



2016

Do Peers Get Punished: Stock Market Effect of BP Oil Spill on Peers

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Recommended Citation

Koda, Yuga (2016) "Do Peers Get Punished: Stock Market Effect of BP Oil Spill on Peers," *Journal of Environmental and Resource Economics at Colby*. Vol. 3 : Iss. 1 , Article 9.
Available at: <https://digitalcommons.colby.edu/jerec/vol3/iss1/9>

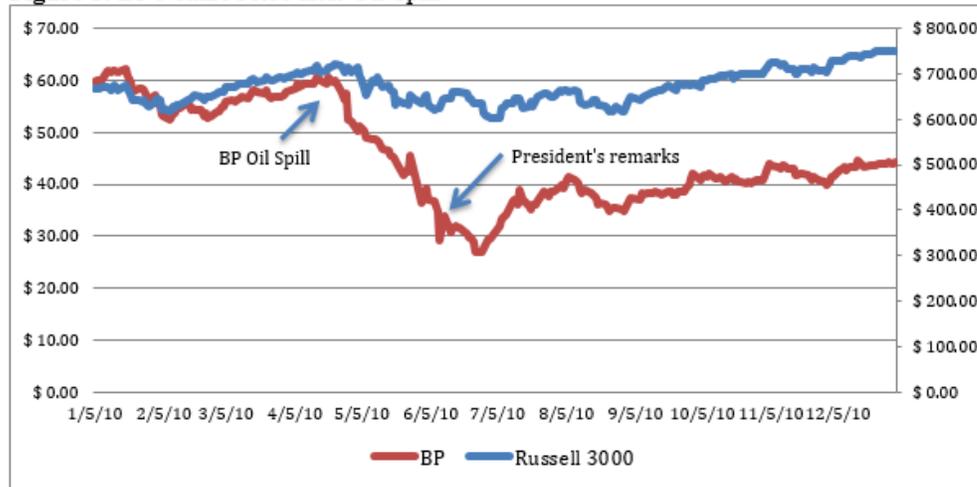
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Do Peers Get Punished: Stock Market Effect of BP Oil Spill on Peers

Introduction

On April 20, 2010 British Petroleum (BP), a publicly owned oil and gas company, operated an oilrig that exploded and sank, causing a seafloor oil gusher to flow. The gusher flowed for 87 days and was capped on July 15, 2010. The oil spill caused an estimated 3.19 million barrels of oil to leak into the Gulf of Mexico¹. The market punished BP after the incident and the stock price continually decreased until bottoming out on June 25 after roughly a 55% decrease. As shown in figure 1, BP's stock price was severely punished by the market for the mishap and the environmental damage that it has caused. Even relative to the Russell 3000, the benchmark, it performed significantly worse. The Russell 3000 also experienced a significant drop in market value in a similar time frame. After the incident, the Russell 3000 dropped slightly under 15%, bottoming out on July 2, 2010. The question now is, by how much and which industries were most affected?

Figure 1: BP's Share Price after Oil Spill



Note: Left axis is BP's share price and right axis is the Russell 3000's share price

This paper studies the effect of the oil spill on other companies within similar markets. To do so, this study will test whether the abnormal returns are statistically significant from the benchmark. This study looks at BP's competitors, oil related companies, utility companies, alternative energy providers, and natural gas providers. There are multiple possibilities regarding the abnormal returns on each sector. Some sectors may benefit with the market using the oil spill as motivation to invest more in different sources of energy; as BP's mechanical failure is highlighted, investors may choose to raise expectations for companies that do not rely on oil or gas, yielding a positive abnormal return. On the other hand it is safe

¹ National Museum of Natural History, "Gulf Oil Spill"

to hypothesize that oil companies can expect a negative abnormal return, as they are heavily connected to oil production and excavation. Utilities companies are expected have mixed results; some utilities companies use fossil fuels provided by large oil companies are their inputs. Other utilities may use alternate forms of energy such as nuclear energy or coal. Therefore, assuming that the selected utilities sample is representative of the utilities sector as a whole, a neutral result (no abnormal returns) can be expected. With the BP oil spill causing negative perspectives on oil, natural gas and alternative energy sources may be in higher demand, and therefore be rewarded. Hence, a positive abnormal return may be expected. Each industry will have a different reaction. Within the energy companies, oil and utilities are hypothesized to suffer, while alternative energy and natural gas providers may benefit.

