

# **The Effect of Corporate Prosecutions on Corporate Financial Policy**

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## **Abstract**

This paper investigates the impact of corporate prosecutions on firm risk and corporate financial policy. Using a unique dataset from Corporate Prosecution Registry compiled by Duke University School of Law and the Legal Data Lab at the University Virginia, I first conduct an event study to show that prosecuted firms experience negative abnormal stock returns around the press release from the Department of Justice (DOJ). Also, I find that the prosecuted firms exhibit negative buy-and-hold stock returns and high turnover ratio in the stock market, using univariate tests. Moreover, I implement a difference-in-differences regression methodology, and find that the risk associated with the prosecuted firms in the stock market significantly increase after the prosecutions. Consequently, those firms are likely to hold more cash following the prosecutions, and even decrease their capital investments and mergers and acquisitions when they are imposed heavy regulatory fines.

*Keyword:* Corporate prosecution, firm risk, uncertainty, precautionary cash holdings, capital investment, mergers and acquisitions

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## 1. Introduction

The world's largest accidental oil spill occurred on April 20, 2010 after the explosion of the British Petroleum's Deepwater Horizon oilrig in the Gulf of Mexico. The accident resulted in the death of 11 workers and caused an estimated five million barrels of oil to be spilled. British Petroleum (BP) had to spend more than four billion dollars for the spill response including grants to the Gulf States, federal costs, and penalties, but there still were additional costs to be taken care of. In addition to BP's monetary expenditures on the spill, BP had dropped from the second to the fourth largest of the four major oil companies in 2010 due to the significant loss in the stock market.

According to Corporate Prosecution Registry database used in this study, BP is prosecuted for multiple charges such as "misconduct or neglect of ship officers" and "oil and hazardous substances liability," and detailed information regarding the investigation and prosecution is revealed in 2013. BP is imposed approximately 1.3 billion dollars as the regulatory fine and 2.8 billion dollars as other penalties, including community service, and the probation length was 5 years. Like the case of BP, the prosecution is often filed several years after the actual incident, but the prosecution still has a significant impact on the firm. In a worst-case scenario, the prosecuted company may even go bankrupt.

When a company commits a crime or violate any type of regulations, the company incurs both tangible and intangible costs. Tangible costs would be the direct and first-hand costs such as regulatory fines and lawyer fees while intangible costs would be the indirect costs incurring from damaged corporate reputation and investor sentiment such as a significant drop in stock prices. Therefore, the stock market reaction to corporate criminals is investigated extensively in prior literature. For example, Davidson, Worrell, and Lee (1994) examine changes in stock prices around the announcement of corporate illegalities, and find significantly negative reactions to announcements of bribery, tax evasion, and violations of government contracts.

However, the overall stock market reaction was insignificant, implying that the market responds differently based on the types of crimes. Similarly, Xu et al. (2012) study the market reaction to the disclosure of environmental violations in China, and find only a weak impact on the stock prices of Chinese listed firms with negative environmental events. However, Xu et al. (2016) re-test the previous relationship, adding the level of media coverage of each environmental violation event, and this time, show that corporate environmental violations with high levels of media attention do result in greater losses in Chinese stock market.

In addition to the negative market reaction, a company also needs to worry about the regulatory fines, penalties, and legal expenses when committed a crime. Previous literature on corporate cash holdings suggest that companies have incentive to increase their cash holdings if companies expect to face greater uncertainty in the near future. For example, companies are likely to hold more cash when future cash flow risk or government economic policy uncertainty increases (Han and Qiu, 2007; Demir and Ersan, 2017; Phan et al. 2019). Therefore, the company may have a strong motive to increase its precautionary savings (a.k.a. cash holdings) while reducing its investment as a response to increased firm risk from the prosecution.

Using a unique prosecution dataset from Corporate Prosecution Registry compiled by Duke University School of Law and the Legal Data Lab at the University of Virginia Arthur J. Morris Law Library, I conduct an event study to analyze the effect of corporate prosecution in the stock market. Furthermore, I implement univariate tests and difference-in-differences analysis to examine if the prosecution influences firm risk, precautionary cash holdings, and eventually capital investment. This study has several strengths compared to previous studies. First, whereas previous studies on corporate misconducts use a certain date such as announcement date, the dataset used in this study provides several dates related to the prosecution, including date filed, agreement date, plea date, and judgment date. Therefore, I could perform additional analyses by dividing the sample period. For example, I investigate

changes in corporate cash holdings during and after the judgment. Secondly, the dataset also provides the regulatory fine and other penalties resulted from the prosecution, so I performed subsample analyses based on the fine amount. Lastly, the dataset contains detailed information regarding the prosecution such as jurisdiction, primary crime type, and disposition type, so various analyses are possible for the future research. In addition, this study contributes to prior literature on precautionary cash holdings and corporate investment, and shed new light on the effect of corporate prosecutions.

