaster. The conclusion stated by Noy is the following: "countries with a higher literacy rate, better institutions, higher per capita income, higher degree of openness to trade, and higher levels of government spending are better able to withstand the initial disaster shock and prevent further spillovers into the macro-economy.".

Two years after the first paper by Rabbatz, he published another paper on natural disasters (Rabbatz,2009). By using a similar method as in his first paper, but focusing solely on natural disasters he finds a negative effect of 0,6 percent on GDP per capita, with the biggest impact of droughts with a one percent loss in GDP per capita. Rabbatz also concludes that small states and low-income countries are more vulnerable to natural disasters. Furthermore, Rabbatz showed that the biggest cost of the natural disasters occurs during the year of the disaster. In the same year, another method is used, namely: autoregressive integrated moving average models (ARIMA)(Hochrainer, 2009). By doing this he compares the actual GDP with the GDP as if the natural disaster never occurred. This thus takes into account the trend in GDP. The main finding here is also that natural disasters have a negative effect on GDP, but only significant in the case of large shocks.

Another interesting paper is one that takes a broad look at the effect of natural disasters and thereby reconciling the negative impact findings with the positive impact findings (Loayza,2009). This research uses a Generalized Method of Moments panel estimator to a cross-country panel. The authors study different disaster types in multiple sectors and countries. This allows them to find specific effects per industry, which is something that was not done before. This research finds three major insights. Firstly, disasters do affect growth, although not always negatively and differing per sector and disaster. Secondly, where disasters with a moderate impact can have a positive impact in some sectors, severe disasters do not. Lastly, the authors find that the growth in developing countries is more sensitive to natural disasters than in non-developing countries. Interesting to note is that just as the research from Rabbatz in 2009, this research also finds droughts to have the most negative effect. On the question of which sector is most negatively influenced there is no clear answer in this study due to a lack of significance in some sectors.

2.2 Firm level economic impacts

Where the previous section covered a lot of cross-country research about natural disasters, this section will go more into depth in terms of the effects that firms encounter. An important factor to is the fact that disasters interrupt business by destroying the factors of production and physical capital (Halliday, 2006; Albala-Bertrand, 1993). Kahn shows that high-quality institutions suffer less from this phenomenon (Kahn, 2005). This suggests that high-quality institutions are less vulnerable to natural disasters shows that not only geographical characteristics as mentioned in the previous section, but also firm-level characteristics have an effect on the losses caused by natural disasters.

Direct business interruptions are not always as clearly observable as property damage, for instance a decline in production, therefore the validity of these interruptions are somewhat doubted by some policymakers (Rose, 2004). In addition, this research also notes that indirect business interruptions via up- and downstream connections in the supply chain, could also cause severe damage. Earlier research already showed the importance of coping with these business interruptions (Tol & Leek, 1999). They found that not replacing destroyed capital will lead to a permanent drop in production level. On the other hand, when destroyed capital is replaced by either insurance, governmental aid or even internal reserves, the production level could even increase in the long-term. The intuition for this possible increase in long term output was clearly explained three years after the paper by Tol and Leek (Skidmore & Toya, 2002). The reasoning used in this research notes that sudden capital investment after a climatic disaster could lead to adopting new technologies which can lead to total factor improvements. This does not hold for geologic disasters. With this Tol & Leek and Skidmore & Toya are the first to find evidence regarding firm level characteristics that shape the relationship between natural disasters and firm level returns. The common characteristic in these cases is the firm's investment strategy. Other papers find evidence that age could be an underlying factor for this (Okuyama, 2003). Following Okuyama, more outdated facilities get struck harder by the damages of natural disasters, because of weaker structure and outdated regulations with older capital stock. With the possible technological progress in the recovery phase after a natural disaster, older capital stock is able to take advantage of this technological upgrade.

Furthermore, the occurrence of a natural disaster can lead to a rise in demand for certain goods and services (Shughart, 2006; Sobel & Leeson, 2006). These papers both studied the impact and disaster relief of the hurricane Katrina. A rise in demand could be beneficial for some sectors. Insurances also showed to be of importance in the restructuring after a natural disaster (Raschky, 2007). The findings by Raschky show that firms in regions with either mandatory insurance in Europe or take part in the

National Flood Insurance Program in the United States of America, are better off than firms in regions without these mechanisms.

One of the first papers that estimate the short term effect of natural disasters on firm level was published in 2007 (Leiter et al, 2007). The paper was slightly improved and republished with conclusions in the same line two years later (Leiter et al, 2009). In that paper, the effect of floods is captured using cross section European firm data. The study uses a difference in difference method between affected and non-affected regions. The focus in the paper is mainly on three aspects, firstly physical capital measured by a firms total assets. Secondly, employment expressed as the number of employees of a firm. Lastly, productivity, measured as the operating revenue per employee. The most important characteristic that is found in this research is the firm's tangibility. The finding is that the higher the intangibility of a firm affected by a flood, the higher the capital stock accumulation and the higher the employment growth. However, the opposite happens in terms of productivity. Their concluding interpretation is that firms with a higher intangibility are less vulnerable regarding flood impacts.

2.3 Stock market efficiency

One of the earlier studies about stock market efficiency comes from the well-known Fama, Fama was the first to introduce The Efficient Market Hypotheses (EMH) Fama (1970). According to EMH, stock prices should fully reflect all information about the market. The EMH has three different types, being: the weak form, the semi strong form, and the strong form.

The first one considered in this paper is the weak form of the efficient market; in this form, the information that is incorporated in the stock prices only contains historical information. The semi-strong form states that stock prices contain all publicly available information and lastly, the strong form hypothesis states that stock prices contain all information including private information. According to the theory, in this study, an important factor is the availability of information about the natural disaster and at what point in time this information is privately and publicly known.

2.4 Capital asset pricing model

This section will cover the capital asset pricing model or short, CAPM. The CAPM model will be used in this research to estimate the price of stock as if the natural disaster did not occur. This is needed to observe the effect of the natural disaster on a firm’s stock price. The CAPM model is originally developed by William F. Sharpe and Jack L. Treynor (Sharpe, 1964) (Treynor, 1961). The model assumes that (1) all assets have limited liability, (2) there are no transactions costs and taxes, (3) there is a sufficient number of investors with comparable wealth levels so that each investor believes he can buy and sell as much of an asset as he wants at the market price, (4) the capital market is always in equilibrium, (5) there exists an exchange market for borrowing and lending funds at the same rate of interest, (6) short sales of assets is allowed, (7) trading in assets takes place continually in time (Merton, 1973).

The model as we know it by now is as follows: $\bar{r}_i = r_F + \beta_i(\bar{r}_m - r_F)$

The model states that stock returns are based on the risk free rate in the market plus a firm factor dependent on the risk of the firm, multiplied by the market risk premium. The use of this model will be further described in the methodology section of this paper.

3 Hypotheses

To be able to answer the research question: "how are firm's stock prices affected by natural disasters?". It is important to test that there is in fact an effect on firm level. The expectation here that it will result in a drop is due to previous literature (Leiter et al, 2009). This leads to the first hypothesis.

Hypothesis 1: A natural disaster results in a stock price drop for firms located in the region of the natural disaster

Furthermore, the literature shows that natural disasters will cause business interruptions which will have a short-term negative effect (Halliday, 2006)(Albala-Bertrand, 1993).

The second hypothesis will dive further into the severity of the natural disaster. Previous literature pays a lot of attention to the severity of natural disasters as a descriptor of damage. This results in the second hypothesis of this paper.

Hypothesis 2: A more severe natural disaster will lead to a bigger stock price drop

The expectation here that stronger natural disasters will lead to bigger drops in price is formed by previous literature (Loayza,2009). Their finding is that moderate disasters can have a positive impact on some sectors, but severe disasters do not.

The following four hypotheses will determine what sorts of firm characteristics have an effect on the stock price impact of a natural disaster. To make a clear distinction between these characteristics, a hypothesis is created for each firm characteristic of interest.

Hypothesis 3: Lower tangibility of a firm leads to lower stock price impact of natural disasters

Hypothesis 4: Bigger firms are less affected by natural disasters

Hypothesis 5: Firms with a lower Tobin's Q ratio suffer less from natural disasters

Hypothesis 6: Older firms are more vulnerable to natural disasters

Starting with hypothesis number three, previous research showed that intangibility shapes the firm impact of a natural disaster (Leiter et al, 2009). With the overall conclusion being that more intangibility makes firms less vulnerable to natural disasters stock price impact.

The rationale behind the fourth hypothesis is derived from previous research as well (Evans, 1987). The finding of Evans is that bigger firms have a smaller chance of failure. Therefore I expect that bigger firms are less affected by natural disasters.

For the fifth hypothesis, the expectation is that firms with a higher growth potential are more heavily affected by natural disasters. This is in line with the reasoning that firms with a higher growth potential are smaller in terms of size (Dunne, 1989) (Evans, 1987). Also in line with both of these researches, smaller firms have a higher rate of failure. Therefore firms with a lower Tobin's Q suffer less from natural disasters.

The last hypothesis on firm characteristics is hypothesis number six. It follows from the literature that due to weaker structures and more outdated regulations older firms get hit harder (Okuyama, 2003). Although the recovery from this gives these older firm a chance to rebuild their firm and in doing so making it more efficient. But for the short run it is expected that , older firms are more vulnerable.

The very last two hypotheses will be about the sectors firms are in. This means firstly investigating whether stock market impacts differ per industry after a natural disaster. And secondly, whether location will the stock impact be different per state. These two questions lead to the following hypotheses.

Hypothesis 7: Agricultural industries are more affected by natural disasters

Hypothesis 8: Firms in smaller and less wealthy states are more affected by natural disasters

The intuition for hypothesis number seven comes from the previous research about the differences per sector (Loayza,2009). In this research, it shows that there are differences between the sectors of agricultural, industrial and services. This raises the idea that the one industry is able to better cope with the shock of a natural disaster than the other industry. This hypothesis will go further into depth in terms of industries, thereby it will add to the existing literature.

The last hypothesis will also re-examine previously written literature (Rabbatz,2009). The finding by Rabbatz concluded that small states and low-income countries are more vulnerable to the effect of a natural disaster. This will be tested taking into account the size and wealth of a state.

4 Data

This section will go further into depth in terms of the data used for this research. To be able to research the stock market effects of natural disasters, two different datasets are needed. First of all an uncommon database in economics that contains data on natural disasters. This is the Emergency Events Database, shortly EM-DAT (CRED, 2016). Secondly, a more common database within economics that contains information about firm and stock performance. For this research, Wharton Research Data Services (WRDS) will be used, which is a database by the University of Pennsylvania (Wharton University of Pennsylvania, 2016). Another database will be used to obtain the founding year of the firms, and with that the age. The database used for this is the Field-Ritter dataset of company founding dates from the Warrington college of business (Ritter, 2017). The needed information of size and wealth of the individual states are provided by Census (Census, 2017). For both the risk-free rate and the Fama & French 48 industry classification, the website of Kenneth R. French will be used (French, 2017). Lastly, Yahoo finance will be used to control for possible mistakes within WRDS (Yahoo finance, 2017). This section will start with information from the databases EM-DAT, WRDS, IPO founding dates, Census database, Kenneth R. French database and Yahoo finance subsequently. After which it will go into depth in terms of the merger of these databases. At the end of this section, the summary statistics and correlations between variables will be described as well as the variable creation.

4.1 EM-DAT database

Firstly EM-DAT, This database was founded in 1988 by the Centre for Research on the Epidemiology of Disasters (CRED) at the Catholic University of Louvain in Belgium. This was done with help of the World Health Organisation (WHO) and the Belgium government. The data is gathered from multiple sources such as UN agencies, insurance companies, research institutions and other non-governmental organizations. For a disaster to be in EM-DAT at least one out of three of the following criteria is required. The first criteria are about a number of deaths, 10 or more people are killed by the natural disaster. The second criteria are a number of people affected by the natural disaster, over a 100 people are affected by the natural disaster. Or lastly, a state of emergency is declared. In the database, there is a distinction between the different kinds of disasters. The disasters that will be taken into account with this research are earthquakes, floods, landslides, mass movement, volcanic activity, and wildfires. A final note on the variable selection of this database is that the damage reported only includes direct damages. The database contains 255 natural disasters in the United States in the period of 17 February 1980 to 13 August 2016. These natural disasters sometimes affected multiple states, in these cases this one disaster is regarded as a single event per state. The 255 natural disasters led to 570 different events, of which 102 were overlapping events. This means that the estimation period of 102 events contained a disaster. Therefore these events were excluded , this will be described extensively in the methodology section.

4.2 WRDS database

Secondly, the Wharton Research Data Services (WRDS) is used for firm specific information. Within WRDS, the CRSP[1] and the Compustat[2] database are used. From CRSP the daily stock prices, the value weighted return including dividend and S&P 500 return are derived. These stock prices will be the basis for the returns used in this research. Compustat is used for firm specific annual reporting data in this research. The overview of these variables can be found in table 1 in this section of the paper.

4.3 Field-Ritter dataset

The Field-Ritter data set of company founding dates is used to calculate the age of a firm. Although this database does not cover all the firms in the dataset, the data that is available is reliable. Obtaining the year of founding can be tricky due to changes in the name or mergers that occurred. This database looked into the real founding dates taking into account name changes, cooperations and mergers(Ritter, 2017).The summary statistics of the age can be found in table 1.

4.4 Census

The U.S. Census Bureau is a part of the U.S. Department of Commerce and is overseen by the Economics and Statistics Administration within the Department of Commerce. This bureau with over 4,000 members of staff provides high-quality economic analysis. The data used from this database are size and wealth of all the individual states. These will be used to find out whether state size or wealth shape the impact of a natural disaster on firm returns.

4.5 Kenneth R. French

The database by Kenneth R. French was used for two completely different data sets. The first one is the daily free cash-flow, this is a variable needed to calculate the normal return via the CAPM model as described in section 2.4 of the literature. The second one used is a database that contains the 48 industry classification by Fama & French. This database will be used to place all the firms in the data

---

[1] The Centre for Research in Security Prices (CRSP) maintains most comprehensive collection of security price return, and volume data for the NYSE, AMEX, and the Nasdaq stock markets. Thus only American stocks.

[2] Compustat consists of annual and quarterly report data of listed American and Canadian companies

set in the correct industry. This will, in the end, be used to find differences between industries during natural disasters.

4.6 Yahoo finance

The last database used is Yahoo finance. The S&P 500 prices are derived on a daily basis from this database. From these prices, the daily return will be calculated as described in section 5.2. These returns will be compared with the S&P 500 return from CRSP to ensure the correct numbers are used.

4.7 Summary statistics

The dataset contains 93,847 observations. An observation is created by linking the disasters to the firms on the basis of the location variable state. Furthermore, the date of the disaster is linked to obtain the stock prices of these firms on the days surrounding the event. Lastly, this database is linked with Compustat on the basis of Cusip (firm id) and year. With this dataset, the abnormal return is generated as described in the literature part of the Capital asset pricing model.

The first table of summary statistics provides information on the characteristics of the natural disasters and firms within the dataset. Whereas the second table summary statistics show what variables will be used in the regressions later on in the paper. Appendix 1.1 shows the variable transformation of the natural disaster characteristics, and appendix 1.2 shows the variable transformations of the firm specific characteristics. Starting with the abnormal return, in case of missing stock market data, the abnormal return could not be calculated. The mean of all three abnormal returns is negative, this shows that on average a firm has a negative price shock if a natural disaster occurs in the state in which the company is located. This, of course, does not provide single evidence about the effect of natural disasters since there could be confounding events that cause the negative price shock. The abnormal return variables are not transformed in order to run the regressions.

The next four variables are the ones from the EM-DAT database which indicate the severity of the natural disaster. The first table contains the real values of the variables. The number of deaths and affected persons are noted per person, furthermore, the damage and insured losses are denoted in thousands US dollars. As can be seen in table 1, those variables are somewhat skewed. Therefore these four variables are normalized by taking the natural logarithm of the variable plus one. The addition of the plus one prevents data loss, the natural logarithm of a zero has no value whereas the natural logarithm of one equals zero. By adding one to all observations this problem is solved.

The following three variables are the ones that contain information about the size of a firm, the numbers shown in the tables are denoted in millions of US dollars. Since these values are also highly skewed, again the natural logarithm is taken. For these variables, in contrary to the disaster variables, holds that a zero is an incorrect value, therefore, taking the natural logarithm without adding one before is the correct approach.

The next three variables are ratios of growth and financing structure. The Tobin's Q variable is a well-known company growth potential measure. The two leverage variables indicate which percentage of the firm is funded with debt. The skewness and kurtosis variables for these variables are just as the previous ones not desired for the assumptions of OLS regressions, therefore again the natural logarithm is taken.

Another variable that will be used in the regressions is free-cash-flow, this is a measure of the profitability of a firm. Since this variable can also have negative values, taking the natural logarithm is not the correct transformation to use. For the free-cash-flow, a method called winsorization is used. This replaces outliers to percentile of your liking. This is done on a one percentile and on a five percentile basis. As an example, with the winsorized value with cuts at one percent, the top percent with highest values is replaced by the value at 99 percent. Just as the values at the lowest percentage, these values are replaced with the value of the free-cash-flow at one percent.

The variable age is generated by subtracting the founding year found in the Field-Ritter dataset from the year of the natural disaster. In this way, the age at the moment of the natural disaster is calculated. This variable will be used in later regressions to decide whether age has influenced the stock market impact of a firm during a natural disaster.

Lastly, the variable intangibility is a measure of what part of the firm consists of assets that are not physical in nature. Again to reduce the skewness and kurtosis the natural logarithm is taken.