This study will also see whether President Obama's remarks on the oil spill had any effect on abnormal returns. The President acknowledging a private institution's mishap inherently expresses the gravity of the situation and motivate abnormal returns. Abnormal returns are measured based on the benchmark, which will be discussed in more detail in the Empirics section.

This study will help understand the market behavior after such events. This hypothesis will show the magnitude in which investors react to a negative shock to a company; this study will attempt to quantify an unpredictable phenomenon. Since the market is so unpredictable, there is no theory that states what will happen to each individual company or sector, and the hypotheses are purely speculative. One hypothesis that could be tested is the efficient market hypothesis, which states that the share prices are reflective all the information available. This can be analyzed by looking at the media coverage. A possible conclusion of BP's share price bottoming out on June 25 can imply that all the negative news had been released, and all the coverage released after were positive.

Literature Review

In 1995, Hamilton published a paper that observed the media coverage of Toxic Release Inventory (TRI) releases and its effect on stock price. Hamilton found that companies reporting TRI releases experienced an abnormal return equaling an average loss of \$4.1 million in stock value for TRI firms on the day the pollution figures were released. Hamilton uses TRI announcement to see the impact of an environmental announcement on share prices, but also includes a media aspect to it. He is able to quantify media, which measures available information to the market, and concurrently analyze the level of media and share prices. Sabet et. al. expand on Hamilton's research by conducting a similar event study. They implemented further research on the BP oil spill with a more industry specific shock. Sabet et. al. look at the effects of the BP oil spill and moratoriums on the share prices of BP and its competitors. Their study looks at a total of 214

companies that are divided into three groups: BP subcontractors, moratorium firms, and other firms. Moratorium firms are defined as firms that own wells that were affected by the moratorium. Other firms are defined as firms that produce oil or gas that did not have affected wells. They hypothesize that the entire industry will suffer from the oil spill, but subcontractors and firms affected by the moratorium will be most affected.

In their regression model they include explanatory variables for the market return, 1-month treasury yield rate, the price of WTI crude oil futures, and the price of natural gas futures. They also include a dummy variable that indicates the day of the event. Their regression model encapsulates the fact that public oil and gas companies are sensitive to oil price, natural gas price, and interest rates. Their results find statistically significant and very large abnormal losses in two companies, Cameron International and Transocean. These two companies are BP subcontractors that were responsible for producing and implementing the blowout preventer and were deemed most responsible for the spill. Moratorium firms and other firms showed no abnormal returns on the day of the BP explosion. They did not experience any abnormal returns until the moratorium announcement, in which the moratorium firms and other firms experienced a 2.12% and .65% loss, respectively.

The event study that I will conduct is conceptually similar, but will look at a broader range of industries with less of a focus on post-explosion events such as moratorium announcements. I will be looking at the explosion's effects on companies across industries, such as alternative energy companies, whether to see if other competing industries actually benefit or suffer from these events. Also, the model of empirical analysis is much simpler. I will be using a simple t-test to see whether the abnormal returns for each industry is different from 0.

