

The BP Oil Spill: How America's Largest Man Made Environmental Disaster Affected BP and Other Oil Producer's Share Prices

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I. Introduction

On April 22, 2010, the world learned that an explosion that had occurred a few days earlier on the Deepwater Horizon Drill in the Gulf of Mexico had resulted in a rupture of an oil pipeline deep underwater that was now leaking oil into the Gulf. This event caused America's largest environmental disaster (Browner, 2010). Eleven people died in the initial explosion; the drilling platform eventually sank and the oil would cause damage to untold numbers of wildlife in the Gulf and on its shores. It is estimated that 4.9 million barrels of oil were lost to the Gulf. British Petroleum (BP), the company responsible for the catastrophe, was the subject of a federal investigation and received the largest fine in corporate history, with BP being forced to pay over 4.5 billions dollars. Our primary focus will be to try and understand what impact the BP oil spill had on BP's share price. Secondly, we will also examine whether the spill affected other large oil producers. Because the event was so long and drawn out, we will observe three separate events and how they impacted BP and the oil industry's share price. The first is the spill on April 22, 2010, the second is the announcement of a federal investigation into BP on June 1, 2010, and the third is the announcement that BP will payout over \$4 billion in fines.

II. Literature Review and Theory

Prior studies have found significant impacts across financial markets following the BP Oil Spill. The repercussions from the event included a significant negative impact of up to 41% in share value for BP (Boudreaux et al., 2013) and a boost in stock returns for BP competitors (Lee & Garza-Gomez, 2006). Research suggests that many of these impacts were not immediate

however, as many small drops in BP's share price over time seem to indicate that economically meaningful information arrived incrementally over the course of two months (Fodor & Stowe, 2010).

The findings in previous studies on the BP oil spill align with literature examining environmental disasters more generally. Looking at decades of catastrophes, researchers have found that the market's response to an industrial disaster is related to the severity of the incident as measured by the number of casualties and amount of toxic release (Capelle-Blancard & Laguna, 2010). On average, petrochemical firms were found to experience a 1.3% drop in market value over the two days following a disaster (Capelle-Blancard & Laguna, 2010). Research has found that the public is increasingly critical towards eco-harmful behavior, like oil spills, and that the negative stock market response to these kinds of disasters has grown over time (Flammer, 2012). Similar studies have also found that those firms with greater environmental disclosure tend to suffer smaller negative shareholder wealth effects after environmental disasters in the increasingly eco-conscious world (Heflin & Wallace, 2017).

Following the BP oil spill, investors would think twice about holding BP stock as the company's profitability and public image would be hit hard, with likely fines and other clean-up costs looming in the distance as well. While this original predicted decline in stock price would most likely take into account some fines BP was sure to face, we will keep the announcement of their full payout as a separate event because of the size of the payout. It is unlikely that at the time of the spill or immediately after it any investors imagined BP would face such large fines. In the immediate aftermath of the spill it was still unclear who was to blame and to what extent they were to blame. The announcement that the federal government would be investigating BP would have served as an indicator that BP could be in deeper trouble than investors had

previously imagined. Furthermore, such significant investor blowback towards BP could result in BP's competitors, other large oil producers, having their share prices bid up. This coupled with a lack of perceived regulation from the government focused on oil producers could result in the industry suffering much smaller, and possibly no negative CARs.

Hypothesis and Methodology

In order to determine the impact the spill had on BP, we will use an event study framework to look at three major events. Our hypothesis is that the BP oil spill, as well as the announcement of a federal investigation and fines that BP will have to pay will result in large decreases in the share price of BP, and large negative cumulative abnormal returns (CARs). This aligns with the current literature regarding oil spills and follows the aforementioned theory regarding investor beliefs about BP after each of the events. We also imagine that other large oil producers will be relatively well insulated from all three of these shocks.