Table 1	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	N	mean	sd	min	max	skewness	kurtosis
1-Day [0]	92,300	-0.00563	0.217	-40.29	48.83	55.40	41,023
3-Day [-1,+1] CAR	92,294	-0.0164	0.412	-110.9	48.35	-193.3	58,739
5-Day [-2,+2] CAR	92,279	-0.0266	0.567	-158.2	47.62	-229.3	66,286
Totaldeaths	93,847	8.662	13.44	0	90	1.922	6.423
Totalaffected	93,847	134,433	1.088e+06	0	1.100e+07	9.835	98.21
Totaldamage000US	93,847	949,428	3.265e+06	0	3.000e+07	6.567	53.19
Insuredlosses000US	93,847	237,956	958,390	0	1.040e+07	9.593	101.1
Assets	80,483	4,957	46,829	0	2.573e+06	31.00	1,203
Market value of equity	84,832	2,427	18,538	0	3.478e+06	85.90	14,729
Market value of assets	37,123	4,981	30,070	0	3.507e+06	49.42	5,058
Tobins Q	37,112	2.673	37.08	0	4,264	77.61	6,898
Market leverage	36,841	0.184	0.237	0	1	1.554	4.908
Book leverage	37,164	0.198	0.287	0	17.78	11.41	480.0
Free cash flow	58,857	83.80	852.1	-19,863	50,629	18.30	688.5
Age	25,043	38.09	22.37	2	177	2.111	8.462
intangibility	73,120	0.0989	0.161	0	0.969	2.031	6.791

Table 2	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	N	mean	sd	min	max	skewness	kurtosis
1-Day [0]	92,300	-0.00563	0.217	-40.29	48.83	55.40	41,023
3-Day [-1,+1] CAR	92,294	-0.0164	0.412	-110.9	48.35	-193.3	58,739
5-Day [-2,+2] CAR	92,279	-0.0266	0.567	-158.2	47.62	-229.3	66,286
LN totaldeaths *	93,847	1.383	1.323	0	4.511	0.496	1.876
LN totalaffected *	93,847	6.400	3.793	0	16.21	-0.177	2.536
LN totaldamage000US *	93,847	8.753	5.724	0	17.22	-0.653	1.832
LN insuredlosses000US *	93,847	5.196	6.200	0	16.16	0.383	1.204
LN assets	80,468	5.666	2.288	-6.908	14.76	0.155	3.002
LN market value of equity	83,632	5.347	2.122	-5.878	15.06	0.201	3.085
LN market value of assets	36,841	6.204	2.163	-6.215	15.07	-0.0729	3.583
LN tobins Q	36,840	0.327	0.894	-11.25	8.358	-0.473	11.98
LN market leverage *	36,841	0.152	0.180	0	0.693	1.207	3.625
LN book leverage *	37,164	0.162	0.184	0	2.933	1.624	9.431
Free cash flow w [1,99]	58,857	57.16	304.1	-632.9	2,224	4.924	33.42
Free cash flow w [5,95]	58,857	30.86	100.6	-91	371.3	2.317	8.039
Age	25,043	38.09	22.37	2	177	2.111	8.462
LN intangibility *	73,120	0.0852	0.130	0	0.677	1.753	5.351

* = A variable that used a method of adding the value of 1 before computing the data

The variables shown above in table 2 are the ones that will be used in the regressions. A possible problem in doing so is multicollinearity, Multicollinearity occurs when two or more predictor variables are highly correlated. Therefore a correlation matrix including significance in shown in table 3 below. The tolerance measure is used to decide which variables may cause multicollinearity (Tabachnick et al, 2001).

Tolerance= 1 - R^2

A value of 0,10 is recommended as the minimum value of tolerance. This implies that the variables Ln assets, Ln market value of equity and market value of assets cannot be used in combination within a single regression. For all the other variables holds that they are not even close to the tolerance measure. Therefore all other variables can be combined in a single regression.

Table 3

	Ln total deaths *	Ln total affected *	Ln total damage *	Ln total insured losses *	Ln asstes	Ln mv equity	Ln mv assets	Ln tobins Q	Ln market leverage *	Ln book leverage *	Fcf [1,99]	Fcf [5,95]	Ln intangi-bility *
Ln total deaths *	1.0000												
Ln total affected *	0.2871 0.0000	1.0000											
Ln total damage *	0.4065 0.0000	0.4177 0.0000	1.0000										
Ln total insured losses *	0.3638 0.0000	0.2224 0.0000	0.3972 0.0000	1.0000									
Ln assets	0.0527 0.0000	0.0911 0.0000	0.0117 0.0009	0.0202 0.0000	1.0000								
Ln mv equity	0.0127 0.0002	0.0854 0.0000	0.0300 0.0000	-0.0268 0.0000	0.8535 0.0000	1.0000							
Ln mv assets	0.1182 0.0000	0.0170 0.0011	0.0398 0.0000	0.0295 0.0000	0.9125 0.0000	0.9775 0.0000	1.0000						
Ln tobins Q	-0.0404 0.0000	-0.0116 0.0262	0.0408 0.0000	-0.0010 0.8455	-0.1461 0.0000	0.2578 0.0000	0.2713 0.0000	1.0000					
Ln market leverage *	0.0853 0.0000	-0.0087 0.0949	-0.0406 0.0000	-0.0013 0.8046	0.2247 0.0000	-0.0373 0.0000	0.0353 0.0000	-0.4435 0.0000	1.0000				
Ln book leverage *	0.0946 0.0000	-0.0097 0.0621	-0.0171 0.0010	0.0103 0.0465	0.2486 0.0000	0.0956 0.0000	0.2128 0.0000	-0.0533 0.0000	0.7786 0.0000	1.0000			
Fcf [1,99]	0.0162 0.0001	0.0574 0.0000	0.0318 0.0000	0.0224 0.0000	0.3980 0.0000	0.4215 0.0000	0.4721 0.0000	0.0326 0.0000	-0.0466 0.0000	-0.0175 0.0017	1.0000		
Fcf [5,95]	0.0349 0.0000	0.0701 0.0000	0.0334 0.0000	0.0265 0.0000	0.5278 0.0000	0.5439 0.0000	0.5818 0.0000	0.0205 0.0002	-0.0356 0.0000	0.0153 0.0061	0.7858 0.0000	1.0000	
Ln intangibility *	-0.0099 0.0074	0.0545 0.0000	0.0051 0.1697	-0.0030 0.4155	0.1175 0.0000	0.2236 0.0000	0.1833 0.0000	-0.0167 0.0017	0.0740 0.0000	0.1193 0.0000	0.1701 0.0000	0.2462 0.0000	1.0000

5 Methodology

This section will describe the methods used in this research, to give a clear view on all the analysis. The section will start with an explanation of the event study where the estimation windows and event periods will be described. The following part will contain the Capital Asset Pricing Model (CAPM) explanation, which is used to generate the normal and abnormal returns. Lastly, the regression framework will be set forth.

5.1 The event study

This research is a combination of an event study and panel data. This means that there are multiple events and multiple returning firms in the dataset. In an event study, an estimation window is used to generate stock returns as if the event did not occur. The estimation window is followed by an event window; this is the period in which the event occurred. The day of the event is day number 0 the day ten days before the event is -10, and so forth. An important part of the event study method is that the estimation window does not overlap with another event. Since the estimation window could be biased if the occurrence of an event is regarded as normal. This EM-DAT database used contained many natural disasters, therefore the events with an overlapping estimation window were deleted. Furthermore, the first two events were also deleted since there was no information available about natural disasters in the estimation window. This led to the deletion of 102 natural disasters. For all the remaining natural disasters an estimation window and an event window was created. The event window starts at day -2 minimum and ends at day +2 maximum. Furthermore, any event window in-between is created. The event period also contains days before the event since nowadays it is possible to see natural disasters coming a few days up front, as is the case with hurricanes. The estimation window is a period of 50 days. This might be somewhat short in comparison to other event studies. A longer estimation window leads to a higher accuracy of the normal returns. But since there were many overlapping events, a longer estimation window would to dropping even more natural disasters. Besides, in other previous papers, smaller estimation windows have been used (Tucker, Guermat, & Prasert, 2012). Conclusively, the estimation window in this research goes from day -53 to day -3.

5.2 Capital Asset Pricing Model

The CAPM model described in the literature section will be used to generate the normal return for the event period described above. In order to do so, a beta, risk-free rate, and market return are needed. A beta is a number that indicates the correlation between a firm and the stock market. Two betas are generated in the estimation window, one in comparison with the S&P 500 and one in comparison with the value weighted return including dividends from CRSP. The risk-free rate is obtained from the website of Kenneth R. French. Lastly, the return of the market was obtained from CRSP and Yahoo finance on a daily basis. Both the return of the market and the firm return were computed by the following formula:

$$stock\ return = \frac{new\ price - old\ price}{old\ price}$$

The return of the S&P 500 computed from Yahoo finance was the exact same as the return found on CRSP. Therefore these both will be regarded as the S&P 500 return. With this data following the CAPM model the normal returns were calculated, one for the S&P 500 and one for the value weighted return including dividends from CRSP. The abnormal return is the return used as the dependent variable for this research. The abnormal return was generated by subtracting the normal return from the real return.

5.3 Return difference method

To ensure this research is robust, another method than the CAPM model is used to find abnormal returns. This method will simply subtract the market return from the individual stock return to find the difference between those two. This will be done both using the S&P 500 and the value weighted return including dividends from CRSP. The intuition is that this is a measure that compares the stock return with the return of the market. If all firms at every point in time were included, and the market portfolio contains all firms in the dataset, this difference should be zero on average. When only using the time periods of disasters, leads to a negative or a positive difference versus the market, this is regarded as the effect caused by the natural disaster. The expectation is that the CAPM model as described above is better able to obtain the correct normal returns. Therefore this method should be seen as a test for robustness in this research.

5.4 Statistical framework

The framework described in this section is based on the hypotheses formed in the section 3 of this research. For all methods described in this section holds that the tests and regressions will run on four different cumulative average abnormal returns (CAAR) The two methods for finding the abnormal returns described above in combination with the two different market return portfolio's, the S&P 500 return and the value weighted return including dividends from CRSP. The first regressions will contain the natural disaster variables only, first separately and then combined. This will only give a hint of information since the firm control variables are still left out of the equation. These will be added in later regressions.

Furthermore, for the first hypothesis, a Wilcoxon matched-pairs signed-rank test will be used to find out whether the AAR and CAAR are significantly different from zero.

For the next four hypotheses, hypotheses three to six, the same regressions will be used as before, only firm variables will be added to the equation. First one at the time, and then combined. The regressions with the firm variables one at the time will show which firm variables are the most significant. By observing this, a choice can be made for the best firm variable which indicates size (LN assets, LN Market value of equity and LN market value of assets), leverage (LN book leverage* and LN market leverage) and lastly profitability (FCF winsorized 1% and FCF winsorized 5%). The most significant variables will be combined at the end.

The last two hypotheses will be answered using a fixed effect model, for industry, state and year. A fixed effects model creates a dummy variable for each of the possible values. This means for each industry, state and year in the dataset. These dummies will be added to the regression. The effect caused by either the year in which the disaster took place, the state in which it took place and the industry in which the firm operates are will be separated from the disaster and firm variables, therefore making the regression more robust. By using this fixed effects model there is no need to exclude certain firms because of the industry in which they operate. Furthermore, the last two hypotheses, whether industry and state have an effect on the stock impact, can be answered.

6 Results

This section will give insight to the results of the result found following the previous sections. The order of the regressions will follow the order of the hypotheses stated in section 3 of this research. The answers to the hypotheses will follow in the conclusion.

The first regressions contain information about the natural disasters only. In Appendix 2.1 to 2.4, the first regressions with only a single natural disaster variable can be observed for all four different abnormal return models. The first regression with only the total deaths variable explaining the abnormal returns, hints towards a negative effect for the amount of deaths on the stock return. Twelve out of the sixteen event periods show a negative significant effect of the total deaths variable on the abnormal return. The total affected variable has a positive significant effect for each CAAR in the CAPM models, but a negative effect for the return difference method at the event period (-2, +2). Furthermore, the disaster damage variable shows some positive and some negative effects, possibly one of the later regressions including other variables will give a clear sign and significance. The insured losses variable shows some negative significant effects on the abnormal returns. Since all these four variables meet the requirements of the tolerance measure explained in section 4.4, they are combined, as shown below in table 4 and appendix 2.5.

Table 4 VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.318***	-0.734***	-1.305***	-0.789***
	(0.101)	(0.261)	(0.411)	(0.258)
LNTotalaffectedplus1	0.0572***	0.186***	0.351***	0.211***
	(0.00674)	(0.0143)	(0.0217)	(0.0138)
LNTotaldamage000USplus1	0.0335***	0.0793***	0.119***	0.0721**
	(0.0115)	(0.0287)	(0.0448)	(0.0283)
LNInsuredlosses000USplus1	0.00977	-0.00842	-0.0253	-0.000323
	(0.0185)	(0.0483)	(0.0761)	(0.0478)
Constant	-2.042***	-6.128***	-10.15***	-6.209***
	(0.129)	(0.210)	(0.307)	(0.208)
Observations	92,309	92,309	92,309	92,309
R-squared	0.000	0.001	0.001	0.001

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The model with the most significance and the highest R-squared is the one in table 4. The total deaths variable shows to have a strong negative and significant effect on the abnormal returns, whereas the total affected and the total damage variable shows to have a positive effect on all average abnormal return periods. Besides the regressions also a Wilcoxon matched-pairs signed-rank test was conducted. The results of this can be found in the table below.

Table 5

	AAR (0)			CAAR (-1,+1)			CAAR (-2,+2)			CAAR (0,+2)		
sign	N	Rank	Expected	N	Rank	Expected	N	Rank	Expected	N	Rank	Expected
positive	36690	2E+09	2E+09	34493	1E+09	2E+09	33713	1E+09	2E+09	35095	1E+09	2E+09
negative	55610	3E+09	2E+09	57801	3E+09	2E+09	58566	3E+09	2E+09	57190	3E+09	2E+09
zero	0	0	0	0	0	0	0	0	0	0	0	0
all	92300	4E+09	4E+09	92294	4E+09	4E+09	92279	4E+09	4E+09	92285	4E+09	4E+09
	-			-			-			-		
Z-value	66.417			85.891			92.428			83.397		
prob.	0.0000			0.0000			0.0000			0.0000		

CAPM model S&P 500 abnormal returns

The table shows that on all abnormal return periods the abnormal return significantly differs from zero. With more negative observations in all cases, a negative observation means an abnormal return below zero. The tables of the Wilcoxon matched-pairs signed-rank test for the other three abnormal returns can be found in appendix 3.1 to 3.3. All returns are equal economically speaking and are all very significant. The abnormal returns during natural disasters are significantly lower than zero.

The following set of regressions will contain all the disaster variables as shown in table 4, but each regression a different firm variable will be added. By doing so, the correct firm variables can be chosen for the later regressions. In the regressions with only one firm variable, only the effect of that one variable will be observed. In later regressions including more firm variables, the change in effect of the natural disaster variables will be captured.

The complete set of regressions can be found in appendix 4. Appendix 4.1 to 4.3 will contain the regression including a firm size variable. Since the correlation between these three variables, they cannot be combined. The first regression includes the natural logarithm of assets. This variable has a positive significant effect on the abnormal return for the CAPM models, however, for the return difference models, this effect is negative but less significant. Again the model with the most significance is the one with the CAPM model of the value weighted return from CRSP. The next size variable tested is the market value of assets. The amount of observations changes drastically from the previous regressions since debt information is not available for all firms. Just as the natural logarithm of assets, the market value of assets mostly has a positive effect on the returns, except some values at the return difference method with little significance. The last size variable is market value of equity. Since the debt is not needed for calculating this variable, the number of observations increases again. The results are similar to the ones of the natural logarithm of assets. Just as the natural logarithm of assets, the market value of equity has a positive significant effect on abnormal return except for some observations in the return difference method. Out of the three size variables, market value of equity is the one that will be used for later regressions. This is due to a larger amount of observations versus the market value of assets and a higher R squared and slightly more significance versus the natural logarithm of assets.

The next variable added will be Tobin's q, this regression can be observed in appendix 4.4. The table shows Tobin's Q has a strong positive and significant effect on the abnormal return in the CAPM models. The return difference models show mixed effects of the value of Tobin's Q on the abnormal returns. Once more the CAPM model of the value weighted returns from CRSP shows to be the best one.

The next two variables will show the effect of leverage, with the one being book leverage and the other being market leverage. These regressions can be found in appendix 4.5 and 4.6. The results from the two tables do not differ a significantly from each other. With both variables indicating a highly negative and significant effect of leverage on the abnormal return. Since the R squared is slightly higher using market leverage, it will be used in the following sets of regressions.

The next part of this set of regressions is to decide on which is the best measure of profitability. Two variables are defined for this, both are free cash-flow where the one is winsorized at one percent and the other is winsorized at five percent. The results of these regressions can be found in appendix 4.7 and appendix 4.8. Profitability, or free cash-flow, shows to have a positive effect on the abnormal returns during natural disasters. Just as in previous regressions the CAPM models have more significance than the return difference models. Furthermore, the CRSP value weighted market returns shows to have more significance than the S&P 500. The results of the free cash-flow winsorized at one percent or winsorized at five percent are similar, with slightly more significance and a higher R-squared using the free cash flow winsorized at five percent. Thus this will be the one used in the next set of regressions.

Appendix 4.9 shows the results of the regressions including an intangibility factor. Intangibility has a positive significant effect on the abnormal returns in the CAPM models. The return difference again shows no clear significant results. Once again the CAPM model is the model with most significance and highest R-squared.

The last firm variable is firm age, results of these regressions can be found in appendix 4.10. The CAPM models show a negative effect of age on the abnormal returns during natural disasters with strong significance. Some event periods of the return difference model show the opposite, although with low significance. The amount of observations dropped drastically including the age variable since the lack of observations described in the data section. Due to this significant drop in observations, the age variable will not be used in every regression from now on.