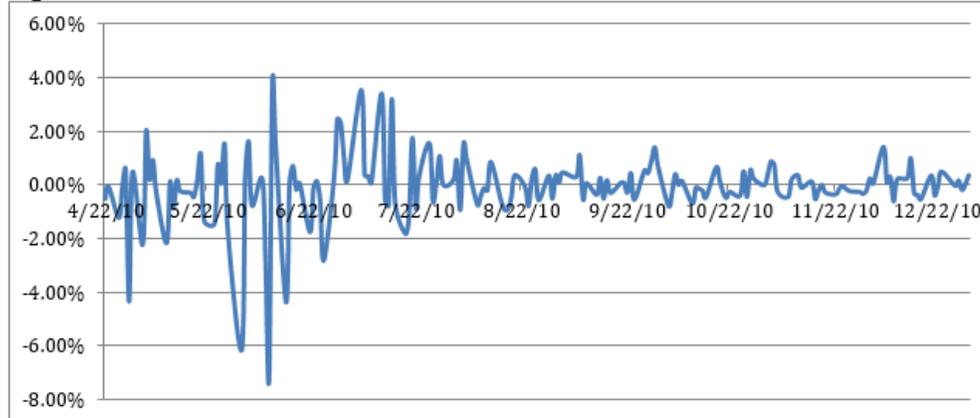
Data/Empirics

All the stock price information is from Yahoo finance. Initially the oil producers were selected through a search of BP competitors. The list was later extended after a search of all utilities related companies on the NASDAQ website. This search yielded a list of 300 companies. Within this list, the companies were registered as oil providers. By adding these names, the list of oil companies was compiled. From the same search on the NASDAQ website, the utilities companies were selected if they had any relation to energy production or distribution. The natural gas companies and the alternative energy companies went through the same vetting process. The list of 300 companies was trimmed to about 150. It was further reduced to 130 companies when the stock price information was not available, as some of the companies in the list were not public during the incident.

The data was also divided by the time periods after the event. The data looks at abnormal return for 8 weeks after the event. The abnormal returns are

reported in a weekly basis. It also looks at the rest of the year (the incident to December 31st 2010) to see whether the stock price reaches similar prices prior to the incident to measure the market's overall forgivingness. The time element is implemented because there may be a lag between the incident and market responses; the market may take time to understand and assess the incident. Also, the amount of media coverage will be a factor. If the incident initially is lightly reported the stock price will not see too much of an affect, but as more news is reported, the stock price reaction may be greater. The more media coverage, the more information the market can act upon. The amount of media coverage can be a measure of the gravity of the situation. There will be more media outlets covering the oil spill if it is worse. Hence media coverage can act as two indicators, the level of information the investors have and the gravity of the oil spill.

Figure 2: BP's Abnormal Return



As seen in figure 2, the abnormal returns were not very volatile a few days after the incident. Then after a week it the volatility increases and becomes most volatile between late May and late June. Within this one month, the market was being most responsive. This can be attributed to the market realizing the gravity of the situation. It is also possible that this was the height of the media coverage. Media coverage would have been helpful to better analyze the event study, but the time lag will compensate, as the time lag component will be able to capture the time lag of transmitted information. Also, the number of companies would ideally be larger. Though the overall event study looks at 130 companies, some of the industries have fewer than ideal companies. For example, the natural gas distributors and the number of alternative energy companies may be too few to draw concrete conclusion.

The summary statistics list the abnormal return (AR) for each industry with different amount of time after the incident. First the daily return of each company is calculated. The daily return is measured as follows:

$$\text{Daily Return}_i = \text{Log}(\text{Price}_t) - \text{Log}(\text{Price}_{t-1}) \quad (1)$$

Instead of taking the percent change, taking difference of the logs will make the daily returns cumulative. The abnormal returns are calculated with respect to a benchmark figure. The Russell 3000 is the benchmark in the study as it has 3000 companies, so no single company has a significant weight. To get the abnormal return, I take difference between the daily return of the specific company, i , and the benchmark:

$$\text{Abnormal Return}_i = \text{Daily Return}_i - \text{Daily Return}_{\text{Russell 3000}} \quad (2)$$

To get the cumulative abnormal return (CAR) I take the sum of the abnormal returns for the specific amount of time:

$$\text{CAR}_i = \sum_{t=1}^T \text{AR}_i \quad (3)$$

There is no need to take the average, as the study is not looking at average returns, but rather the return over a certain period of time². To get the industry average, I implement the following equation:

$$\text{CAR}_{\text{industry}} = \frac{1}{n} \sum_{i=1}^n \text{CAR}_i \quad (4)$$

Table 1: Summary Statistics

Observations	Oil		Utilities and Power		Alternative and Environmental		Natural Gas		All	
	27	60	24	19	130					
	CAR	Standard Dev.	CAR	Standard Dev.	CAR	Standard Dev.	CAR	Standard Dev.	CAR	Standard Dev.
1 Week	0.01%	0.0112	0.27%	0.0167	0.05%	0.0231	-0.73%	0.0129	0.03%	0.0170
2 Weeks	-0.66%	0.0358	0.93%	0.0253	-1.93%	0.0399	-1.18%	0.0220	-0.24%	0.0325
3 Weeks	-0.11%	0.0314	1.18%	0.0223	1.85%	0.1713	-0.67%	0.0188	0.76%	0.0773
4 Weeks	-0.41%	0.0518	1.64%	0.0296	-0.84%	0.1655	-1.75%	0.0305	0.26%	0.0796
5 Weeks	-0.57%	0.0415	0.81%	0.0266	0.07%	0.1721	-1.41%	0.0313	0.06%	0.0798
6 Weeks	0.25%	0.0380	1.38%	0.0327	-0.49%	0.1634	0.26%	0.0274	0.64%	0.0767
7 Weeks	0.47%	0.0433	1.65%	0.0291	-0.23%	0.1521	0.25%	0.0282	0.85%	0.0723
8 Weeks	0.92%	0.0378	2.28%	0.0322	0.46%	0.1576	0.24%	0.0301	1.36%	0.0746
Full Year	1.23%	0.0504	1.70%	0.0836	-0.75%	0.1572	2.08%	0.0694	1.20%	0.0954