We will download daily stock price data for both BP and other large oil producers from Yahoo Finance. Using stock price data from seven other large oil producers will serve as our indicator for how the rest of the industry fairs. One observation in our data will be a firm's stock price on a single day with the Fama French market factors for that day. Our event window for the first event, the spill on April 22, 2010 will start at day 0 on the 22nd and continue for the next 15 days. This allows for 16 days total of observation. Because the first event was sudden and unforeseen, we do not include the period before the event. The other two events will have a window of 20 days prior to the event to account for any leaked information before the event took place, and 20 days after the event to allow investors to take into account the new information in their portfolios. This allows for 41 days total of observations for the second and third event. We will generate abnormal returns for the event using the Fama French Three Factor Model

(FF3FM) and the actual daily stock returns. The FF3FM will generate predicted returns over the event windows. The FF3FM predicts a company's return by taking into account three macroeconomic factors that affect return, and weighting them by how important these factors are for the given firm. The FF3FM model is as follows:

$$r = r_f + B_{mktrf} * (mktrf) + B_{smb} * (smb) + B_{hml} * (hml) + \epsilon$$

where r_f is the risk-free rate. The three factors that can affect return are a market factor ($mktrf$), a factor that takes into account firm size (smb), and a factor that takes into account firms with a lower book to market ratio generally make a lower return (hml). Our firm specific betas for BP will be estimated using the 120 days of stock returns before the spill. The values for each of the factors and the risk-free rate have all been downloaded from French's website for each day our study examines. From our abnormal returns that we will generate using the FF3FM and the actual stock prices, we will generate CARs and run a regression for each event window to determine the value and magnitude of our CARs. If our hypothesis holds true, we can expect significantly different and larger negative CARs for each event for BP compared to the other companies. Our regression is as follows:

$$CAR_{20} = \beta_0 + \beta_1 * (BPDummy) + \theta_i$$

where CAR_{20} is the 20-day (15 for event one) CAR for each event window, and $BPDummy$ is a dummy variable indicating if the firm is BP. From this regression, we will be able to estimate β_1 to tell us the size and value of the CARs, and if they are statistically significantly different from the industry's CARs.

III. Results

After generating our abnormal and CARs we found that BP did indeed experience large and negative CARs after the first two events, and much smaller, if any, negative CARs after the

third (table 1). Below, figure 1 shows that CARs for BP and the average of the seven other largest oil producers over the first event, the spill on April 22, 2010. Figure 2 shows the CARs for the same firms over the window for the second event, the announcement of the federal investigation into BP on June 1, 2010, and Figure 3 shows the CARs over the third event window, the announcement of the fine on November 14, 2012. Note that the first event window starts with the event date at 0, while the second and third event windows start 10 days before the event. Table 1 contains the outputs for the three regressions we ran to determine the size and magnitude of the CAR for BP compared to the industry. It shows that BP did have significantly different negative returns compared to the other firms in the 20 day event window, with event one having larger CARs by 14.98 percentage points and event two have larger CARs by 36.71 percentage points. Event three did have negative CARs but the results are not statistically significant.