Now all firm variables will be combined, the results of these regressions can be found in appendix 4.11. The regressions using the CAPM model are the ones with the higher R-squared, therefore these results will be interpreted here. The effect of the total deaths on the abnormal return is unclear with some negative significant and some positive significant values. The variable amount of people affected has a negative effect on the abnormal returns. Furthermore, damage seems to have a positive effect on the returns and the insured losses give mixed results. An important note to take into account with regards to these regressions is that a lot of observations are lost using all variables, thereforethe results of these regressions should be interpreted with caution. The firm variables in these regressions show a positive effect of market value of equity on the returns, whereas free cash-flow shows to have a negative effect. Leverage also has a significant negative effect on the abnormal returns. The CAPM model using the value weighted return form CRSP again shows to have the highest R-squared.

In the following regressions shown in table 6 below and appendix 4.12 again a regression is shown with multiple firm variables, only is this the regression without a big loss in observations. Since the CAPM model using the value weighted return is the best model in all previous regressions, this is the one that this paper will focus on the most from now on. The other model will be used as robustness test.

The amount of deaths again shows a negative effect on the abnormal return periods, whereas the amount of people affected shows to have some positive effects. Just as in the previous set of regressions again the firm size variable being market value of equity shows to have a positive effect and the profitability measure of free cash-flow has a negative effect. This implies that more profitable firms suffer more. The intangibility of a firm also shows to have a positive effect on the returns during a natural disaster. Lastly, the effect of age is tested in combination with multiple firm variables, this is shown in appendix 4.13. Here only the model with the best fit is shown. Age shows to have a negative effect on the abnormal returns during natural disasters.

Table 6	(1)	(2)	(3)	(4)
VARIABLES	vwar0percent	vwcar11percent	vwcar22percent	vwcar02percent
LNTotaldeathsplus1	-0.382**	-0.858*	-1.467**	-0.907**
	(0.178)	(0.461)	(0.724)	(0.455)
LNTotalaffectedplus1	0.00917	0.0745***	0.183***	0.101***
	(0.0116)	(0.0240)	(0.0364)	(0.0234)
LNTotaldamage000USplus1	0.0215	0.0437	0.0617	0.0395
	(0.0192)	(0.0482)	(0.0754)	(0.0475)
LNInsuredlosses000USplus1	0.0311	0.0374	0.0490	0.0544
	(0.0342)	(0.0897)	(0.141)	(0.0886)
LNmvequity	0.455***	1.277***	2.063***	1.326***
	(0.140)	(0.367)	(0.578)	(0.363)
fcf_w5	-0.00299**	-0.00798**	-0.0127**	-0.00874**
	(0.00135)	(0.00360)	(0.00567)	(0.00356)
LNratiointangibleplus1	1.013**	3.560***	5.933***	3.621***
	(0.475)	(0.798)	(1.204)	(0.793)
Constant	-4.129***	-12.25***	-20.19***	-12.63***
	(0.707)	(1.569)	(2.421)	(1.551)
Observations	52,163	52,163	52,163	52,163
R-squared	0.001	0.002	0.003	0.002

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Now all firm variables have been studied, the effect of the industry in which a firm is doing business will be assessed. The results of these regressions can be found in appendix 4.14. This model used is a so called fixed effects model. A dummy for each category, so in this case for each industry is generated. Each dummy gets its own coefficient with matching significance level. This means the effect of operating in a certain industry is shown. Furthermore, it helps the regression overall since it takes out the effect of the industry out of the firm and disaster variables. In the regression table, all 48 Fama & French industries are shown except for the first one, agriculture, this is the omitted variable. This thus means that all the industry coefficients should be interpreted in comparison with agriculture. This means that for instance, a firm operating in the healthcare industry has a significantly higher return during natural disasters. The following industries cope significantly better with a natural disaster than agriculture: Recreation, Healthcare, Medical Equipment, Pharmaceutical Products, Chemicals, Construction, Steel Works Etc, Machinery, Electrical Equipment, Business Services, Computers, Electronic Equipment, Measuring and Control Equipment, Transportation, Retail, Restaurants & Hotels/Motels, Insurance and Almost Nothing. These industries are service industries and industrial industries following Loayza (Loayza,2009).

The last and final hypothesis is about the effect of the location of the firm, the state in which it is located to be more precise. This is tested with the same sort of model as the industries, only this is done twice to assess the effect of size and wealth of a state. Appendix 4.15 shows all the states and the characteristics of size and wealth including the rank for the both. Appendix 4.16 and 4.17 show the results of the regressions. Appendix 4.16 takes into account the size, the biggest state is the one with rank number one, which is Alaska. Alaska in this regression is the omitted variable, this thus means that all the state coefficients should be interpreted in comparison with Alaska. Although some states significantly differ from Alaska in terms of return during natural disasters, there is no clear sign that the size of the state is a factor for this. The next regression is order on the basis of GDP per capita in a state. Just as the size this is also done in ranks, Massachusetts is the state with rank number one, therefore all results should be interpreted in comparison with Massachusetts. Once more some states do significantly differ from the rank number one state. But also this time there is no clear line in the coefficients following the ranks.

Out of the fixed effects models, the industry fixed effects model showed to be the one with the higher R-squared of the two. This fixed effects model will be used in the final regression in combination with year fixed effects. This final regression will show whether all the previous results were caused by either industry and/or year. The outcomes of this final model will thus be regarded as the most correct model in this research. The results of these regressions are displayed in table 7 below and in appendix 4.18.

Table 7	(1)	(2)	(3)	(4)
VARIABLES	vwar0percent	vwcar11percent	vwcar22percent	vwcar02percent
LNTotaldeathsplus1	-0.0813	0.0474	0.0760	0.00433
	(0.108)	(0.121)	(0.138)	(0.122)
LNTotalaffectedplus1	4.91e-05	0.0436***	0.104***	0.0595***
	(0.00758)	(0.0152)	(0.0224)	(0.0147)
LNTotaldamage000USplus1	0.0102	0.0176	0.0255	0.0197
	(0.00920)	(0.0166)	(0.0239)	(0.0163)
LNInsuredlosses000USplus1	-0.00634	-0.0466**	-0.0846***	-0.0276
	(0.0157)	(0.0207)	(0.0263)	(0.0202)
LNmvequity	0.342***	0.839***	1.293***	0.880***
	(0.112)	(0.301)	(0.476)	(0.298)
fcf_w5	-0.00313**	-0.00760**	-0.0118**	-0.00843**
	(0.00135)	(0.00367)	(0.00580)	(0.00363)
LNratiointangibleplus1	-0.621	-1.490**	-2.887***	-1.614**
	(0.442)	(0.694)	(1.026)	(0.697)
Constant	-3.859***	-11.07***	-17.49***	-11.11***
	(0.662)	(1.405)	(2.147)	(1.423)
Observations	52,046	52,046	52,046	52,046
R-squared	0.006	0.009	0.011	0.010
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The regression shows that the total amount of people affected has a positive influence on the stock returns during natural disasters, for all CAAR's. Whereas the negative effect of the amount of deaths found earlier lost its significance. The last disaster variable that shows to have significant effect is the insured losses variable. For the event period (-1,+1) and (-2,+2) it shows to have a negative effect on the CAAR during a natural disaster.

The three firm variables used in these regressions also show to have impact on the abnormal returns. As found in all previous regressions, the size variable market value of equity has a positive effect on the abnormal returns during natural disasters. Whereas free cash-flow has a negative effect on this same return. Lastly, the intangibility ratio that showed a positive effect in most previous regressions, now also shows to have a negative effect on the abnormal returns.

7 Conclusion and discussion

This section will be conclusive to all previous sections and will answer the hypotheses and main question raised in section 3. First, all hypotheses will be answered in this section and the main question, “how are firm’s stock prices affected by natural disasters?”. Second, in the discussion section limitations to this research and recommendations for future research will be explained.

7.1 Conclusion

The first hypothesis; “A natural disaster results in a stock price drop for firms located in the region of the natural disaster” is accepted. The Wilcoxon matched-pairs signed-rank test showed that all the abnormal returns were significantly lower than zero in a dataset with firm returns in the area of a natural disaster.

For the second hypothesis, regressions models are used to find whether the severity of a natural disaster has an effect on the abnormal returns, more specific, a more severe natural disaster will lead to a bigger stock price drop. The severity variables were captured by the amount of deaths, people affected and damage in US dollars. No clear negative effect is found, actually, the amount of people affected showed to have a positive effect. This second hypothesis is therefore rejected. This could be due to the fact that this information could be unavailable immediately after a disaster.

Hypotheses 3 to 6 all assess firm variables that could affect the abnormal returns during natural disasters. The first firm variable tested is tangibility, with the hypothesis; Lower tangibility of a firm leads to lower stock price impact of natural disasters. Mixed effects were found in the regressions, the earlier regressions seemed to confirm the hypothesis but the negative values in the last model showed the opposite. Therefore the hypothesis is rejected. This indicates that the effects found earlier were influenced by the state or in industry of the firm.

The next firm hypothesis is about firm size. Three different variables have been tested and market value of equity showed to be the best out of the three. The hypothesis tested is; “bigger firms are less affected by natural disasters ”. The variable market value of equity showsa positive effect on the abnormal returns even in the final regressions. Therefore the hypothesis is accepted, bigger firms are less affected by natural disasters.

Another firm variable that is tested in this research is the Tobin's Q ratio of a firm. Where the hypothesis states that firms with a lower Tobin's Q ratio suffer less from natural disasters. This has been tested in multiple regressions, but this resulted in mixed results, therefore the fifth hypothesis is rejected.

The final firm variable tested is the age of the firm that is hit by a natural disaster. Where the hypothesis is that older firms are more vulnerable to natural disasters. This hypothesis is accepted, the negative coefficient for age means that older firms have significantly lower abnormal returns during natural disasters.

Hypothesis number seven goes into depth in terms of the industry in which a firm operates. Following the hypothesis, agricultural industries are more affected by natural disasters. In the regression agriculture is the omitted variable. Multiple industries show to be affected less by natural disasters than agriculture, but this does not hold for every industry. Therefore the hypothesis is rejected. But it is clear that the one industry is able to cope better with the effects of natural disasters than the other.

The final hypothesis is about the location of a firm that is hit by a natural disaster and of course the effect of this. From previous researches the hypothesis; smaller and less wealthy states are more affected by natural disasters, is formed. The two test that was used to indicate that there are significant differences per state, but this was not caused by either the wealth of size of the state. Therefore the final hypothesis must be rejected.

To conclude, how are firm's stock prices affected by natural disasters? This research shows that a natural disaster causes negative stock market impact for firms located in the region of the natural disaster. Although it is unclear what natural disasters characteristics really cause this, since no evidence is found for the amount of people hurt or the amount of damage done. Furthermore, the research shows that bigger firms cope better with the effects of a natural disaster than smaller firms whereas older firms are more affected during natural disasters. The state and industry in which a firm operates do have an effect on the stock market impact, but it remains uncertain and unclear which underlying characteristics cause this.

7.2 Discussion

This part will go into the area of improvements of the research and will contain the limitations of this research and recommendations for future research. The first limitation is that this research only investigates the effect of natural disasters in the United States and therefore also only firms located in the United States. This means that the results found in this research only hold for the United States. Another limitation to the dataset is the timeframe, there was no data before 1980 on natural disasters in the EM-DAT database . However this , of course, does not mean there were no natural disasters before. Therefore this research only holds for 1980 till 2016 in the United States.

Other than limitations to the dataset there are also limitations to the models used. Instead of the CAPM model or the model that observes the difference between firm return and market return, different models can also be used,. For instance the three factor of the five-factor model by Fama and French. What this research does is finding the firm return as if the natural disaster did not occur and comparing that with the return as it actually was. There is no possibility yet that is able to exactly find the return as if an event did not occur, but it is crucial to the research that the estimation is as close as possible. Therefore using more and different methods would make a research like this more robust.

Another possibility for future research is to assume that the effects differ per sort of natural disaster. This could be done using dummy’s or running separate regressions for each sort of regressions, by doing so the research is more robust since the type of disaster is accounted for.

Finally, firm location is a factor that could be more precise because of two reasons. The first one is that if a state is hit by a natural disaster, this doesn't mean every square mile is hit by the natural disaster. Therefore the one firm in the state could be affected whereas the other firm could have missed the natural disaster. By making the location more precise this problem would be countered and results will be more precise. The second reason is one that has to do with the multiple facilities of a firm. Although a firms headquarter is in the state of a disaster, this doesn't mean that the whole business of this firm is in that state only. The other way around, a firm can have a headquarter in state without the occurrence of a natural disaster. The firm can still be affected by the natural disaster if it has some value or business in the state of the disaster without the headquarter.

References

Albala-Bertrand, J. M. (1993). Political economy of large natural disasters: with special reference to developing countries. OUP Catalogue.

Auffret, P. (2003). High consumption volatility: The impact of natural disasters?.

Cavallo, E. A., & Noy, I. (2009). The economics of natural disasters: a survey.

Cavallo, E., Powell, A., & Becerra, O. (2010). Estimating the direct economic damages of the earthquake in Haiti. The Economic Journal, 120(546), F298-F312.

Census. (2017, August 10). American fact finder. Retrieved from United states census bureau: https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

CRED. (2016, December 22). EM-DAT the international disaster database. Retrieved from Welcome to the EM-DAT website: http://www.emdat.be/

Dunne, T., Roberts, M. J., & Samuelson, L. (1989). The growth and failure of US manufacturing plants. The Quarterly Journal of Economics, 104(4), 671-698.

Evans, D. S. (1987). The relationship between firm growth, size, and age: Estimates for 100 manufacturing industries. The journal of industrial economics, 567-581.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. The journal of Finance, 25(2), 383-417.

French, K. R. (2017, August 2). Data library. Retrieved from Kenneth R. French: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Halliday, T. (2006). Migration, risk, and liquidity constraints in El Salvador. Economic development and cultural change, 54(4), 893-925.

Healy, A., & Malhotra, N. (2009). Myopic voters and natural disaster policy. American Political Science Review, 387-406.

Hochrainer, S. (2009). Assessing the macroeconomic impacts of natural disasters: are there any?

Jaramillo, C. R. (2009). Do natural disasters have long-term effects on growth?.

Kahn, M. E. (2005). The death toll from natural disasters: the role of income, geography, and institutions. Review of economics and statistics, 87(2), 271-284.

Leiter, A. M., Oberhofer, H., & Raschky, P. A. (2007). Productive disasters? Evidence from European firm level data (No. 2007-25). working Papers in Economics and Statistics.

Leiter, A. M., Oberhofer, H., & Raschky, P. A. (2009). Creative disasters? Flooding effects on capital, labour and productivity within European firms. Environmental and Resource Economics, 43(3), 333-350.

Loayza, N., Olaberria, E., Rigolini, J., & Christiaensen, L. (2009). Natural Disasters and Growth. Development Research.

Merton, R. C. (1973). An intertemporal capital asset pricing model. Econometrica: Journal of the Econometric Society, 867-887

Noy, I. (2009). The macroeconomic consequences of disasters. Journal of Development economics, 88(2), 221-231.

Okuyama, Y. (2003). Economics of natural disasters: A critical review. Research paper, 12, 20-22.

Raddatz, C. (2007). Are external shocks responsible for the instability of output in low-income countries?. Journal of Development Economics, 84(1), 155-187.

Raddatz, C. E. (2009). The wrath of God: macroeconomic costs of natural disasters.

Raschky, P. A. (2007). Estimating the effects of risk transfer mechanisms against floods in Europe and USA: a dynamic panel approach (No. 2007-05). Working papers in economics and statistics.

Ritter, J. R. (2017, july 19). IPO data. Retrieved from Warrington college of business: https://site.warrington.ufl.edu/ritter/ipo-data/

Rose, A. (2004). Economic principles, issues, and research priorities in hazard loss estimation. In Modeling spatial and economic impacts of disasters (pp. 13-36). Springer Berlin Heidelberg.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. The journal of finance, 19(3), 425-442.

Shughart, W. F. (2006). Katrinanomics: The politics and economics of disaster relief. Public Choice, 127(1-2), 31-53.

Skidmore, M., & Toya, H. (2002). Do natural disasters promote long-run growth?. Economic Inquiry, 40(4), 664-687.

Sobel, R. S., & Leeson, P. T. (2006). Government's response to Hurricane Katrina: A public choice analysis. Public Choice, 127(1-2), 55-73.

Tabachnick, B. G., Fidell, L. S., & Osterlind, S. J. (2001). Using multivariate statistics.

Tol, R., & Leek, F. (1999). Economic analysis of natural disasters. Climate change and risk, 308-327.

Treynor, J. L. (1961). Market value, time, and risk.

Tucker, J., Guermat , C., & Prasert, S. (2012). Short-run reaction to news announcements: UK evidence. Working Paper Series (ISSN 2041-1596).