Note: The standard deviations are for the industry CAR of the corresponding week

The abnormal returns are calculated starting April 22nd. Though, this is two days after the oil spill, according to Sabet et. al., this is the first day that an article was published and released to the market. As a result, looking at days prior to the 22nd should not yield any abnormal returns caused by the oil spill. The summary statistics shows that the oil industry, represented by 27 companies, on average had a positive CAR one week after the incident, which is contradictory to the hypothesis. The CAR is negative for two to five weeks after the incident, which is consistent with the hypothesis. This is reflective of the lag effect of the information being transmitted to the market. To see whether the oil spill did actually affect the industries more than the overall market, I conducted a t-test for each for each industry.

²Princeton University, "Value Relevance of Analysts" Earnings Forecast"

Table 2: T-Test Results on CAR

	Oil	Utilities and Power	Alternative and Environmental	Natural Gas	ALL
1Week	0.01%	0.27%	0.05%	-0.73%**	0.03%
2 Weeks	-0.66%	0.93%***	-1.93%**	-1.18%**	-0.24%
3 Weeks	-0.11%	1.18%***	1.85%	-0.67%	0.76%
4 Weeks	-0.41%	1.64%***	-0.84%	-1.75%**	0.26%
5 Weeks	-0.57%	0.81%**	0.07%	-1.41%*	0.06%
6 Weeks	0.25%	1.38%***	-0.49%	0.26%	0.64%
7 Weeks	0.47%	1.65%***	-0.23%	0.25%	0.85%
8 Weeks	0.92%	2.28%***	0.46%	0.24%	1.36%**
Full Year	1.23%	1.70%**	-0.75%	2.08%	1.20%

Note: "*" 10% level of significance, "***" 5% level of significance, "****" 1% level of significance

The results indicate that the most industries do not have a statistically significant abnormal return. The utility companies consistently, and unexpectedly outperform the market. The hypothesis states that utilities are likely to have a neutral response from the incident, if the utilities sample is representative of the overall industry. This implies that the sample selected mainly consists of competitors that benefitted from a shock in oil. In this regard, within the utilities sector, companies do benefit from a negative shock to its competitors. Assuming that the sample is not fully representative of the utilities industry and is compromised more competitors such as coal or nuclear-power based companies, part of the abnormal returns may be explained by the jump in the WTI crude oil price. On April 19th, the floating crude oil price was \$81.52. The day of the incident, the price jumps to \$82.98 and peaks on May 3rd at \$86.92.³ This may explain the short-term abnormal return the utilities, meaning that there is a clear substitution effect. Within the utilities companies, individuals expect higher returns from non-oil based utilities companies, due to the incident. As a result, investors are transitioning to alternative utilities companies, possibly coal or nuclear energy. It also makes sense that the abnormal returns last as the gravity of the situation is becoming more and more apparent in the market. A key assumption is that the utilities industry represented in by the sample may be composed of more non-oil based companies. Assuming this holds, this implies that competitors, within the utilities market, do indeed benefit from the negative shock.

On the other hand, alternative energy and natural gas companies, which could be considered competitors and a possible substitute to oil companies, do not show positive abnormal returns. The lack of significant difference from the benchmark in the alternative energy sector goes against the hypothesis that a negative shock in competing industries will be beneficial. The natural gas industry also goes against the hypothesis and actually does worse than expected. This implies that market did not positively adjust their expectation for cleaner and

³ U.S. Energy Information Administration

environmentally friendly energy sources. For all industries, it makes sense that the full year for all industries are not statistically significant as the stock prices stabilized overtime.