The remainder of the study is organized as follows. Section 2 reviews the related literature, outlines the empirical implications, and develops the main hypotheses. Section 3 describes the data sources and research methods. Section 4 discusses the empirical results, and Section 5 summarizes and concludes the paper.

## **2. Previous Literature and Hypotheses Development**

### **2.1. Market Reaction to Corporate Misconduct**

The stock market reaction to corporate misconduct and crime is examined extensively in corporate finance. At the early stage of the research stream, Spicer (1978) uses an event study methodology to examine financial consequences of companies based on pollution-control records in the pulp and paper industry. He finds that companies with poorer pollution-control records are likely to have lower profitability, smaller size, higher total risk, higher systematic risk and lower price/earnings ratios than companies with better pollution-control records do. By contrast, Mahapatra (1984) uses a larger sample with longer sample period across six different industries, and finds that environmentally responsible behaviors have no relation with corporate financial performance. Davidson, Worrell, and Garrison (1988) examine the stock market reaction to strikes, one of the labor management problems, and test the notion that strikes are good investments for unions whereas poor investments for corporations. They document strong and negative abnormal stock returns around the beginning of a strike, and

weak but positive abnormal returns around the announcement of a strike's end, implying that the strike leads to a permanent reduction in firm value and shareholders' wealth. Then, Davidson, Worrell, and Lee (1994) investigate the stock market reactions to the announcements of corporate illegalities. When they examine a total of 535 announcements, they find an insignificant market reaction overall, but figure out significantly negative reactions in the subsample analyses on crime types, especially bribery, tax evasion, and violations of government contracts. More importantly, they show that the market reacts more negatively to the companies that had previously been accused of other crimes, and also highlight that 51% of companies accused of crime in the 1970s were accused again in the 1980s.

Klassen and McLaughlin (1996) study the effect of environmental management on financial performance using the event study methodology, and show that firms with environmental crises (awards) experience significantly negative (positive) abnormal returns. Furthermore, they find that first-time award announcements result in greater increases in market returns although there are smaller increases for firms in environmentally dirty industries. Frooman (1997) also conducts event studies to test the stock market's reaction to socially irresponsible incidences and illicit behaviors. He finds significant and negative abnormal returns after firms acted in a socially irresponsible or illegal manner, and claims that acting in a socially responsible and law-abiding manner is a necessary, though not sufficient, condition for increasing shareholder wealth. In other words, firms should act in a socially responsible way to support shareholder's interests.

Similarly, Murphy, Shrieves, and Tibbs (2009) examine if allegations of corporate misconduct affect profitability and risk associated with alleged offenders. They document decreases in reported earnings and increases in stock return volatility following allegations, and point out the importance of reputational penalties. Xu et al. (2012; 2016) study the stock market reaction to environmental violations of publicly traded firms in China and changes in

shareholders' wealth, using an event study methodology. They find that estimated reduction in shareholders' wealth in China due to environmental violations is much lower than estimated reduction in other countries due to similar events, and a high level of media coverage is an important factor for the market reaction.

In sum, most of prior studies on corporate misconduct employ an event study methodology and focus on the stock market reactions, examining the stock prices and volatilities. However, in this study, I examine the impact of corporate prosecutions on other firm characteristics such as precautionary cash savings and capital investment in addition to the stock market reactions.

## **2.2. Determinants of Corporate Cash Holdings**

Prior literature on corporate cash holdings suggest various factors and circumstances that make firms hold more cash. For example, Opler et al. (1999) enumerate possible determinants of cash holdings such as investment opportunities, cash flow uncertainty, transaction costs of raising outside funds, and costs of dividend cuts. Then, they test each of those determinants, examining cash holdings of publicly traded US firms in the 1971–1994 period, and find that firms with strong growth opportunities, with riskier operating activities, or with small size tend to hold more cash than other firms. Further, firms that have better access to the capital market are likely to have lower cash holdings, which is consistent with their static tradeoff theory. In a similar vein, Han and Qiu (2007) propose a theoretical model of optimal cash holdings, and argue that a financially constrained firm increases its precautionary cash holdings in response to an increase in future cash flow variability.