Wharton University of pennsylvania. (2016, 12 29). The Center for Research in Security Prices (CRSP). Retrieved from WRDS: http://www.whartonwrds.com/datasets/CRSP/

Yahoo finance. (2017, July 15). S&p500. Retrieved from Yahoo finance: https://finance.yahoo.com/quote/%5EGSPC/history?p=%5EGSPC

Appendix 1

Appendix 1.1

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max	(6) skewness	(7) kurtosis
Totaldeaths	93,847	8.662	13.44	0	90	1.922	6.423
LNTotaldeaths	61,511	1.871	1.269	0	4.500	0.0655	1.653
Totaldeathsplus1	93,847	9.662	13.44	1	91	1.922	6.423
LNTotaldeathsplus1	93,847	1.383	1.323	0	4.511	0.496	1.876
Totalaffected	93,847	134,433	1.088e+06	0	1.100e+07	9.835	98.21
LNTotalaffected	77,760	7.720	2.676	0.693	16.21	0.616	2.856
Totalaffectedplus1	93,847	134,434	1.088e+06	1	1.100e+07	9.835	98.21
LNTotalaffectedplus1	93,847	6.400	3.793	0	16.21	-0.177	2.536
Totaldamage000US	93,847	949,428	3.265e+06	0	3.000e+07	6.567	53.19
LNTotaldamage000US	68,093	12.06	2.285	5.704	17.22	-0.281	2.604
Totaldamage000USplus1	93,847	949,429	3.265e+06	1	3.000e+07	6.567	53.19
LNTotaldamage000USplus1	93,847	8.753	5.724	0	17.22	-0.653	1.832
Insuredlosses000US	93,847	237,956	958,390	0	1.040e+07	9.593	101.1
LNInsuredlosses000US	39,042	12.49	1.145	9.210	16.16	-0.0467	4.486
Insuredlosses000USplus1	93,847	237,957	958,390	1	1.040e+07	9.593	101.1
LNInsuredlosses000USplus1	93,847	5.196	6.200	0	16.16	0.383	1.204

Appendix 1.2

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max	(6) skewness	(7) kurtosis
assets	80,483	4,957	46,829	0	2.573e+06	31.00	1,203
lnassets	80,468	5.666	2.288	-6.908	14.76	0.155	3.002
mvequity	84,832	2,427	18,538	0	3.478e+06	85.90	14,729
LNmvequity	83,632	5.347	2.122	-5.878	15.06	0.201	3.085
LNmvassets	36,841	6.204	2.163	-6.215	15.07	-0.0729	3.583
mvassets	37,123	4,981	30,070	0	3.507e+06	49.42	5,058
tobinsq	37,112	2.673	37.08	0	4,264	77.61	6,898
LNtobinsq	36,840	0.327	0.894	-11.25	8.358	-0.473	11.98
mktleverage	36,841	0.184	0.237	0	1	1.554	4.908
LNmktleverage	27,736	-2.360	2.002	-13.69	0	-1.623	5.749
mktleverageplus1	36,841	1.184	0.237	1	2	1.554	4.908
LNmktleverageplus1	36,841	0.152	0.180	0	0.693	1.207	3.625
bookleverage	37,164	0.198	0.287	0	17.78	11.41	480.0
LNbookleverage	27,771	-2.131	1.793	-13.09	2.878	-1.698	6.167
bookleverageplus1	37,164	1.198	0.287	1	18.78	11.41	480.0
LNbookleverageplus1	37,164	0.162	0.184	0	2.933	1.624	9.431
fcf	58,857	83.80	852.1	-19,863	50,629	18.30	688.5
fcf_w	58,857	57.16	304.1	-632.9	2,224	4.924	33.42
fcf_w95	58,857	30.86	100.6	-91	371.3	2.317	8.039
Founding year	25,043	1979	22.37	1840	2015	-2.111	8.462
ratiointangible	73,120	0.0989	0.161	0	0.969	2.031	6.791
ratiointangibleplus1	73,120	1.099	0.161	1	1.969	2.031	6.791
LNratiointangibleplus1	73,120	0.0852	0.130	0	0.677	1.753	5.351

Appendix 2

Appendix 2.1

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.134	-0.259	-0.492*	-0.373**
	(0.0819)	(0.196)	(0.276)	(0.184)
Constant	-0.378***	-1.280***	-1.979***	-1.065***
	(0.127)	(0.188)	(0.245)	(0.182)
Observations	92,300	92,294	92,279	92,285
R-squared	0.000	0.000	0.000	0.000

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0932**	-0.110**	-0.200***	-0.103**
	(0.0469)	(0.0491)	(0.0514)	(0.0498)
Constant	0.127	0.116	0.313**	0.146
	(0.123)	(0.126)	(0.130)	(0.127)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.196**	-0.455**	-0.850**	-0.488**
	(0.0893)	(0.222)	(0.348)	(0.220)
Constant	-1.501***	-4.672***	-7.628***	-4.644***
	(0.130)	(0.205)	(0.294)	(0.204)
Observations	92,309	92,309	92,309	92,309
R-squared	0.000	0.000	0.000	0.000

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)
VARIABLES	vwar0percentd	vwcar11percentd	vwcar22percentd	vwcar02percentd
LNTotaldeathsplus1	-0.0691	-0.0784	-0.182***	-0.0972*
	(0.0469)	(0.0490)	(0.0513)	(0.0497)
Constant	0.122	0.109	0.296**	0.148
	(0.123)	(0.126)	(0.130)	(0.127)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 2.2

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotalaffectedplus1	0.00913	0.0432**	0.0964***	0.0385**
	(0.00913)	(0.0188)	(0.0270)	(0.0184)
Constant	-0.621***	-1.915***	-3.277***	-1.828***
	(0.0913)	(0.114)	(0.149)	(0.117)
Observations	92,300	92,294	92,279	92,285
R-squared	0.000	0.000	0.000	0.000

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotalaffectedplus1	-0.00546	-0.00676	-0.0276***	0.00719
	(0.00717)	(0.00887)	(0.0103)	(0.00867)
Constant	0.0327	0.00665	0.212**	-0.0422
	(0.0941)	(0.102)	(0.107)	(0.101)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotalaffectedplus1	0.0499***	0.159***	0.285***	0.177***
	(0.00967)	(0.0210)	(0.0326)	(0.0207)
Constant	-2.091***	-6.322***	-10.63***	-6.454***
	(0.0920)	(0.121)	(0.163)	(0.119)
Observations	92,309	92,309	92,309	92,309
R-squared	0.000	0.000	0.000	0.000

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotalaffectedplus1	-0.00486	-0.00508	-0.0334***	-0.00330
	(0.00716)	(0.00885)	(0.0103)	(0.00866)
Constant	0.0578	0.0328	0.258**	0.0346
	(0.0941)	(0.101)	(0.107)	(0.101)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 2.3

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldamage000USplus1	0.00537	-0.00197	-0.0207	-0.00825
	(0.01000)	(0.0257)	(0.0368)	(0.0243)
Constant	-0.610***	-1.621***	-2.479***	-1.509***
	(0.0889)	(0.139)	(0.188)	(0.136)
Observations	92,300	92,294	92,279	92,285
R-squared	0.000	0.000	0.000	0.000

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldamage000USplus1	-0.00631	-0.0176***	-0.0481***	-0.0238***
	(0.00419)	(0.00526)	(0.00633)	(0.00534)
Constant	0.0530	0.118	0.457***	0.213**
	(0.0846)	(0.0906)	(0.0965)	(0.0913)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldamage000USplus1	0.0236**	0.0581**	0.0819*	0.0562*
	(0.0111)	(0.0294)	(0.0463)	(0.0290)
Constant	-1.978***	-5.811***	-9.522***	-5.812***
	(0.0913)	(0.154)	(0.225)	(0.152)
Observations	92,309	92,309	92,309	92,309
R-squared	0.000	0.000	0.000	0.000

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldamage000USplus1	-0.00743*	-0.0156***	-0.0461***	-0.0222***
	(0.00418)	(0.00525)	(0.00631)	(0.00533)
Constant	0.0918	0.137	0.448***	0.208**
	(0.0846)	(0.0905)	(0.0964)	(0.0912)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 2.4

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNInsuredlosses000USplus1	0.00705	-0.0162	-0.0486*	-0.0278
	(0.00982)	(0.0186)	(0.0257)	(0.0178)
Constant	-0.600***	-1.554***	-2.407***	-1.436***
	(0.119)	(0.227)	(0.311)	(0.216)
Observations	92,300	92,294	92,279	92,285
R-squared	0.000	0.000	0.000	0.000

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNInsuredlosses000USplus1	-0.00596	-0.0247***	-0.0389***	-0.0136
	(0.00823)	(0.00881)	(0.00954)	(0.00897)
Constant	0.0288	0.0919	0.238**	0.0745
	(0.0983)	(0.102)	(0.105)	(0.102)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNInsuredlosses000USplus1	0.00510	-0.0110	-0.0355	-0.00646
	(0.0103)	(0.0209)	(0.0317)	(0.0207)
Constant	-1.798***	-5.244***	-8.619***	-5.286***
	(0.125)	(0.255)	(0.388)	(0.253)
Observations	92,309	92,309	92,309	92,309
R-squared	0.000	0.000	0.000	0.000

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNInsuredlosses000USplus1	-0.00585	-0.0187**	-0.0348***	-0.0112
	(0.00823)	(0.00881)	(0.00953)	(0.00896)
Constant	0.0571	0.0977	0.225**	0.0717
	(0.0983)	(0.102)	(0.105)	(0.102)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 2.5

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.195**	-0.330	-0.584*	-0.450**
	(0.0921)	(0.230)	(0.325)	(0.216)
LNTotalaffectedplus1	0.0150**	0.0707***	0.164***	0.0763***
	(0.00636)	(0.0125)	(0.0184)	(0.0128)
LNTotaldamage000USplus1	0.0130	0.0114	-0.000307	0.0171
	(0.0105)	(0.0251)	(0.0356)	(0.0238)
LNInsuredlosses000USplus1	0.0154	-0.00431	-0.0255	-0.00952
	(0.0167)	(0.0425)	(0.0605)	(0.0400)
Constant	-0.582***	-1.711***	-2.769***	-1.547***
	(0.126)	(0.193)	(0.259)	(0.189)
Observations	92,300	92,294	92,279	92,285
R-squared	0.000	0.000	0.000	0.000

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.100**	-0.0791*	-0.121**	-0.0826*
	(0.0452)	(0.0480)	(0.0510)	(0.0483)
LNTotalaffectedplus1	0.00311	0.0112	0.0114	0.0313***
	(0.00552)	(0.00802)	(0.00965)	(0.00747)
LNTotaldamage000USplus1	0.00200	-0.00552	-0.0315***	-0.0235***
	(0.00618)	(0.00731)	(0.00839)	(0.00737)
LNInsuredlosses000USplus1	0.000666	-0.0180**	-0.0195**	-0.00279
	(0.00756)	(0.00836)	(0.00926)	(0.00845)
Constant	0.0959	0.144	0.507***	0.138
	(0.121)	(0.128)	(0.135)	(0.129)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0680	-0.0499	-0.103**	-0.0759
	(0.0452)	(0.0480)	(0.0510)	(0.0483)
LNTotalaffectedplus1	0.00321	0.00969	0.00161	0.0168**
	(0.00551)	(0.00800)	(0.00962)	(0.00745)
LNTotaldamage000USplus1	-0.00176	-0.00786	-0.0300***	-0.0195***
	(0.00618)	(0.00730)	(0.00837)	(0.00736)
LNInsuredlosses000USplus1	-0.000368	-0.0133	-0.0160*	-0.000399
	(0.00756)	(0.00835)	(0.00924)	(0.00844)
Constant	0.118	0.145	0.522***	0.185
	(0.121)	(0.128)	(0.135)	(0.129)
Observations	92,582	92,570	92,546	92,564
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 3

Appendix 3.1

	AAR (0)			CAAR (-1,+1)			CAAR (-2,+2)			CAAR (0,+2)		
sign	N	Rank	Expected	N	Rank	Expected	N	Rank	Expected	N	Rank	Expected
positive	43760	2E+09	2E+09	42877	2E+09	2E+09	43611	2E+09	2E+09	43335	2E+09	2E+09
negative	48822	2E+09	2E+09	49693	2E+09	2E+09	48935	2E+09	2E+09	49229	2E+09	2E+09
zero	0	0	0	0	0	0	0	0	0	0	0	0
all	92582	4E+09	4E+09	92570	4E+09	4E+09	92546	4E+09	4E+09	92564	4E+09	4E+09
	-			-			-			-		
Z-value	17.088			20.176			16.588			17.079		
prob.	0.0000			0.0000			0.0000			0.0000		

Return difference S&P 500 abnormal returns

Appendix 3.2

	AAR (0)			CAAR (-1,+1)			CAAR (-2,+2)			CAAR (0,+2)		
sign	N	Rank	Expected	N	Rank	Expected	N	Rank	Expected	N	Rank	Expected
positive	25627	9E+08	2E+09	21495	7E+08	2E+09	20046	6E+08	2E+09	21547	7E+08	2E+09
negative	66407	3E+09	2E+09	70551	4E+09	2E+09	72008	4E+09	2E+09	70508	4E+09	2E+09
zero	0	0	0	263	34716	34716	255	32640	32640	0	32385	32385
all	92309	4E+09	4E+09	92309	4E+09	4E+09	92309	4E+09	4E+09	92309	4E+09	4E+09
	-			-						-		
Z-value	147.23			181.88			-192.7			181.23		
prob.	0.0000			0.0000			0.0000			0.0000		

CAPM model value weighted return including dividend CRSP abnormal returns

Appendix 3.3

	AAR (0)			CAAR (-1,+1)			CAAR (-2,+2)			CAAR (0,+2)		
sign	N	Rank	Expected	N	Rank	Expected	N	Rank	Expected	N	Rank	Expected
positive	43713	2E+09	2E+09	43119	2E+09	2E+09	43602	2E+09	2E+09	43263	2E+09	2E+09
negative	48869	2E+09	2E+09	49451	2E+09	2E+09	48944	2E+09	2E+09	49301	2E+09	2E+09
zero	0	0	0	0	0	0	0	0	0	0	0	0
all	92582	4E+09	4E+09	92570	4E+09	4E+09	92546	4E+09	4E+09	92564	4E+09	4E+09
					0	0						
	-			-			-					
Z-value	14.166			17.787			16.179			-16.93		
prob.	0.0000			0.0000			0.0000			0.0000		

Return difference value weighted return including dividend CRSP abnormal returns

Appendix 4

Appendix 4.1

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.203*	-0.340	-0.599	-0.480*
	(0.108)	(0.271)	(0.384)	(0.254)
LNTotalaffectedplus1	-0.00194	0.0280**	0.106***	0.0411***
	(0.00686)	(0.0118)	(0.0176)	(0.0126)
LNTotaldamage000USplus1	0.0124	0.00569	-0.00847	0.0128
	(0.0113)	(0.0267)	(0.0378)	(0.0253)
LNInsuredlosses000USplus1	0.0216	0.00614	-0.0118	-0.00163
	(0.0195)	(0.0496)	(0.0706)	(0.0467)
lnassets	0.165***	0.452***	0.735***	0.442***
	(0.0487)	(0.113)	(0.158)	(0.106)
Constant	-1.434***	-4.024***	-6.586***	-3.824***
	(0.315)	(0.516)	(0.690)	(0.496)
Observations	79,009	79,003	78,992	78,997
R-squared	0.000	0.001	0.001	0.001

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.105**	-0.0687	-0.123**	-0.0790
	(0.0507)	(0.0540)	(0.0575)	(0.0543)
LNTotalaffectedplus1	-0.000587	0.00871	0.0174	0.0321***
	(0.00652)	(0.00928)	(0.0114)	(0.00885)
LNTotaldamage000USplus1	0.00339	-0.00675	-0.0324***	-0.0240***
	(0.00682)	(0.00813)	(0.00942)	(0.00823)
LNInsuredlosses000USplus1	0.00358	-0.0182*	-0.0239**	-0.00177
	(0.00864)	(0.00959)	(0.0107)	(0.00969)
lnassets	-0.00812	-0.0674**	-0.103***	-0.0551*
	(0.0288)	(0.0311)	(0.0339)	(0.0316)
Constant	0.163	0.564*	1.122***	0.473
	(0.280)	(0.295)	(0.308)	(0.296)
Observations	79,276	79,265	79,247	79,262
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.308***	-0.686**	-1.230**	-0.733**
	(0.119)	(0.308)	(0.485)	(0.305)
LNTotalaffectedplus1	0.0304***	0.111***	0.235***	0.138***
	(0.00712)	(0.0133)	(0.0197)	(0.0128)
LNTotaldamage000USplus1	0.0314**	0.0685**	0.103**	0.0629**
	(0.0123)	(0.0304)	(0.0475)	(0.0300)
LNInsuredlosses000USplus1	0.0170	0.00540	-0.00538	0.0160
	(0.0215)	(0.0564)	(0.0889)	(0.0558)
lnassets	0.261***	0.735***	1.220***	0.748***
	(0.0528)	(0.128)	(0.199)	(0.126)
Constant	-3.446***	-10.07***	-16.75***	-10.27***
	(0.325)	(0.571)	(0.839)	(0.565)
Observations	79,017	79,017	79,017	79,017
R-squared	0.001	0.001	0.002	0.002

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0749	-0.0437	-0.107*	-0.0754
	(0.0506)	(0.0540)	(0.0574)	(0.0543)
LNTotalaffectedplus1	0.000161	0.00663	0.00707	0.0185**
	(0.00652)	(0.00926)	(0.0114)	(0.00882)
LNTotaldamage000USplus1	0.000381	-0.00819	-0.0298***	-0.0189**
	(0.00682)	(0.00812)	(0.00940)	(0.00821)
LNInsuredlosses000USplus1	0.00286	-0.0126	-0.0197*	0.000528
	(0.00863)	(0.00957)	(0.0106)	(0.00967)
lnassets	-0.00845	-0.0617**	-0.0947***	-0.0524*
	(0.0288)	(0.0311)	(0.0339)	(0.0316)
Constant	0.179	0.530*	1.070***	0.487*
	(0.280)	(0.295)	(0.308)	(0.296)
Observations	79,276	79,265	79,247	79,262
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.2

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.0862***	0.0569	0.122*	-0.120**
	(0.0248)	(0.0497)	(0.0721)	(0.0474)
LNTotalaffectedplus1	-0.0400***	-0.0509***	-0.0188	-0.0537***
	(0.00728)	(0.0164)	(0.0239)	(0.0176)
LNTotaldamage000USplus1	0.0290***	0.0502***	0.0734***	0.0350***
	(0.00532)	(0.0125)	(0.0168)	(0.0116)
LNInsuredlosses000USplus1	0.0146***	-0.0519***	-0.140***	-0.0429***
	(0.00565)	(0.0137)	(0.0193)	(0.0128)
LNmvassets	0.188***	0.384***	0.526***	0.315***
	(0.0143)	(0.0321)	(0.0555)	(0.0406)
Constant	-1.393***	-2.946***	-4.161***	-2.123***
	(0.119)	(0.275)	(0.407)	(0.301)
Observations	36,230	36,229	36,225	36,225
R-squared	0.009	0.008	0.008	0.005