The oil industry goes against our hypothesis and shows that the returns are not abnormal and follow the Russell 3000. There is no statistical significant CAR's in any given week within the oil industry, going against the proposed hypothesis. This leads to the conclusion that the overall oil industry was not largely affected by the oil spill. This is likely because smaller companies that were less affected by the oil spill dilute the sample. The results are completely different when the analysis specifically focuses on large, global companies that are considered to be BP's competitors.

When looking at BP's competitors, the number of observations in the oil production industry decreases from 31 to 9. The 9 companies being analyzed are categorized as BP's competitors are based on Yahoo Finance and Morning Star; if Yahoo Finance or Morning Star considers a company a competitor, it is included in the sample, yielding a list of 9 companies. These companies are similar in size, operation, and global reach. I hypothesize that these companies will experience a similar punishment as BP, but not with the same magnitude, because these companies are most likely to have similar risks as BP.

Table 3: Summary Statistics of BP's competitors with T-Test Results on CAR

	1	2	3	4	5	6	7	8	Full year
Exxon Mobil	0.18%	0.13%	-0.56%	-0.11%	-0.72%	-0.48%	0.12%	-0.02%	0.90%
Royal Dutch Shell	0.26%	-1.32%	-2.98%	-1.77%	-2.61%	-2.02%	-2.77%	-2.11%	2.94%
PetroChina	-1.09%	-1.35%	-0.52%	-1.48%	0.00%	0.56%	2.03%	1.72%	2.25%
Total SA ADR	-1.95%	-4.71%	-4.73%	-4.54%	-4.67%	-5.46%	-4.79%	-3.36%	-5.75%
Petroleo Brasileiro	-1.42%	-4.45%	-4.63%	-6.72%	-5.47%	-3.18%	-1.61%	-2.65%	-8.63%
Eni SpA	-2.52%	-5.25%	-4.60%	-4.47%	-5.49%	-7.36%	-6.11%	-4.60%	-5.82%
Statoil	-0.54%	-2.72%	-2.02%	-3.13%	-4.07%	-3.79%	-2.73%	-2.62%	-3.63%
Chevron	0.30%	0.61%	0.30%	0.78%	-0.19%	-0.40%	0.19%	0.04%	2.78%
Suncor Energy	-1.43%	-2.77%	-2.13%	-3.67%	-1.67%	-0.32%	1.44%	1.90%	1.80%
Average	-0.91%**	-2.43%**	-2.43%***	-2.79%***	-2.76%***	-2.49%**	-1.58%	-1.30%	-1.46%
Standard Dev.	0.0096	0.0199	0.0183	0.0223	0.0210	0.0252	0.0262	0.0216	0.0423

Note: The numbers 1 through 8 indicate the number of weeks after the incident. The Average is CAR.

**" signifies 10% level of significance

***" signifies 5% level of significance

****" signifies 1% level of significance

When looking at only large competitors, who are listed in table 3, the companies underperform the index with statistical significance. The CAR's, listed as 'Average' in table 3, show that there are negative statistically significant negative returns. This follows the hypothesis that BP's peers suffer from BP's mistake. The 9 companies underperform the market by 0.91% one week after the incident. The competitors underperform the market even more for six consecutive weeks after the incident. This shows that the market took six weeks to fully adjust to the shock. With regards to the efficient market theory, this shows that the market took 6 weeks to receive and interpret the information. The largest abnormal return is observed 4

weeks after the incident. This can be reflective of the lack of initial coverage. Once the gravity of the situation became clear, the market reacted even more. The analysis clearly shows that peers, similar in size and operation, are punished for BP's mishap.

Another event that this study looks at is the President's remarks regarding the oil spill. The evening of June 15th, President Obama addressed the gravity of the oil spill referring to it as, "the worst environmental disaster America has ever faced."⁴ This reaction by the president should provoke a statistically significant negative abnormal return specifically within the competitors. The test itself is conducted in a similar way that Hamilton (1995) conducts his study. The study looks at five days prior, the day of the announcement, and the 5 days after, which show the immediate effect of the announcement and the lingering effects of the announcements.