Figure 1

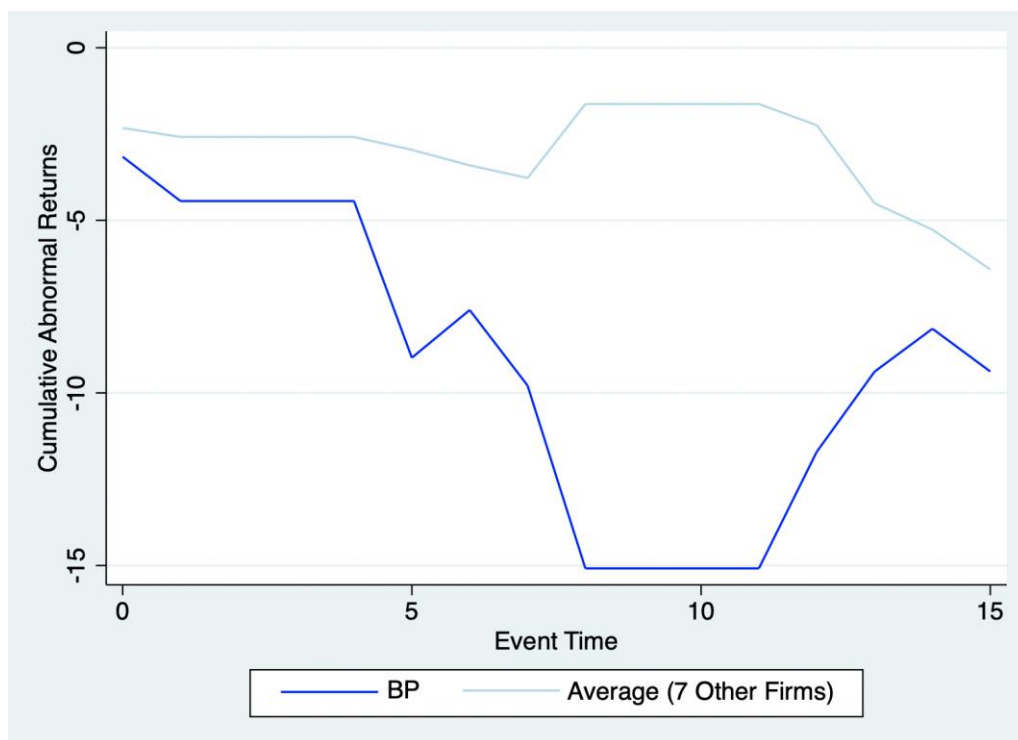


Figure 2

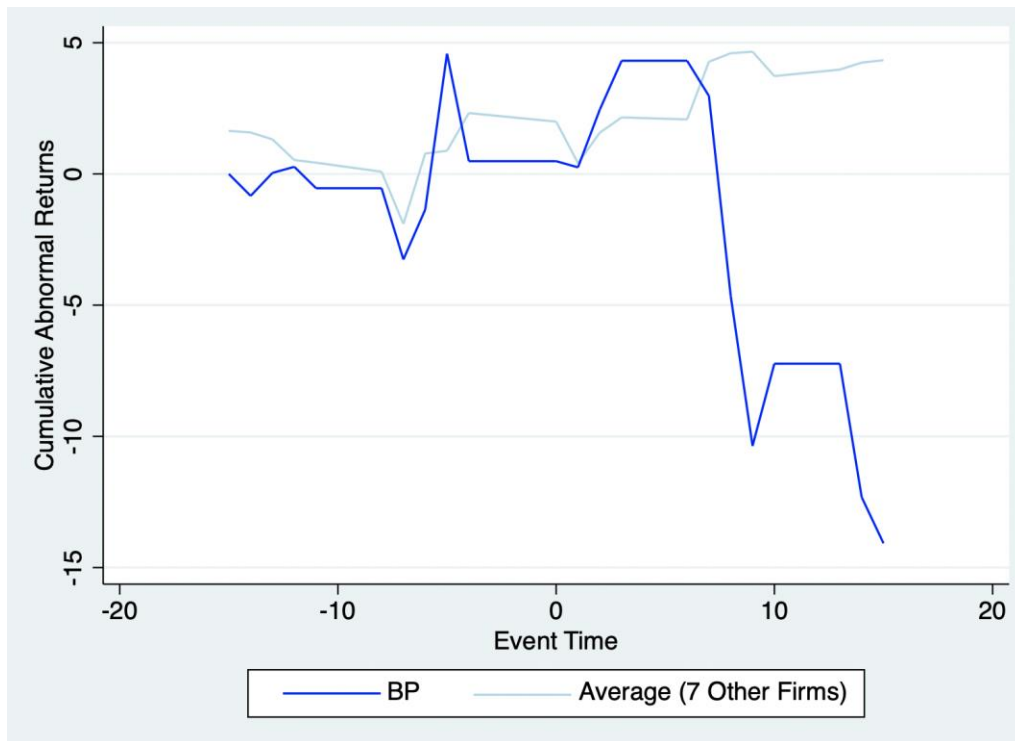


Figure 3

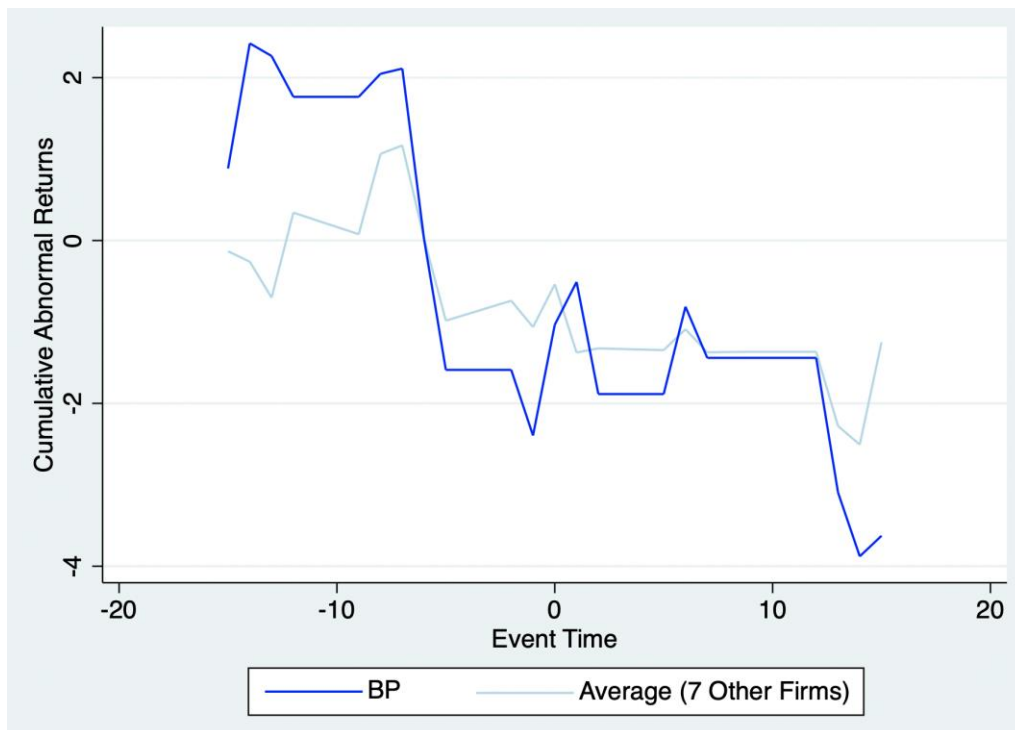


Table 1

Parameter	CAR_{20_EventWindow1}	CAR_{20_EventWindow2}	CAR_{20_EventWindow3}
BPDummy	-14.98*** (-12.56)	-36.71*** (-28.49)	-1.232 (-1.47)
_cons	-1.226** (-2.91)	6.814*** (14.96)	-0.364 (-1.23)
N	8	8	8

What is important to notice is that in all three graphs there is a downward trend in CARs for BP. For the first two events this trend is even more prominent after the event occurs. While we believe that it is the events listed in this paper that caused the decline in CARs, it is also plausible that this gradual decrease over time came from a number of other smaller pieces of information that decreased investor confidence in BP. This supports the findings of Fodor and Stowe. BP sees its greatest discrepancy with the industry and largest negative CARs during the second event, the announcement of the investigation. The discrepancies magnitude is more than twice that of the first incident's. One reason we could see such drastic negative CARs from BP here could be because information about the leak was compounded by the announcement that the government would be investigating BP.

IV. Conclusion

In conclusion, the BP oil spill in the Gulf of Mexico and the announcement of a federal investigation into BP did result in large negative CARs for BP. This supports our original hypothesis and is also consistent with the current literature on oil spills and environmental

disasters. However, our third event, the announcement of the \$4.525 billion fine that BP was going to pay did not immediately result in large negative CARs. We may have been naïve to assume that investors would not have already been expecting a large fine. If investors had already taken into account a fine of this magnitude, the share price would not have dropped as dramatically as we would have expected. It could even have risen if the fine was smaller than what investors had imagined. This would in turn explain why BP did not suffer serious negative CARs after the fine. Putting our results from these three events together, we can see a bigger picture of how the event impacted the share price of BP. While the initial announcement of the spill decreased BP's share price, it was a long and winding road to the bottom for BP that didn't end until sometime after the announcement of the investigation, but also before the final announcement of the fine. This is supported by both our empirical analysis and the current literature.

V. References

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