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0787***	-0.0975***	-0.109**	0.0461
	(0.0225)	(0.0367)	(0.0537)	(0.0440)
LNTotalaffectedplus1	-0.0343***	0.00669	0.0390**	0.0263**
	(0.00699)	(0.0145)	(0.0187)	(0.0125)
LNTotaldamage000USplus1	0.00870*	0.00346	0.00309	0.0273***
	(0.00444)	(0.00855)	(0.0116)	(0.00839)
LNInsuredlosses000USplus1	0.0153***	-0.0132*	-0.0780***	-0.0543***
	(0.00447)	(0.00789)	(0.0120)	(0.00861)
LNmvassets	0.0666***	0.0102	-0.0941*	0.0192
	(0.0129)	(0.0281)	(0.0501)	(0.0349)
Constant	-0.361***	-0.190	0.595*	-0.503**
	(0.106)	(0.231)	(0.348)	(0.241)
Observations	36,317	36,313	36,308	36,313
R-squared	0.002	0.000	0.002	0.001

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.152***	-0.201***	-0.345***	-0.135**
	(0.0264)	(0.0568)	(0.0822)	(0.0588)
LNTotalaffectedplus1	-0.0638***	-0.143***	-0.183***	-0.113***
	(0.00754)	(0.0168)	(0.0239)	(0.0153)
LNTotaldamage000USplus1	0.0472***	0.116***	0.187***	0.140***
	(0.00576)	(0.0144)	(0.0199)	(0.0131)
LNInsuredlosses000USplus1	0.0224***	-0.0135	-0.0594***	-0.0345**
	(0.00610)	(0.0150)	(0.0214)	(0.0144)
LNmvassets	0.244***	0.551***	0.804***	0.555***
	(0.0148)	(0.0356)	(0.0597)	(0.0399)
Constant	-2.537***	-6.358***	-9.835***	-6.730***
	(0.128)	(0.323)	(0.476)	(0.310)
Observations	36,231	36,231	36,231	36,231
R-squared	0.015	0.015	0.014	0.014

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0563**	-0.0797**	-0.111**	0.0286
	(0.0224)	(0.0365)	(0.0535)	(0.0439)
LNTotalaffectedplus1	-0.0303***	0.000554	0.0233	0.00649
	(0.00697)	(0.0145)	(0.0187)	(0.0125)
LNTotaldamage000USplus1	0.00431	0.00133	-0.000175	0.0227***
	(0.00443)	(0.00853)	(0.0116)	(0.00837)
LNInsuredlosses000USplus1	0.0126***	-0.0125	-0.0655***	-0.0398***
	(0.00445)	(0.00787)	(0.0120)	(0.00859)
LNmvassets	0.0647***	0.00965	-0.0913*	0.0204
	(0.0129)	(0.0280)	(0.0500)	(0.0348)
Constant	-0.324***	-0.112	0.697**	-0.364
	(0.106)	(0.231)	(0.348)	(0.241)
Observations	36,317	36,313	36,308	36,313
R-squared	0.002	0.000	0.002	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.3

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.210**	-0.380	-0.651*	-0.495**
	(0.102)	(0.254)	(0.360)	(0.239)
LNTotalaffectedplus1	0.00188	0.0357***	0.116***	0.0463***
	(0.00629)	(0.0111)	(0.0166)	(0.0118)
LNTotaldamage000USplus1	0.0106	0.00735	-0.00819	0.0120
	(0.0118)	(0.0282)	(0.0400)	(0.0267)
LNInsuredlosses000USplus1	0.0208	0.0103	-0.00209	0.00281
	(0.0196)	(0.0498)	(0.0709)	(0.0469)
LNmvequity	0.240***	0.664***	1.051***	0.614***
	(0.0677)	(0.166)	(0.235)	(0.157)
Constant	-1.763***	-4.996***	-8.010***	-4.576***
	(0.376)	(0.742)	(1.026)	(0.706)
Observations	83,374	83,372	83,360	83,364
R-squared	0.001	0.001	0.002	0.001

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0980**	-0.0823	-0.124**	-0.0755
	(0.0490)	(0.0520)	(0.0552)	(0.0524)
LNTotalaffectedplus1	0.00141	0.0126	0.0237**	0.0349***
	(0.00600)	(0.00865)	(0.0106)	(0.00821)
LNTotaldamage000USplus1	0.00236	-0.00266	-0.0280***	-0.0210***
	(0.00676)	(0.00798)	(0.00913)	(0.00803)
LNInsuredlosses000USplus1	-0.00174	-0.0234**	-0.0280***	-0.00669
	(0.00870)	(0.00952)	(0.0104)	(0.00962)
LNmvequity	-0.00890	-0.0678*	-0.134***	-0.0447
	(0.0333)	(0.0355)	(0.0389)	(0.0362)
Constant	0.161	0.504*	1.157***	0.338
	(0.290)	(0.303)	(0.316)	(0.303)
Observations	83,624	83,618	83,599	83,611
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.336***	-0.791***	-1.390***	-0.837***
	(0.112)	(0.289)	(0.455)	(0.286)
LNTotalaffectedplus1	0.0401***	0.139***	0.280***	0.166***
	(0.00656)	(0.0125)	(0.0186)	(0.0120)
LNTotaldamage000USplus1	0.0301**	0.0719**	0.106**	0.0640**
	(0.0129)	(0.0322)	(0.0504)	(0.0318)
LNInsuredlosses000USplus1	0.0171	0.0126	0.00982	0.0228
	(0.0216)	(0.0567)	(0.0893)	(0.0560)
LNmvequity	0.350***	0.985***	1.611***	1.015***
	(0.0742)	(0.189)	(0.297)	(0.187)
Constant	-3.778***	-11.03***	-18.21***	-11.31***
	(0.397)	(0.834)	(1.276)	(0.824)
Observations	83,378	83,378	83,378	83,378
R-squared	0.001	0.002	0.003	0.003

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0665	-0.0542	-0.107*	-0.0701
	(0.0490)	(0.0519)	(0.0552)	(0.0524)
LNTotalaffectedplus1	0.00200	0.0108	0.0130	0.0204**
	(0.00599)	(0.00863)	(0.0106)	(0.00819)
LNTotaldamage000USplus1	-0.00152	-0.00510	-0.0265***	-0.0172**
	(0.00676)	(0.00797)	(0.00911)	(0.00801)
LNInsuredlosses000USplus1	-0.00279	-0.0185*	-0.0241**	-0.00416
	(0.00870)	(0.00951)	(0.0104)	(0.00960)
LNmvequity	-0.00848	-0.0627*	-0.125***	-0.0416
	(0.0333)	(0.0355)	(0.0389)	(0.0362)
Constant	0.180	0.482	1.131***	0.370
	(0.290)	(0.303)	(0.316)	(0.303)
Observations	83,624	83,618	83,599	83,611
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.4

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.0277	0.174***	0.277***	-0.0331
	(0.0252)	(0.0500)	(0.0730)	(0.0508)
LNTotalaffectedplus1	-0.0377***	-0.0467***	-0.0141	-0.0518***
	(0.00729)	(0.0163)	(0.0236)	(0.0173)
LNTotaldamage000USplus1	0.0283***	0.0491***	0.0733***	0.0361***
	(0.00535)	(0.0126)	(0.0170)	(0.0117)
LNInsuredlosses000USplus1	0.0125**	-0.0561***	-0.145***	-0.0464***
	(0.00567)	(0.0137)	(0.0195)	(0.0129)
LNtobinsq	0.305***	0.576***	0.631***	0.246**
	(0.0393)	(0.0833)	(0.143)	(0.104)
Constant	-0.391***	-0.883***	-1.273***	-0.345**
	(0.0665)	(0.144)	(0.201)	(0.143)
Observations	36,229	36,228	36,224	36,224
R-squared	0.005	0.004	0.004	0.001

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0571**	-0.0934**	-0.143***	0.0585
	(0.0229)	(0.0371)	(0.0551)	(0.0422)
LNTotalaffectedplus1	-0.0333***	0.00691	0.0370**	0.0277**
	(0.00699)	(0.0145)	(0.0185)	(0.0125)
LNTotaldamage000USplus1	0.00820*	0.00317	0.00441	0.0257***
	(0.00443)	(0.00841)	(0.0114)	(0.00828)
LNInsuredlosses000USplus1	0.0145***	-0.0133*	-0.0770***	-0.0545***
	(0.00447)	(0.00783)	(0.0121)	(0.00866)
LNtobinsq	0.134***	0.0439	-0.260**	0.194**
	(0.0362)	(0.0676)	(0.116)	(0.0767)
Constant	-0.0162	-0.145	0.136	-0.463***
	(0.0607)	(0.112)	(0.150)	(0.107)
Observations	36,316	36,312	36,307	36,312
R-squared	0.002	0.000	0.002	0.001

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.0814***	-0.0475	-0.130	0.0241
	(0.0267)	(0.0563)	(0.0824)	(0.0572)
LNTotalaffectedplus1	-0.0618***	-0.139***	-0.180***	-0.109***
	(0.00756)	(0.0168)	(0.0239)	(0.0154)
LNTotaldamage000USplus1	0.0473***	0.117***	0.191***	0.141***
	(0.00582)	(0.0146)	(0.0201)	(0.0133)
LNInsuredlosses000USplus1	0.0197***	-0.0195	-0.0682***	-0.0406***
	(0.00614)	(0.0151)	(0.0216)	(0.0145)
LNtobinsq	0.272***	0.464***	0.445***	0.576***
	(0.0404)	(0.0853)	(0.138)	(0.0902)
Constant	-1.188***	-3.260***	-5.226***	-3.649***
	(0.0720)	(0.167)	(0.235)	(0.153)
Observations	36,230	36,230	36,230	36,230
R-squared	0.006	0.005	0.005	0.006

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0351	-0.0762**	-0.144***	0.0413
	(0.0229)	(0.0370)	(0.0549)	(0.0421)
LNTotalaffectedplus1	-0.0293***	0.000691	0.0213	0.00788
	(0.00697)	(0.0145)	(0.0185)	(0.0124)
LNTotaldamage000USplus1	0.00381	0.00114	0.00121	0.0213**
	(0.00442)	(0.00839)	(0.0114)	(0.00826)
LNInsuredlosses000USplus1	0.0119***	-0.0126	-0.0645***	-0.0400***
	(0.00445)	(0.00780)	(0.0121)	(0.00865)
LNtobinsq	0.132***	0.0318	-0.265**	0.193**
	(0.0362)	(0.0674)	(0.115)	(0.0766)
Constant	0.0104	-0.0662	0.256*	-0.317***
	(0.0605)	(0.112)	(0.150)	(0.107)
Observations	36,316	36,312	36,307	36,312
R-squared	0.001	0.000	0.002	0.001

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.5

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.0246	0.187***	0.308***	-0.0122
	(0.0254)	(0.0503)	(0.0723)	(0.0497)
LNTotalaffectedplus1	-0.0398***	-0.0505***	-0.0182	-0.0533***
	(0.00729)	(0.0164)	(0.0240)	(0.0176)
LNTotaldamage000USplus1	0.0296***	0.0508***	0.0736***	0.0354***
	(0.00534)	(0.0127)	(0.0169)	(0.0117)
LNInsuredlosses000USplus1	0.0121**	-0.0570***	-0.147***	-0.0471***
	(0.00567)	(0.0137)	(0.0194)	(0.0129)
LNmktleverageplus1	-0.915***	-2.149***	-3.362***	-1.827***
	(0.172)	(0.336)	(0.475)	(0.354)
Constant	-0.149**	-0.368**	-0.570**	0.000482
	(0.0682)	(0.158)	(0.225)	(0.150)
Observations	36,230	36,229	36,225	36,225
R-squared	0.003	0.003	0.004	0.002

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0610***	-0.0962**	-0.138**	0.0551
	(0.0232)	(0.0375)	(0.0536)	(0.0421)
LNTotalaffectedplus1	-0.0343***	0.00668	0.0389**	0.0264**
	(0.00699)	(0.0145)	(0.0187)	(0.0125)
LNTotaldamage000USplus1	0.00924**	0.00366	0.00264	0.0271***
	(0.00443)	(0.00856)	(0.0115)	(0.00826)
LNInsuredlosses000USplus1	0.0145***	-0.0133*	-0.0768***	-0.0546***
	(0.00448)	(0.00785)	(0.0121)	(0.00870)
LNmktleverageplus1	-0.0883	0.0666	0.326	-0.254
	(0.164)	(0.296)	(0.400)	(0.298)
Constant	0.0471	-0.138	-0.00879	-0.354***
	(0.0599)	(0.114)	(0.162)	(0.123)
Observations	36,317	36,313	36,308	36,313
R-squared	0.001	0.000	0.002	0.001

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.0796***	-0.0376	-0.103	0.0333
	(0.0269)	(0.0570)	(0.0823)	(0.0574)
LNTotalaffectedplus1	-0.0637***	-0.142***	-0.183***	-0.113***
	(0.00756)	(0.0168)	(0.0241)	(0.0154)
LNTotaldamage000USplus1	0.0485***	0.119***	0.191***	0.143***
	(0.00581)	(0.0147)	(0.0202)	(0.0132)
LNInsuredlosses000USplus1	0.0194***	-0.0202	-0.0694***	-0.0414***
	(0.00613)	(0.0151)	(0.0216)	(0.0145)
LNmktleverageplus1	-0.759***	-1.691***	-2.660***	-1.923***
	(0.178)	(0.372)	(0.521)	(0.361)
Constant	-0.980***	-2.851***	-4.690***	-3.164***
	(0.0749)	(0.184)	(0.260)	(0.176)
Observations	36,231	36,231	36,231	36,231
R-squared	0.005	0.005	0.005	0.005

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0390*	-0.0792**	-0.138***	0.0385
	(0.0231)	(0.0373)	(0.0535)	(0.0420)
LNTotalaffectedplus1	-0.0303***	0.000536	0.0232	0.00654
	(0.00697)	(0.0145)	(0.0187)	(0.0125)
LNTotaldamage000USplus1	0.00484	0.00160	-0.000616	0.0225***
	(0.00442)	(0.00854)	(0.0114)	(0.00824)
LNInsuredlosses000USplus1	0.0118***	-0.0125	-0.0644***	-0.0402***
	(0.00446)	(0.00782)	(0.0121)	(0.00868)
LNmktleverageplus1	-0.0831	0.115	0.315	-0.291
	(0.164)	(0.295)	(0.399)	(0.297)
Constant	0.0723	-0.0706	0.111	-0.203*
	(0.0598)	(0.114)	(0.162)	(0.123)
Observations	36,317	36,313	36,308	36,313
R-squared	0.001	0.000	0.001	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.6

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.0322	0.170***	0.287***	-0.0236
	(0.0252)	(0.0499)	(0.0725)	(0.0493)
LNTotalaffectedplus1	-0.0397***	-0.0502***	-0.0189	-0.0534***
	(0.00729)	(0.0164)	(0.0239)	(0.0175)
LNTotaldamage000USplus1	0.0305***	0.0527***	0.0771***	0.0373***
	(0.00534)	(0.0126)	(0.0169)	(0.0117)
LNInsuredlosses000USplus1	0.0125**	-0.0565***	-0.146***	-0.0470***
	(0.00566)	(0.0137)	(0.0194)	(0.0129)
LNbookleverageplus1	-0.429***	-1.206***	-2.127***	-1.194***
	(0.146)	(0.303)	(0.415)	(0.314)
Constant	-0.214***	-0.483***	-0.713***	-0.0726
	(0.0690)	(0.155)	(0.220)	(0.147)
Observations	36,281	36,280	36,276	36,276
R-squared	0.002	0.002	0.003	0.001

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0627***	-0.0949**	-0.126**	0.0554
	(0.0229)	(0.0370)	(0.0539)	(0.0428)
LNTotalaffectedplus1	-0.0339***	0.00737	0.0385**	0.0261**
	(0.00698)	(0.0145)	(0.0187)	(0.0125)
LNTotaldamage000USplus1	0.00925**	0.00297	0.00168	0.0271***
	(0.00444)	(0.00854)	(0.0115)	(0.00828)
LNInsuredlosses000USplus1	0.0147***	-0.0130*	-0.0767***	-0.0541***
	(0.00447)	(0.00782)	(0.0121)	(0.00866)
LNbookleverageplus1	0.0324	-0.139	-0.429	-0.261
	(0.131)	(0.250)	(0.340)	(0.246)
Constant	0.0276	-0.107	0.105	-0.349***
	(0.0605)	(0.110)	(0.155)	(0.118)
Observations	36,368	36,364	36,359	36,364
R-squared	0.001	0.000	0.002	0.001

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.0885***	-0.0603	-0.132	0.0117
	(0.0268)	(0.0567)	(0.0824)	(0.0579)
LNTotalaffectedplus1	-0.0632***	-0.141***	-0.182***	-0.113***
	(0.00756)	(0.0168)	(0.0240)	(0.0155)
LNTotaldamage000USplus1	0.0494***	0.121***	0.194***	0.145***
	(0.00581)	(0.0146)	(0.0201)	(0.0132)
LNInsuredlosses000USplus1	0.0197***	-0.0198	-0.0691***	-0.0409***
	(0.00613)	(0.0150)	(0.0215)	(0.0145)
LNbookleverageplus1	-0.216	-0.503	-1.094**	-0.662**
	(0.149)	(0.323)	(0.457)	(0.310)
Constant	-1.056***	-3.012***	-4.898***	-3.335***
	(0.0757)	(0.182)	(0.258)	(0.174)
Observations	36,282	36,282	36,282	36,282
R-squared	0.004	0.004	0.004	0.004

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0407*	-0.0778**	-0.127**	0.0386
	(0.0229)	(0.0368)	(0.0538)	(0.0427)
LNTotalaffectedplus1	-0.0300***	0.00125	0.0228	0.00627
	(0.00696)	(0.0145)	(0.0187)	(0.0125)
LNTotaldamage000USplus1	0.00484	0.000859	-0.00158	0.0226***
	(0.00443)	(0.00852)	(0.0114)	(0.00825)
LNInsuredlosses000USplus1	0.0121***	-0.0122	-0.0642***	-0.0397***
	(0.00445)	(0.00780)	(0.0121)	(0.00864)
LNbookleverageplus1	0.0321	-0.106	-0.426	-0.279
	(0.131)	(0.250)	(0.339)	(0.245)
Constant	0.0538	-0.0375	0.223	-0.201*
	(0.0603)	(0.110)	(0.155)	(0.118)
Observations	36,368	36,364	36,359	36,364
R-squared	0.001	0.000	0.001	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.7