Table 4: President's Announcements on Abnormal Returns

	Competitors	Oil	Utilities and Power	Alternative and Environmental	Natural Gas	ALL
5 days prior	0.64%	0.23%	0.19%	1.53%	-0.37%	0.36%
Announcement	-0.07%	0.04%	0.24%***	0.13%	0.02%	0.14%
5 Days after	-0.25%	0.31%	-0.53%	-1.26%	1.86%	0.14%

Note:

"*" signifies 10% level of significance

"***" signifies 5% level of significance

"****" Signifies 1% level of significance

This results go against the hypothesis that the announcement should cause negative abnormal returns. This may reflect the fact that the market had already priced in the gravity of the situation. The President's announcement may not have had an effect of the market's interpretation of the situation. The results show that there is only one significant abnormal return on the day of the announcement by the utilities companies. Like the earlier analysis, the increase in abnormal return may be rooted from the increase in oil price. Though not a significant increase in price, the floating WTI oil price increase 1.05% the day after the announcement, causing the utilities to have abnormal returns of .24%.⁵ The President's announcement did not have the expected effects on the abnormal returns on BP's competitors.

Conclusion and Summary

⁴ The White House, "Remarks by the President to the Nation on the BP Oil Spill"

⁵ U.S. Energy Information Administration

We provide evidence of peers experiencing abnormal returns in reaction to the BP oil spill, particularly with respect utilities companies and BP's direct competitors. The question being answered is whether if a company's mishaps punishes its peers. We can conclude that peers do get punished and that other industries may get rewarded. This implies that the stock market is intertwined; exogenous factors can and will affect the overall market. In this case, a negative shock to BP caused a downward revision of expectations for direct competitors. There are multiple layers of effects that can lead to some sort of multiplier effect; investors may believe that the peers have similar possible risks as BP since their operations are similar. There was also a moratorium on exploration in the Gulf of Mexico, so if companies had exposure to that area, they would have been negatively affected. Hence, Investors with more foresight will anticipate this downward revision and try to sell off their shares before the share prices decrease significantly. Lastly, investors may experience a sharp decline in the value of the share, motivating them to sell their shares. A combination of these affects can cause a downward steep downward revision of the share prices, causing large negative abnormal returns.

On the other hand, utilities companies experienced a positive abnormal return. This is sensible if we assume that the sample consists mainly of non-oil based companies. This implies that non-oil based companies benefit from the oil spill within the utilities market; non-oil based utilities companies are expected to outperform the oil-based utilities companies. This is evidence of the substitution effect. Individuals expect non-oil based utilities companies to outperform, motivating a transition from oil-based companies to non-oil based companies. Though utilities companies are not direct peers to BP, the oil spill indeed benefitted them.

Future research to understand the effect on peers will be based on other event studies. Studying other events will lead a greater understanding of market behavior. This will test both the efficient market hypothesis and the impact of exogenous shocks. This can be done by looking at other events such as the Valdez oil spill. In a non-environmental context, analyzing fines on major brokers and banks can help understand investor behavior. As a bank is fined, investors may stay away from the finance industry as a whole. Another possible topic would be the effect of a fast-food restaurant's salmonella outbreak on the overall industry. A possible way of analyzing this would be by looking at the peers' market share value when a large institution is penalized for malpractice.

An improvement to this event study is to add a media component a media component like Hamilton's (1995) analysis of TRI reports. The media variable would have better tested the efficient market hypothesis by measuring the amount of information available to the market. By using the media data and abnormal returns, investor behavior and responsiveness to information can be analyzed. As

more credible news sources report this incident, investors will begin to understand the gravity of the situation. There are other aspects that may have led to abnormal returns. Digging deeper into these specific issues, such as moratorium announcements, can explain the reasoning behind the abnormal returns. Also, better understanding of the BP oil spill timeline would help understand the abnormal returns. For example, on May 27th, the BP oil spill was recorded as the worst spill on U.S. history.⁶ By examining more specific events, investor behavior can be analyzed. Though maybe impossible, understanding the type of investor who sells off BP would narrow down investor behavior even more; if individuals are more environmental, they are likely to sell off the shares. Environmental investors may not even own BP shares to begin with, but looking at the composition of shareholders can shed light the investor's motivations and behaviors. Lastly, market forgiveness is a topic of further research. This can be analyzed by looking at the share prices after the incident to see if it reaches pre-incident levels.

⁶ Time Magazine, "100 Days of the BP Spill: A Timeline"

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