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.230	-0.411	-0.690	-0.532
	(0.141)	(0.349)	(0.494)	(0.328)
LNTotalaffectedplus1	0.00248	0.0575***	0.166***	0.0672***
	(0.00843)	(0.0164)	(0.0248)	(0.0173)
LNTotaldamage000USplus1	0.00591	-0.0105	-0.0393	-0.00567
	(0.0159)	(0.0377)	(0.0535)	(0.0357)
LNInsuredlosses000USplus1	0.0236	0.0107	0.000844	0.00260
	(0.0255)	(0.0648)	(0.0923)	(0.0611)
fcf_w1	0.000343***	0.00105***	0.00159***	0.00103***
	(8.21e-05)	(0.000155)	(0.000215)	(0.000149)
Constant	-0.446**	-1.433***	-2.454***	-1.280***
	(0.192)	(0.296)	(0.398)	(0.289)
Observations	57,552	57,549	57,544	57,545
R-squared	0.000	0.000	0.000	0.000

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0921	-0.0694	-0.152**	-0.0914
	(0.0663)	(0.0694)	(0.0738)	(0.0704)
LNTotalaffectedplus1	-0.0100	-0.00100	0.0191	0.0309***
	(0.00758)	(0.0113)	(0.0139)	(0.0106)
LNTotaldamage000USplus1	0.00445	-0.00409	-0.0310**	-0.0218**
	(0.00903)	(0.0106)	(0.0122)	(0.0107)
LNInsuredlosses000USplus1	0.000519	-0.0262**	-0.0321**	-0.00542
	(0.0110)	(0.0120)	(0.0134)	(0.0123)
fcf_w1	1.16e-05	6.34e-05	1.11e-05	-5.34e-05
	(6.66e-05)	(7.81e-05)	(9.18e-05)	(8.30e-05)
Constant	0.139	0.258	0.586***	0.169
	(0.173)	(0.182)	(0.192)	(0.183)
Observations	57,755	57,747	57,737	57,745
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.331**	-0.750*	-1.313**	-0.801**
	(0.155)	(0.397)	(0.624)	(0.393)
LNTotalaffectedplus1	0.0443***	0.167***	0.338***	0.202***
	(0.00891)	(0.0187)	(0.0284)	(0.0180)
LNTotaldamage000USplus1	0.0226	0.0456	0.0596	0.0377
	(0.0173)	(0.0431)	(0.0672)	(0.0424)
LNInsuredlosses000USplus1	0.0187	0.00929	0.00762	0.0268
	(0.0282)	(0.0737)	(0.116)	(0.0728)
fcf_w1	0.000595***	0.00182***	0.00288***	0.00168***
	(8.68e-05)	(0.000176)	(0.000268)	(0.000177)
Constant	-1.983***	-6.055***	-10.16***	-6.230***
	(0.196)	(0.323)	(0.472)	(0.320)
Observations	57,558	57,558	57,558	57,558
R-squared	0.000	0.000	0.001	0.000

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0648	-0.0443	-0.133*	-0.0875
	(0.0663)	(0.0693)	(0.0737)	(0.0703)
LNTotalaffectedplus1	-0.00828	-0.00189	0.00925	0.0189*
	(0.00757)	(0.0112)	(0.0139)	(0.0105)
LNTotaldamage000USplus1	0.00113	-0.00581	-0.0280**	-0.0164
	(0.00902)	(0.0106)	(0.0121)	(0.0106)
LNInsuredlosses000USplus1	6.81e-05	-0.0208*	-0.0285**	-0.00385
	(0.0110)	(0.0120)	(0.0134)	(0.0123)
fcf_w1	5.38e-06	7.11e-05	3.32e-05	-4.65e-05
	(6.65e-05)	(7.80e-05)	(9.18e-05)	(8.30e-05)
Constant	0.152	0.249	0.574***	0.189
	(0.173)	(0.182)	(0.192)	(0.183)
Observations	57,755	57,747	57,737	57,745
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.8

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.232*	-0.417	-0.701	-0.538
	(0.141)	(0.350)	(0.496)	(0.329)
LNTotalaffectedplus1	0.00129	0.0538***	0.159***	0.0634***
	(0.00835)	(0.0161)	(0.0245)	(0.0170)
LNTotaldamage000USplus1	0.00615	-0.00979	-0.0381	-0.00494
	(0.0158)	(0.0376)	(0.0533)	(0.0356)
LNInsuredlosses000USplus1	0.0236	0.0106	0.000608	0.00248
	(0.0255)	(0.0648)	(0.0922)	(0.0610)
fcf_w5	0.00152***	0.00470***	0.00768***	0.00472***
	(0.000430)	(0.000803)	(0.00110)	(0.000766)
Constant	-0.466**	-1.494***	-2.556***	-1.342***
	(0.195)	(0.292)	(0.390)	(0.286)
Observations	57,552	57,549	57,544	57,545
R-squared	0.000	0.000	0.000	0.000

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0920	-0.0693	-0.152**	-0.0910
	(0.0659)	(0.0690)	(0.0734)	(0.0700)
LNTotalaffectedplus1	-0.00979	-0.000374	0.0195	0.0313***
	(0.00755)	(0.0113)	(0.0140)	(0.0106)
LNTotaldamage000USplus1	0.00444	-0.00408	-0.0310**	-0.0219**
	(0.00900)	(0.0106)	(0.0121)	(0.0106)
LNInsuredlosses000USplus1	0.000539	-0.0261**	-0.0320**	-0.00540
	(0.0110)	(0.0120)	(0.0134)	(0.0123)
fcf_w5	-0.000104	-0.000197	-0.000219	-0.000330
	(0.000347)	(0.000384)	(0.000425)	(0.000392)
Constant	0.141	0.263	0.591***	0.174
	(0.178)	(0.187)	(0.196)	(0.188)
Observations	57,755	57,747	57,737	57,745
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.335**	-0.762*	-1.332**	-0.812**
	(0.155)	(0.398)	(0.626)	(0.394)
LNTotalaffectedplus1	0.0421***	0.160***	0.326***	0.195***
	(0.00881)	(0.0184)	(0.0279)	(0.0176)
LNTotaldamage000USplus1	0.0230	0.0469	0.0617	0.0390
	(0.0173)	(0.0429)	(0.0670)	(0.0423)
LNInsuredlosses000USplus1	0.0186	0.00908	0.00719	0.0265
	(0.0281)	(0.0737)	(0.116)	(0.0728)
fcf_w5	0.00274***	0.00837***	0.0138***	0.00818***
	(0.000452)	(0.000901)	(0.00136)	(0.000894)
Constant	-2.019***	-6.165***	-10.34***	-6.340***
	(0.199)	(0.318)	(0.461)	(0.315)
Observations	57,558	57,558	57,558	57,558
R-squared	0.000	0.001	0.001	0.001

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0647	-0.0443	-0.133*	-0.0871
	(0.0659)	(0.0689)	(0.0733)	(0.0699)
LNTotalaffectedplus1	-0.00804	-0.00132	0.00962	0.0192*
	(0.00754)	(0.0112)	(0.0139)	(0.0105)
LNTotaldamage000USplus1	0.00112	-0.00579	-0.0280**	-0.0164
	(0.00899)	(0.0106)	(0.0121)	(0.0106)
LNInsuredlosses000USplus1	8.74e-05	-0.0208*	-0.0285**	-0.00383
	(0.0110)	(0.0120)	(0.0134)	(0.0123)
fcf_w5	-0.000120	-0.000149	-0.000125	-0.000302
	(0.000347)	(0.000384)	(0.000425)	(0.000392)
Constant	0.155	0.253	0.578***	0.194
	(0.178)	(0.187)	(0.196)	(0.188)
Observations	57,755	57,747	57,737	57,745
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.9

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.211*	-0.316	-0.531	-0.450
	(0.119)	(0.296)	(0.419)	(0.278)
LNTotalaffectedplus1	-0.00140	0.0358***	0.113***	0.0443***
	(0.00738)	(0.0127)	(0.0189)	(0.0133)
LNTotaldamage000USplus1	0.00703	-0.00920	-0.0277	-0.000891
	(0.0138)	(0.0334)	(0.0474)	(0.0316)
LNInsuredlosses000USplus1	0.0251	0.00897	-0.0102	0.000938
	(0.0221)	(0.0565)	(0.0805)	(0.0532)
LNratiointangibleplus1	0.929**	3.316***	5.342***	3.060***
	(0.465)	(0.853)	(1.192)	(0.854)
Constant	-0.505***	-1.663***	-2.754***	-1.480***
	(0.185)	(0.259)	(0.338)	(0.256)
Observations	71,731	71,726	71,715	71,720
R-squared	0.000	0.000	0.000	0.000

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.105*	-0.0731	-0.117*	-0.0741
	(0.0558)	(0.0589)	(0.0626)	(0.0597)
LNTotalaffectedplus1	-0.00452	0.00498	0.00471	0.0232**
	(0.00699)	(0.00971)	(0.0117)	(0.00933)
LNTotaldamage000USplus1	0.000815	-0.00927	-0.0320***	-0.0233***
	(0.00751)	(0.00885)	(0.0102)	(0.00897)
LNInsuredlosses000USplus1	0.00793	-0.0165	-0.0238**	0.000153
	(0.00918)	(0.0101)	(0.0113)	(0.0103)
LNratiointangibleplus1	-0.422	-0.603	-0.919*	-0.670
	(0.379)	(0.421)	(0.528)	(0.425)
Constant	0.169	0.232	0.641***	0.235
	(0.173)	(0.181)	(0.191)	(0.182)
Observations	71,968	71,958	71,942	71,956
R-squared	0.000	0.000	0.000	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.312**	-0.655*	-1.160**	-0.700**
	(0.131)	(0.337)	(0.529)	(0.333)
LNTotalaffectedplus1	0.0316***	0.121***	0.249***	0.145***
	(0.00771)	(0.0146)	(0.0217)	(0.0141)
LNTotaldamage000USplus1	0.0244	0.0480	0.0737	0.0456
	(0.0151)	(0.0381)	(0.0596)	(0.0376)
LNInsuredlosses000USplus1	0.0202	0.00702	-0.00396	0.0191
	(0.0244)	(0.0643)	(0.101)	(0.0636)
LNratiointangibleplus1	1.979***	6.554***	10.87***	6.487***
	(0.486)	(0.950)	(1.452)	(0.942)
Constant	-2.014***	-6.216***	-10.37***	-6.320***
	(0.188)	(0.279)	(0.394)	(0.277)
Observations	71,737	71,737	71,737	71,737
R-squared	0.000	0.001	0.001	0.001

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0750	-0.0462	-0.102	-0.0714
	(0.0558)	(0.0588)	(0.0625)	(0.0597)
LNTotalaffectedplus1	-0.00392	0.00274	-0.00505	0.00987
	(0.00698)	(0.00969)	(0.0117)	(0.00930)
LNTotaldamage000USplus1	-0.00214	-0.0111	-0.0303***	-0.0192**
	(0.00750)	(0.00884)	(0.0102)	(0.00896)
LNInsuredlosses000USplus1	0.00694	-0.0112	-0.0191*	0.00328
	(0.00918)	(0.0101)	(0.0113)	(0.0103)
LNratiointangibleplus1	-0.414	-0.577	-0.827	-0.636
	(0.379)	(0.421)	(0.527)	(0.425)
Constant	0.183	0.232	0.637***	0.269
	(0.173)	(0.181)	(0.191)	(0.182)
Observations	71,968	71,958	71,942	71,956
R-squared	0.000	0.000	0.000	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.10

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.0768***	0.0452	-0.0669	-0.139***
	(0.0260)	(0.0459)	(0.0647)	(0.0465)
LNTotalaffectedplus1	-0.00652	0.0169	0.0940***	0.0250
	(0.00839)	(0.0152)	(0.0219)	(0.0156)
LNTotaldamage000USplus1	0.0241***	0.0225**	-0.00389	0.0166
	(0.00595)	(0.0103)	(0.0151)	(0.0107)
LNInsuredlosses000USplus1	0.0121**	-0.0423***	-0.0763***	-0.0401***
	(0.00556)	(0.00970)	(0.0143)	(0.0102)
age	-0.00348***	-0.0155***	-0.0228***	-0.0144***
	(0.00102)	(0.00194)	(0.00277)	(0.00201)
Constant	-0.407***	-0.522***	-0.808***	-0.300**
	(0.0781)	(0.141)	(0.205)	(0.145)
Observations	24,879	24,879	24,878	24,878
R-squared	0.002	0.003	0.004	0.003

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0453*	0.0917**	0.0763	0.0680*
	(0.0244)	(0.0385)	(0.0476)	(0.0387)
LNTotalaffectedplus1	-0.0120	-0.00589	0.0252	0.0342**
	(0.00789)	(0.0128)	(0.0164)	(0.0133)
LNTotaldamage000USplus1	0.0107*	0.000548	-0.0332***	-0.0115
	(0.00561)	(0.00881)	(0.0121)	(0.00998)
LNInsuredlosses000USplus1	0.0107**	-0.0240***	-0.0439***	-0.0114
	(0.00524)	(0.00812)	(0.0109)	(0.00853)
age	0.00208**	0.000177	0.00300	0.00361**
	(0.000980)	(0.00165)	(0.00211)	(0.00160)
Constant	-0.214***	-0.116	-0.0361	-0.495***
	(0.0732)	(0.121)	(0.165)	(0.134)
Observations	24,909	24,909	24,908	24,909
R-squared	0.001	0.000	0.001	0.001

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.156***	-0.229***	-0.525***	-0.303***
	(0.0268)	(0.0496)	(0.0729)	(0.0513)
LNTotalaffectedplus1	0.0192**	0.0723***	0.170***	0.105***
	(0.00874)	(0.0168)	(0.0249)	(0.0171)
LNTotaldamage000USplus1	0.0359***	0.0683***	0.0789***	0.0605***
	(0.00611)	(0.0111)	(0.0166)	(0.0120)
LNInsuredlosses000USplus1	0.00735	-0.0416***	-0.0705***	-0.0231**
	(0.00569)	(0.0102)	(0.0154)	(0.0108)
age	-0.00891***	-0.0328***	-0.0527***	-0.0294***
	(0.00109)	(0.00226)	(0.00337)	(0.00222)
Constant	-1.457***	-3.655***	-5.970***	-4.009***
	(0.0808)	(0.154)	(0.231)	(0.165)
Observations	24,879	24,879	24,879	24,879
R-squared	0.005	0.011	0.016	0.010

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0203	0.107***	0.0808*	0.0623
	(0.0244)	(0.0382)	(0.0473)	(0.0385)
LNTotalaffectedplus1	-0.00951	-0.0108	0.00908	0.0169
	(0.00786)	(0.0127)	(0.0163)	(0.0133)
LNTotaldamage000USplus1	0.00721	-0.000469	-0.0316***	-0.00922
	(0.00559)	(0.00877)	(0.0120)	(0.00993)
LNInsuredlosses000USplus1	0.00953*	-0.0184**	-0.0360***	-0.00560
	(0.00522)	(0.00807)	(0.0108)	(0.00847)
age	0.00208**	-1.55e-06	0.00229	0.00310*
	(0.000976)	(0.00164)	(0.00210)	(0.00159)
Constant	-0.196***	-0.0789	0.0430	-0.391***
	(0.0729)	(0.120)	(0.164)	(0.134)
Observations	24,909	24,909	24,908	24,909
R-squared	0.000	0.000	0.001	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.11

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.0503*	0.110**	0.225***	-0.0350
	(0.0266)	(0.0544)	(0.0786)	(0.0524)
LNTotalaffectedplus1	-0.0446***	-0.0612***	-0.0317	-0.0684***
	(0.00749)	(0.0180)	(0.0261)	(0.0189)
LNTotaldamage000USplus1	0.0238***	0.0406***	0.0618***	0.0289**
	(0.00580)	(0.0146)	(0.0195)	(0.0133)
LNInsuredlosses000USplus1	0.0169***	-0.0477***	-0.132***	-0.0380***
	(0.00617)	(0.0154)	(0.0219)	(0.0143)
LNmvequity	0.234***	0.466***	0.661***	0.405***
	(0.0216)	(0.0498)	(0.0771)	(0.0551)
LNtobinsq	0.0764	0.0351	-0.280	-0.293**
	(0.0527)	(0.119)	(0.196)	(0.147)
LNmktleverageplus1	-0.686***	-1.918***	-3.693***	-2.480***
	(0.199)	(0.422)	(0.711)	(0.566)
fcf_w5	-0.00159***	-0.00291***	-0.00420***	-0.00231***
	(0.000238)	(0.000526)	(0.000761)	(0.000522)
LNratiointangibleplus1	0.376**	0.314	0.488	0.657
	(0.166)	(0.336)	(0.705)	(0.610)
Constant	-1.520***	-2.936***	-4.066***	-2.139***
	(0.148)	(0.376)	(0.552)	(0.406)
Observations	30,177	30,177	30,174	30,174
R-squared	0.012	0.010	0.009	0.007

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.0669***	-0.103**	-0.101*	0.0493
	(0.0241)	(0.0401)	(0.0585)	(0.0469)
LNTotalaffectedplus1	-0.0385***	-0.00349	0.0236	0.0221*
	(0.00719)	(0.0160)	(0.0202)	(0.0134)
LNTotaldamage000USplus1	0.00572	-0.000804	0.00117	0.0223**
	(0.00461)	(0.00944)	(0.0129)	(0.00915)
LNInsuredlosses000USplus1	0.0178***	-0.0107	-0.0733***	-0.0513***
	(0.00467)	(0.00839)	(0.0134)	(0.00967)
LNmvequity	0.0655***	-0.0483	-0.194***	-0.0448
	(0.0192)	(0.0430)	(0.0699)	(0.0515)
LNtobinsq	0.107**	0.0720	-0.252*	0.185**
	(0.0474)	(0.0932)	(0.149)	(0.0843)
LNmktleverageplus1	0.0274	-0.219	-0.960	-0.110
	(0.186)	(0.353)	(0.584)	(0.325)
fcf_w5	-0.000282	0.00114**	0.00265***	0.000801
	(0.000219)	(0.000452)	(0.000633)	(0.000493)
LNratiointangibleplus1	0.165	-0.188	-0.132	-0.191
	(0.154)	(0.277)	(0.635)	(0.295)
Constant	-0.373***	0.238	1.386***	-0.0866
	(0.130)	(0.314)	(0.475)	(0.326)
Observations	30,255	30,252	30,248	30,251
R-squared	0.003	0.001	0.003	0.001

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.136***	-0.210***	-0.352***	-0.146**
	(0.0284)	(0.0624)	(0.0904)	(0.0636)
LNTotalaffectedplus1	-0.0665***	-0.146***	-0.184***	-0.109***
	(0.00780)	(0.0184)	(0.0261)	(0.0167)
LNTotaldamage000USplus1	0.0456***	0.114***	0.189***	0.139***
	(0.00637)	(0.0169)	(0.0232)	(0.0152)
LNInsuredlosses000USplus1	0.0217***	-0.0186	-0.0679***	-0.0393**
	(0.00672)	(0.0171)	(0.0244)	(0.0165)
LNmvequity	0.298***	0.647***	0.971***	0.658***
	(0.0218)	(0.0527)	(0.0836)	(0.0586)
LNtobinsq	0.00631	-0.185	-0.644***	-0.0993
	(0.0534)	(0.116)	(0.178)	(0.105)
LNmktleverageplus1	-0.606***	-1.668***	-3.378***	-1.585***
	(0.205)	(0.449)	(0.713)	(0.405)
fcf_w5	-0.00168***	-0.00308***	-0.00458***	-0.00352***
	(0.000243)	(0.000553)	(0.000818)	(0.000579)
LNratiointangibleplus1	0.442**	0.598*	1.005	0.488
	(0.172)	(0.359)	(0.730)	(0.365)
Constant	-2.669***	-6.280***	-9.673***	-6.709***
	(0.160)	(0.433)	(0.639)	(0.414)
Observations	30,177	30,177	30,177	30,177
R-squared	0.018	0.015	0.015	0.015

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0424*	-0.0822**	-0.100*	0.0331
	(0.0240)	(0.0399)	(0.0583)	(0.0468)
LNTotalaffectedplus1	-0.0345***	-0.00874	0.00974	0.00373
	(0.00717)	(0.0160)	(0.0202)	(0.0134)
LNTotaldamage000USplus1	0.00167	-0.00308	-0.00210	0.0179**
	(0.00460)	(0.00942)	(0.0129)	(0.00913)
LNInsuredlosses000USplus1	0.0149***	-0.0101	-0.0615***	-0.0374***
	(0.00465)	(0.00836)	(0.0133)	(0.00965)
LNmvequity	0.0651***	-0.0469	-0.187***	-0.0408
	(0.0191)	(0.0429)	(0.0698)	(0.0515)
LNtobinsq	0.105**	0.0602	-0.262*	0.179**
	(0.0473)	(0.0930)	(0.149)	(0.0842)
LNmktleverageplus1	0.0345	-0.191	-0.993*	-0.155
	(0.186)	(0.352)	(0.584)	(0.324)
fcf_w5	-0.000316	0.00113**	0.00260***	0.000768
	(0.000218)	(0.000450)	(0.000632)	(0.000492)
LNratiointangibleplus1	0.156	-0.211	-0.152	-0.203
	(0.154)	(0.276)	(0.634)	(0.294)
Constant	-0.347***	0.300	1.467***	0.0369
	(0.130)	(0.314)	(0.475)	(0.326)
Observations	30,255	30,252	30,248	30,251
R-squared	0.002	0.001	0.002	0.001

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.12

VARIABLES	(1) ar0percent	(2) car11percent	(3) car22percent	(4) car02percent
LNTotaldeathsplus1	-0.270*	-0.483	-0.772	-0.592
	(0.161)	(0.404)	(0.573)	(0.380)
LNTotalaffectedplus1	-0.0214*	-0.00351	0.0655**	0.00957
	(0.0111)	(0.0213)	(0.0310)	(0.0215)
LNTotaldamage000USplus1	0.00418	-0.0131	-0.0385	-0.00799
	(0.0175)	(0.0423)	(0.0599)	(0.0399)
LNInsuredlosses000USplus1	0.0340	0.0334	0.0309	0.0230
	(0.0310)	(0.0788)	(0.112)	(0.0742)
LNmvequity	0.319**	0.875***	1.350***	0.781***
	(0.127)	(0.322)	(0.457)	(0.303)
fcf_w5	-0.00236*	-0.00612*	-0.00910**	-0.00497*
	(0.00121)	(0.00315)	(0.00449)	(0.00296)
LNratiointangibleplus1	0.211	1.038	1.606	0.774
	(0.463)	(0.732)	(1.029)	(0.787)
Constant	-1.914***	-5.627***	-8.930***	-4.996***
	(0.664)	(1.391)	(1.935)	(1.318)
Observations	52,160	52,159	52,154	52,155
R-squared	0.001	0.001	0.001	0.001

CAPM model S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) ar0percentds	(2) car11percentds	(3) car22percentds	(4) car02percentds
LNTotaldeathsplus1	-0.112	-0.0968	-0.169**	-0.106
	(0.0724)	(0.0755)	(0.0800)	(0.0767)
LNTotalaffectedplus1	-0.0112	0.00707	0.0289*	0.0299**
	(0.00953)	(0.0130)	(0.0158)	(0.0125)
LNTotaldamage000USplus1	0.00286	-0.00657	-0.0321**	-0.0215*
	(0.00958)	(0.0113)	(0.0129)	(0.0113)
LNInsuredlosses000USplus1	0.00287	-0.0255*	-0.0353**	-0.00601
	(0.0130)	(0.0140)	(0.0153)	(0.0143)
LNmvequity	-0.0168	-0.126**	-0.250***	-0.0812
	(0.0528)	(0.0566)	(0.0643)	(0.0583)
fcf_w5	0.000191	0.00142***	0.00286***	0.000745
	(0.000436)	(0.000512)	(0.000587)	(0.000529)
LNratiointangibleplus1	-0.362	-0.568	-0.732	-0.434
	(0.415)	(0.472)	(0.628)	(0.476)
Constant	0.309	0.949**	1.896***	0.661
	(0.464)	(0.482)	(0.502)	(0.484)
Observations	52,337	52,332	52,324	52,330
R-squared	0.000	0.000	0.001	0.000

Return difference S&P 500 abnormal returns, Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) vwar0percentd	(2) vwcar11percentd	(3) vwcar22percentd	(4) vwcar02percentd
LNTotaldeathsplus1	-0.0842	-0.0707	-0.151*	-0.103
	(0.0724)	(0.0754)	(0.0799)	(0.0766)
LNTotalaffectedplus1	-0.00965	0.00529	0.0186	0.0179
	(0.00952)	(0.0130)	(0.0158)	(0.0125)
LNTotaldamage000USplus1	-0.000458	-0.00854	-0.0296**	-0.0169
	(0.00958)	(0.0112)	(0.0129)	(0.0113)
LNInsuredlosses000USplus1	0.00226	-0.0203	-0.0312**	-0.00370
	(0.0130)	(0.0140)	(0.0153)	(0.0142)
LNmvequity	-0.0156	-0.119**	-0.238***	-0.0771
	(0.0528)	(0.0566)	(0.0642)	(0.0583)
fcf_w5	0.000157	0.00135***	0.00279***	0.000714
	(0.000435)	(0.000512)	(0.000587)	(0.000529)
LNratiointangibleplus1	-0.357	-0.538	-0.657	-0.410
	(0.415)	(0.471)	(0.628)	(0.475)
Constant	0.318	0.905*	1.829***	0.663
	(0.464)	(0.482)	(0.502)	(0.484)
Observations	52,337	52,332	52,324	52,330
R-squared	0.000	0.000	0.001	0.000

Return difference value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.13

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.166***	-0.266***	-0.499***	-0.306***
	(0.0308)	(0.0561)	(0.0818)	(0.0576)
LNTotalaffectedplus1	-0.00200	0.0211	0.0734***	0.0388**
	(0.01000)	(0.0190)	(0.0278)	(0.0192)
LNTotaldamage000USplus1	0.0312***	0.0578***	0.0710***	0.0597***
	(0.00686)	(0.0124)	(0.0184)	(0.0130)
LNInsuredlosses000USplus1	0.0167**	-0.0137	-0.0276	0.00174
	(0.00663)	(0.0117)	(0.0178)	(0.0125)
LNmvequity	0.496***	1.183***	1.959***	1.315***
	(0.0264)	(0.0488)	(0.0679)	(0.0462)
fcf_w5	-0.00246***	-0.00434***	-0.00668***	-0.00551***
	(0.000344)	(0.000644)	(0.000914)	(0.000637)
LNratiointangibleplus1	0.624***	0.887**	1.512**	1.172***
	(0.218)	(0.417)	(0.588)	(0.401)
age	-0.00666***	-0.0284***	-0.0465***	-0.0250***
	(0.00129)	(0.00247)	(0.00366)	(0.00243)
Constant	-4.195***	-10.05***	-16.71***	-11.22***
	(0.191)	(0.346)	(0.492)	(0.345)
Observations	18,022	18,022	18,022	18,022
R-squared	0.041	0.070	0.093	0.080

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.14

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.349**	-0.772*	-1.334*	-0.828*
	(0.177)	(0.465)	(0.732)	(0.460)
LNTotalaffectedplus1	0.00749	0.0681**	0.170***	0.0946***
	(0.0130)	(0.0268)	(0.0408)	(0.0262)
LNTotaldamage000USplus1	0.0148	0.0253	0.0342	0.0229
	(0.0192)	(0.0483)	(0.0755)	(0.0476)
LNInsuredlosses000USplus1	0.0327	0.0447	0.0608	0.0606
	(0.0351)	(0.0913)	(0.144)	(0.0903)
LNmvequity	0.467***	1.279***	2.059***	1.332***
	(0.135)	(0.357)	(0.564)	(0.353)
fcf_w5	-0.00310**	-0.00782*	-0.0124*	-0.00873**
	(0.00148)	(0.00403)	(0.00636)	(0.00398)
LNratiointangibleplus1	0.415	2.254***	3.688***	2.264***
	(0.555)	(0.651)	(0.857)	(0.656)
Food Products	0.463	1.429*	1.565	1.153
	(0.364)	(0.754)	-1.085	(0.796)
Candy & Soda	0.137	0.708	1.016	0.835
	(0.539)	(0.838)	-1.337	(0.912)
Beer & Liquor	0.285	0.164	-0.575	-0.139
	(0.458)	(0.820)	-1.325	(0.907)
Tobacco Products	0.0189	-0.890	-0.728	-0.382
	(0.570)	-1.363	-1.773	-1.322
Recreation	0.645*	2.339***	3.698***	2.242***
	(0.392)	(0.784)	-1.138	(0.808)
Entertainment	0.617	1.442*	2.262*	1.377*
	(0.386)	(0.761)	-1.180	(0.831)
Printingand Publishing	0.486	0.767	0.820	0.610
	(0.394)	(0.713)	-1.065	(0.754)
Consumer Goods	0.455	0.927	0.870	0.552
	(0.363)	(0.688)	-1.027	(0.737)
Apparel	8.604	8.949	8.973	9.098
	-7.987	-7.962	-7.922	-7.965
Healthcare	0.940**	2.290***	2.997***	1.818**
	(0.412)	(0.768)	-1.140	(0.811)
Medical Equipment	0.792**	2.433***	3.604***	2.208***
	(0.343)	(0.744)	-1.107	(0.742)
Pharmaceutical Products	0.761**	2.655***	3.597***	2.104***
	(0.343)	(0.721)	-1.064	(0.740)
Chemicals	1.008***	2.574***	3.732***	2.438***
	(0.355)	(0.674)	(0.976)	(0.716)
Rubber and Plastic Products	0.0618	0.735	1.321	1.027
	(0.424)	(0.824)	-1.249	(0.927)
Textiles	0.327	0.672	1.059	0.540
	(0.457)	(0.978)	-1.578	-1.133
Construction Materials	0.117	0.565	0.337	0.129

	(0.345)	(0.673)	(0.999)	(0.717)
Construction	0.791**	2.629***	3.743***	2.120***
	(0.380)	(0.861)	-1.196	(0.744)
Steel Works Etc	0.601*	1.364**	2.206**	1.439**
	(0.338)	(0.660)	(0.960)	(0.697)
Fabricated Products	0.950	2.209*	2.907*	1.810
	(0.685)	-1.163	-1.698	-1.259
Machinery	0.704**	2.155***	2.971***	1.739**
	(0.331)	(0.634)	(0.944)	(0.677)
Electrical Equipment	1.037***	2.581***	3.929***	2.317***
	(0.360)	(0.731)	-1.110	(0.779)
Automobiles and Trucks	0.329	1.997*	2.528*	1.827
	(0.346)	-1.121	-1.365	-1.181
Aircraft	0.296	1.272	1.861	1.039
	(0.447)	(0.807)	-1.197	(0.837)
Shipbuilding, Railroad Equipment	0.513	0.839	1.458	1.803
	(0.541)	-1.003	-1.640	-1.218
Defense	0.154	2.178**	2.930*	1.583
	(0.579)	-1.029	-1.606	-1.105
Precious Metals	-0.358	-0.916	-2.173	-1.384
	(0.566)	-1.091	-1.639	-1.106
Non-Metallic and Industrial Metal Mining	0.304	1.310	2.038	1.745*
	(0.486)	(0.866)	-1.291	(0.920)
Coal	1.004	2.780**	4.946***	2.808**
	(0.631)	-1.141	-1.663	-1.175
Petroleumand Natural Gas	0.375	1.629***	2.188**	1.274**
	(0.319)	(0.604)	(0.893)	(0.650)
Utilities	-0.286	-0.540	-1.329	-0.846
	(0.350)	(0.706)	-1.068	(0.747)
Communication	0.354	1.027	2.181*	1.099
	(0.378)	(0.694)	-1.209	-1.026
PersonalServices	0.470	1.706	1.998	0.839
	(0.384)	-1.096	-1.469	(0.871)
BusinessServices	0.917***	2.709***	4.334***	2.531***
	(0.344)	(0.609)	(0.902)	(0.666)
Computers	0.941***	3.079***	4.174***	2.435***
	(0.331)	(0.634)	(0.938)	(0.678)
Electronic Equipment	1.049***	3.179***	4.809***	2.707***
	(0.309)	(0.592)	(0.876)	(0.642)
Measuring and Control Equipment	0.772**	2.537***	3.715***	2.398***
	(0.353)	(0.677)	-1.002	(0.720)
BusinessSupplies	0.557	1.215*	1.272	0.921
	(0.359)	(0.670)	(0.989)	(0.707)
ShippingContainers	-0.115	0.146	0.436	-0.425
	(0.444)	(0.785)	-1.147	(0.833)
Transportation	0.576*	1.576**	2.103**	1.279*
	(0.328)	(0.614)	(0.909)	(0.661)
Wholesale	0.529	1.356*	1.900	1.406*
	(0.344)	(0.798)	-1.317	(0.829)

Retail	0.735**	1.965***	2.892***	1.937***
	(0.319)	(0.607)	(0.895)	(0.654)
Restaraunts, Hotels, Motels	0.760**	1.851***	3.220***	2.173***
	(0.354)	(0.672)	-1.004	(0.728)
Banking	0.368	1.919***	2.532**	1.410*
	(0.369)	(0.708)	-1.076	(0.750)
Insurance	0.745**	1.830***	2.715***	1.665**
	(0.338)	(0.658)	(0.973)	(0.703)
Real Estate	-8.516	-24.15	-39.17	-24.46
	-8.900	(24.86)	(39.36)	(24.55)
Trading	0.470	1.293**	1.961**	1.193*
	(0.322)	(0.640)	(0.986)	(0.680)
Almost Nothing	1.627***	4.565***	6.399***	4.029***
	(0.321)	(0.610)	(0.898)	(0.654)
Constant	-4.815***	-13.99***	-22.54***	-14.14***
	(0.610)	-1.389	-2.146	-1.399
Observations	52,046	52,046	52,046	52,046
R-squared	0.003	0.004	0.005	0.005

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.15

State Name	Population	Area	GDP per capita	state rank area	state gdp rank	state
Alabama	4.447.100	51.609	37261	29	45	AL
Alaska	626.932	589.757	63971	1	4	AK
Arizona	5.130.632	113.909	38590	6	44	AZ
Arkansas	2.673.400	53.104	36368	27	47	AR
California	33.871.648	158.693	58619	3	8	CA
Colorado	4.301.261	104.247	52795	8	16	CO
Connecticut	3.405.565	5.009	64511	48	3	CT
Delaware	783.600	2.057	63664	49	5	DE
Florida	15.982.378	58.560	39543	22	40	FL
Georgia	8.186.453	58.876	44723	21	29	GA
Hawaii	1.211.537	6.450	51277	47	19	HI
Idaho	1.293.953	83.557	35466	13	49	ID
Illinois	12.419.293	56.400	54091	24	12	IL
Indiana	6.080.485	36.291	45317	38	28	IN
Iowa	2.926.324	56.290	50315	25	22	IA
Kansas	2.688.418	82.264	46982	14	27	KS
Kentucky	4.041.769	40.395	38985	37	42	KY
Louisiana	4.468.976	48.523	43917	31	34	LA
Maine	1.274.923	33.215	38921	39	43	ME
Maryland	5.296.486	10.577	55404	42	11	MD
Massachusetts	6.349.097	8.257	65545	45	1	MA
Michigan	9.938.444	58.216	43372	23	36	MI
Minnesota	4.919.479	84.068	53704	12	14	MN
Mississippi	2.844.658	47.716	31881	32	50	MS
Missouri	5.595.211	69.686	43317	19	37	MO
Montana	902.195	147.138	39356	4	41	MT
Nebraska	1.711.263	77.227	53114	15	15	NE
Nevada	1.998.257	110.540	43820	7	35	NV
New Hampshire	1.235.786	9.304	51794	44	17	NH
New Jersey	8.414.350	7.836	57084	46	9	NJ
New Mexico	1.819.046	121.666	41348	5	39	NM
New York	18.976.457	49.576	64579	30	2	NY
North Carolina	8.049.313	52.586	44325	28	32	NC
North Dakota	642.200	70.665	62837	17	6	ND
Ohio	11.353.140	41.222	47567	35	25	OH
Oklahoma	3.450.654	69.919	44623	18	31	OK
Oregon	3.421.399	96.981	50582	10	21	OR
Pennsylvania	12.281.054	45.333	50997	33	20	PA
Rhode Island	1.048.319	1.214	47639	50	24	RI
South Carolina	4.012.012	31.055	37063	40	46	SC
South Dakota	754.844	77.047	48076	16	23	SD
Tennessee	5.689.283	42.244	43267	34	38	TN
Texas	20.851.820	267.338	53795	2	13	TX
Utah	2.233.169	84.916	44636	11	30	UT
Vermont	608.827	9.609	43946	43	33	VT
Virginia	7.078.515	40.817	51736	36	18	VA
Washington	5.894.121	68.192	56831	20	10	WA

West Virginia	1.808.344	24.181	36315	41	48	WV
Wisconsin	5.363.675	56.154	47266	26	26	WI
Wyoming	493.782	97.914	58821	9	7	WY

Appendix 4.16

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.412*	-0.948	-1.676*	-1.077*
	(0.219)	(0.592)	(0.935)	(0.585)
LNTotalaffectedplus1	0.0150	0.0942***	0.211***	0.119***
	(0.0138)	(0.0301)	(0.0460)	(0.0294)
LNTotaldamage000USplus1	0.0225**	0.0493*	0.0851**	0.0601**
	(0.0107)	(0.0267)	(0.0410)	(0.0258)
LNInsuredlosses000USplus1	0.0368	0.0566	0.0768	0.0671
	(0.0300)	(0.0789)	(0.124)	(0.0779)
LNmvequity	0.455***	1.269***	2.041***	1.307***
	(0.136)	(0.356)	(0.560)	(0.352)
fcf_w5	-0.00289**	-0.00766**	-0.0122**	-0.00842**
	(0.00138)	(0.00370)	(0.00583)	(0.00365)
LNratiointangibleplus1	1.018**	3.484***	5.818***	3.564***
	(0.467)	(0.775)	(1.167)	(0.769)
2.staterankarea	1.401*	4.567**	7.534	6.266*
	(0.729)	(2.109)	(4.666)	(3.787)
3.staterankarea	1.230*	3.625*	5.510	4.769
	(0.715)	(2.000)	(4.538)	(3.729)
4.staterankarea	0.658	0.727	5.173	7.190
	(1.864)	(3.187)	(8.080)	(6.196)
5.staterankarea	2.067	3.319	4.645	4.044
	(1.905)	(2.349)	(5.056)	(4.053)
6.staterankarea	2.014***	5.437**	8.497*	7.226*
	(0.778)	(2.243)	(4.798)	(3.858)
7.staterankarea	1.451*	2.964	5.481	5.247
	(0.838)	(2.315)	(4.897)	(3.903)
8.staterankarea	2.096**	4.783**	7.034	6.260
	(1.053)	(2.210)	(4.687)	(3.844)
9.staterankarea	10.77*	7.375	13.34	13.80*
	(6.102)	(6.969)	(10.75)	(8.204)
10.staterankarea	0.991	2.118	3.668	3.419
	(0.804)	(2.210)	(4.787)	(3.845)
11.staterankarea	1.981**	7.261***	11.07**	8.726**
	(0.857)	(2.414)	(4.938)	(3.947)
12.staterankarea	1.645**	4.948**	8.463*	6.437*
	(0.766)	(2.204)	(4.773)	(3.839)
13.staterankarea	0.858	0.168	0.306	2.572
	(0.868)	(2.219)	(4.759)	(3.852)
14.staterankarea	1.579**	4.153*	6.202	5.287
	(0.781)	(2.209)	(4.772)	(3.833)
15.staterankarea	1.464*	4.760**	7.465	5.891
	(0.772)	(2.172)	(4.742)	(3.829)
16.staterankarea	1.055	4.599**	6.253	5.260
	(0.820)	(2.234)	(4.916)	(3.889)
17.staterankarea	0.681	3.080	6.267	5.779

	(0.949)	(2.240)	(4.897)	(3.905)
18.staterankarea	1.083	3.884*	6.998	5.674
	(0.749)	(2.114)	(4.670)	(3.792)
19.staterankarea	1.202	3.479	5.821	5.227
	(0.758)	(2.160)	(4.717)	(3.814)
20.staterankarea	0.719	2.444	3.985	3.777
	(0.730)	(2.110)	(4.670)	(3.787)
21.staterankarea	1.345*	4.951**	7.802*	6.165
	(0.761)	(2.159)	(4.709)	(3.813)
22.staterankarea	0.923	3.684*	6.163	4.810
	(0.697)	(2.044)	(4.566)	(3.730)
23.staterankarea	0.384	1.220	2.418	2.975
	(0.693)	(2.008)	(4.554)	(3.733)
24.staterankarea	0.799	2.603	4.204	4.039
	(0.702)	(2.033)	(4.581)	(3.747)
25.staterankarea	0.967	3.988*	6.048	4.634
	(0.744)	(2.065)	(4.601)	(3.755)
26.staterankarea	1.162	3.330	5.635	4.961
	(0.729)	(2.067)	(4.616)	(3.768)
27.staterankarea	2.330***	5.084**	8.943*	7.325*
	(0.822)	(2.226)	(4.795)	(3.858)
28.staterankarea	1.370*	4.311**	7.124	6.116
	(0.727)	(2.066)	(4.617)	(3.766)
29.staterankarea	1.032	4.386**	5.092	4.741
	(0.798)	(2.208)	(4.761)	(3.845)
30.staterankarea	0.994	2.976	4.707	4.454
	(0.732)	(2.125)	(4.684)	(3.789)
31.staterankarea	0.684	2.216	4.771	5.160
	(0.782)	(2.152)	(4.923)	(4.029)
32.staterankarea	1.000	1.888	3.372	3.979
	(0.869)	(2.395)	(4.925)	(3.920)
33.staterankarea	0.826	2.589	3.421	3.890
	(0.706)	(2.138)	(4.740)	(3.804)
34.staterankarea	1.903**	5.720***	9.372**	7.317*
	(0.741)	(2.100)	(4.654)	(3.783)
35.staterankarea	1.177	3.007	5.253	4.751
	(0.721)	(2.062)	(4.613)	(3.764)
36.staterankarea	1.518**	4.451**	7.360	6.262*
	(0.728)	(2.085)	(4.630)	(3.779)
37.staterankarea	1.431*	5.474**	8.580*	6.722*
	(0.779)	(2.152)	(4.703)	(3.814)
38.staterankarea	1.051	3.936*	6.182	5.317
	(0.733)	(2.088)	(4.632)	(3.775)
39.staterankarea	0.0337	3.078	5.330	4.300
	(1.100)	(2.637)	(5.103)	(3.991)
40.staterankarea	0.960	8.589*	8.372	6.330
	(1.565)	(4.487)	(6.378)	(4.590)
41.staterankarea	0.642	8.193***	6.568	4.316
	(1.408)	(3.112)	(5.146)	(4.124)
42.staterankarea	1.131	2.856	4.224	4.122
	(0.918)	(2.234)	(4.772)	(3.877)
43.staterankarea	1.274	1.808	4.843	4.903

	(1.109)	(2.633)	(5.157)	(3.970)
44.staterankarea	1.098	2.318	2.108	3.158
	(1.006)	(2.652)	(5.680)	(4.224)
45.staterankarea	1.090	3.152	4.992	4.747
	(0.729)	(2.050)	(4.596)	(3.758)
46.staterankarea	0.881	2.628	4.329	4.523
	(0.736)	(2.100)	(4.678)	(3.812)
47.staterankarea	-0.268	0.207	0.379	1.867
	(0.865)	(2.442)	(5.023)	(3.916)
48.staterankarea	0.966	2.783	4.559	4.309
	(0.775)	(2.156)	(4.708)	(3.812)
49.staterankarea	1.226	2.435	3.428	4.010
	(1.084)	(2.795)	(5.822)	(4.612)
50.staterankarea	0.0375	4.109*	4.673	3.670
	(0.857)	(2.344)	(4.936)	(3.851)
Constant	-5.377***	-15.98***	-26.03***	-17.66***
	(0.913)	(2.552)	(5.187)	(4.045)
Observations	52,163	52,163	52,163	52,163
R-squared	0.001	0.002	0.003	0.003

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.17

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.412*	-0.948	-1.676*	-1.077*
	(0.219)	(0.592)	(0.935)	(0.585)
LNTotalaffectedplus1	0.0150	0.0942***	0.211***	0.119***
	(0.0138)	(0.0301)	(0.0460)	(0.0294)
LNTotaldamage000USplus1	0.0225**	0.0493*	0.0851**	0.0601**
	(0.0107)	(0.0267)	(0.0410)	(0.0258)
LNInsuredlosses000USplus1	0.0368	0.0566	0.0768	0.0671
	(0.0300)	(0.0789)	(0.124)	(0.0779)
LNmvequity	0.455***	1.269***	2.041***	1.307***
	(0.136)	(0.356)	(0.560)	(0.352)
fcf_w5	-0.00289**	-0.00766**	-0.0122**	-0.00842**
	(0.00138)	(0.00370)	(0.00583)	(0.00365)
LNratiointangibleplus1	1.018**	3.484***	5.818***	3.564***
	(0.467)	(0.775)	(1.167)	(0.769)
2.stategdprank	-0.0967	-0.176	-0.285	-0.293
	(0.221)	(0.542)	(0.861)	(0.517)
3.stategdprank	-0.124	-0.369	-0.432	-0.438
	(0.270)	(0.580)	(0.884)	(0.583)
4.stategdprank	-1.090	-3.152	-4.992	-4.747
	(0.729)	(2.050)	(4.596)	(3.758)
5.stategdprank	0.136	-0.718	-1.564	-0.737
	(0.784)	(1.772)	(3.404)	(2.594)
6.stategdprank	-0.409	-0.0728	1.275	1.031
	(0.700)	(1.184)	(2.067)	(1.317)
7.stategdprank	9.680	4.222	8.346	9.049
	(6.063)	(6.624)	(9.649)	(7.262)
8.stategdprank	0.139	0.472	0.518	0.0219
	(0.267)	(0.648)	(1.014)	(0.653)
9.stategdprank	-0.209	-0.525	-0.662	-0.224
	(0.237)	(0.470)	(0.883)	(0.699)
10.stategdprank	-0.371	-0.708	-1.006	-0.970*
	(0.303)	(0.577)	(0.889)	(0.584)
11.stategdprank	0.0408	-0.296	-0.768	-0.625
	(0.575)	(0.849)	(1.215)	(0.939)
12.stategdprank	-0.292	-0.549	-0.788	-0.708*
	(0.191)	(0.345)	(0.529)	(0.374)
13.stategdprank	0.311	1.414***	2.542***	1.519***
	(0.220)	(0.470)	(0.726)	(0.484)
14.stategdprank	0.555*	1.796***	3.471***	1.690**
	(0.299)	(0.682)	(1.057)	(0.687)
15.stategdprank	0.373	1.607**	2.473**	1.144
	(0.354)	(0.777)	(1.238)	(0.814)
16.stategdprank	1.006	1.631*	2.042**	1.512*
	(0.811)	(0.895)	(1.026)	(0.897)
17.stategdprank	0.00796	-0.834	-2.884	-1.589

	(0.751)	(1.813)	(3.506)	(2.052)
18.stategdprank	0.427	1.299**	2.368***	1.515***
	(0.269)	(0.531)	(0.770)	(0.576)
19.stategdprank	-1.358**	-2.945**	-4.613**	-2.880**
	(0.606)	(1.444)	(2.180)	(1.252)
20.stategdprank	-0.265	-0.564	-1.571	-0.857
	(0.215)	(0.782)	(1.370)	(0.792)
21.stategdprank	-0.0994	-1.035	-1.323	-1.328*
	(0.445)	(0.764)	(1.183)	(0.775)
22.stategdprank	-0.124	0.835	1.056	-0.113
	(0.368)	(0.666)	(0.962)	(0.627)
23.stategdprank	-0.0356	1.447	1.261	0.513
	(0.485)	(1.037)	(1.921)	(1.149)
24.stategdprank	-1.053**	0.956	-0.319	-1.077
	(0.496)	(1.151)	(1.814)	(0.881)
25.stategdprank	0.0867	-0.146	0.261	0.00438
	(0.211)	(0.388)	(0.605)	(0.428)
26.stategdprank	0.0715	0.177	0.643	0.214
	(0.252)	(0.452)	(0.686)	(0.492)
27.stategdprank	0.489	1.001	1.210	0.540
	(0.340)	(0.786)	(1.207)	(0.744)
28.stategdprank	-0.0396	0.783	1.190	0.570
	(0.285)	(0.568)	(0.830)	(0.577)
29.stategdprank	0.255	1.799***	2.810***	1.418**
	(0.292)	(0.627)	(0.914)	(0.625)
30.stategdprank	0.891*	4.109***	6.075***	3.979***
	(0.528)	(1.232)	(1.692)	(1.178)
31.stategdprank	-0.00699	0.732	2.007**	0.927
	(0.305)	(0.560)	(0.858)	(0.582)
32.stategdprank	0.280	1.159**	2.133***	1.369***
	(0.249)	(0.504)	(0.788)	(0.530)
33.stategdprank	0.184	-1.344	-0.149	0.156
	(0.857)	(1.639)	(2.308)	(1.278)
34.stategdprank	-0.406	-0.936	-0.221	0.413
	(0.424)	(0.842)	(1.937)	(1.560)
35.stategdprank	0.361	-0.188	0.490	0.500
	(0.459)	(0.952)	(1.461)	(0.950)
36.stategdprank	-0.707**	-1.933***	-2.574**	-1.773***
	(0.307)	(0.653)	(1.013)	(0.662)
37.stategdprank	0.111	0.327	0.829	0.480
	(0.250)	(0.582)	(0.891)	(0.588)
38.stategdprank	0.812***	2.568***	4.380***	2.570***
	(0.237)	(0.489)	(0.762)	(0.505)
39.stategdprank	0.977	0.166	-0.347	-0.703
	(1.789)	(1.273)	(2.264)	(1.626)
40.stategdprank	-0.167	0.532	1.172	0.0627
	(0.355)	(0.728)	(1.007)	(0.629)
41.stategdprank	-0.432	-2.426	0.181	2.443
	(1.742)	(2.407)	(6.601)	(4.913)
42.stategdprank	0.340	2.321***	3.588***	1.975***
	(0.354)	(0.663)	(0.987)	(0.689)
43.stategdprank	-1.057	-0.0740	0.339	-0.447

	(0.837)	(1.607)	(2.106)	(1.296)
44.stategdprank	0.924***	2.285***	3.505***	2.479***
	(0.345)	(0.825)	(1.193)	(0.808)
45.stategdprank	-0.0587	1.234	0.101	-0.00565
	(0.411)	(0.810)	(1.192)	(0.829)
46.stategdprank	-0.131	5.436	3.380	1.583
	(1.458)	(4.105)	(4.663)	(2.808)
47.stategdprank	1.240***	1.932**	3.951***	2.578***
	(0.373)	(0.761)	(1.200)	(0.791)
48.stategdprank	-0.448	5.040**	1.576	-0.431
	(1.276)	(2.499)	(2.681)	(1.916)
49.stategdprank	-0.233	-2.984***	-4.686***	-2.175**
	(0.578)	(0.982)	(1.420)	(0.996)
50.stategdprank	-0.0902	-1.264	-1.620	-0.768
	(0.546)	(1.248)	(1.759)	(1.144)
Constant	-4.287***	-12.83***	-21.03***	-12.92***
	(0.662)	(1.352)	(2.058)	(1.342)
Observations	52,163	52,163	52,163	52,163
R-squared	0.001	0.002	0.003	0.003

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4.18

VARIABLES	(1) vwar0percent	(2) vwcar11percent	(3) vwcar22percent	(4) vwcar02percent
LNTotaldeathsplus1	-0.0667	0.145	0.174	0.0231
	(0.125)	(0.135)	(0.148)	(0.136)
LNTotalaffectedplus1	-0.00321	0.0451***	0.107***	0.0622***
	(0.00927)	(0.0167)	(0.0240)	(0.0166)
LNTotaldamage000USplus1	0.0102	0.00795	0.0220	0.0223
	(0.0106)	(0.0186)	(0.0263)	(0.0182)
LNInsuredlosses000USplus1	-0.0149	-0.0563**	-0.0977***	-0.0407*
	(0.0184)	(0.0233)	(0.0280)	(0.0224)
LNmvequity	0.324***	0.820***	1.266***	0.851***
	(0.118)	(0.312)	(0.491)	(0.308)
fcf_w5	-0.00283**	-0.00704**	-0.0109**	-0.00773**
	(0.00122)	(0.00328)	(0.00517)	(0.00324)
LNratiointangibleplus1	0.0158	-0.0191	-0.264	-0.00851
	(0.352)	(0.615)	(0.938)	(0.606)
Constant	-3.499***	-10.55***	-16.47***	-11.94***
	(1.004)	(2.704)	(5.055)	(3.964)
Observations	52,163	52,163	52,163	52,163
R-squared	0.004	0.008	0.009	0.008
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

CAPM model value weighted return including dividend CRSP abnormal returns, Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1