In addition to firm characteristics that affect corporate cash holdings, Dittmar, Mahrt-Smith, and Servaes (2003) argue that agency problems are also an important determinant, increasing excess cash balances. In accordance with the free cash flow hypothesis of Jensen (1986) and Stulz (1990), they find that firms in countries with weak shareholder protection (i.e., bad

corporate governance) hold up cash twice more than firms in countries where shareholder rights are well protected (i.e., good corporate governance), using more than 11,000 firms from 45 countries. Furthermore, when shareholders are not well protected, previous factors such as investment opportunities and increased uncertainty become less significant.

Similarly, Harford, Mansi, and Maxwell (2008) also examine the relationship between corporate governance structures and cash holdings in the US, but they find the opposite result. They find that firms with weaker (better) corporate governance structures hold less (more) cash reserves, but they explain the discrepancy with country-level shareholder rights and the way firms spend their cash flow. For example, firms with better governance structures are likely to choose to pay dividends, thereby committing to higher payouts in the long term, whereas firms with weaker governance structures tend to select stock repurchases, which are more flexible option with no future commitment. Therefore, firms with better governance structures need to hold more cash reserves. Moreover, they argue that firms with weaker governance spend their excess cash on capital expenditures and acquisitions, rather than research and development (R&D) expenses. Interestingly, Gormley and Matsa (2011) examine corporate responses to the liability risk arising from workers' exposure to newly identified cancer-causing agent, a.k.a. carcinogen. They argue that companies have strong incentives to acquire large but unrelated businesses with high operating cash flow to increase their precautionary cash holdings in response to the increased liability risk. Their paper is very similar to this study, but the results on the impact of corporate prosecutions on mergers and acquisitions (M&A) are exactly opposite because of the different in natures of litigation and prosecution. I also extend and add to their work by examining what happens during and after the actual judgment and the risk/uncertainty is somewhat resolved.

Recently, Demir and Ersan (2017) implement a news-based index of policy uncertainty, named Economic Policy Uncertainty (EPU) index, to examine the relationship between

uncertainty and cash holdings of firms in BRIC countries (Brazil, Russia, India, and China). They demonstrate that both country-specific EPU levels and global EPU level have a significant and positive impact on corporate cash holdings in those countries. In the same vein, Phan et al. (2019) find evidence that government economic policy uncertainty is positively associated with corporate cash holdings in the US because of the precautionary motives. Moreover, Friberg and Seiler (2017) distinguish between uncertainties with known probabilities, *risk*, and uncertainties with “unknown” probabilities, *ambiguity*, and create text-based measures of ambiguity and risk for the US firms, using 10-K reports between 1995 and 2013. Using their own measures of ambiguity and risk, they find that greater ambiguity is associated with more cash holdings while greater risk is associated with a higher probability of use of financial derivatives for hedging purpose.

In addition to these prior studies, extensive research on corporate cash holdings has been done as it is an important topic in corporate finance. I also examine if the prosecution alter prosecuted company’s policy on cash holdings in this study.

### **2.3. Hypotheses Development**

Regardless of the facts and trial result, the prosecution is clearly a bad news about the company. Therefore, like the previous studies on corporate misconduct, I argue that the stock market will react negatively when a company is prosecuted for a certain allegation, and use an event study methodology to support this argument. As the regulatory fine and probation period are often followed by the prosecution, prosecuted firms are hampered from regular operating activities. For example, BP is charged 4 billion dollars as a result of the prosecution in 2013, and in response, BP increased its cash holdings from 19 billion dollars at the end of 2012 to 30 billion dollars at the end of 2014. Consequently, the uncertainty and risk associated with prosecuted firms would increase substantially, so I formulate the first hypothesis.

*H<sub>1</sub>: Firms will experience increased uncertainty and firm risk when they are prosecuted.*

In addition to the increased risk, prosecuted firms should also get ready for the possible regulatory payments. Building upon the extant research on corporate cash holdings, I formulate the second hypothesis:

*H<sub>2</sub>: After the prosecution, prosecuted firms will increase their precautionary cash holdings in response to increased firm risk and possible regulatory fines from prosecutions.*

Furthermore, after the judgment, prosecuted firms will react differently depending on the severity of the penalty. Thus, I could formulate the last hypothesis in this study:

*H<sub>3</sub>: Depending on the amount of the regulatory fine, prosecuted firms will react differently and modify their financial policy such as cash holdings and corporate investments.*

### **3. Data Description and Methodology**

#### **3.1. Corporate Prosecution Registry Data**

The most important data source in this study is the corporate prosecution data from Corporate Prosecution Registry<sup>1</sup>, created by a joint project between Duke University School of Law and the Legal Data Lab at the University of Virginia. Corporate Prosecution Registry provides information associated with prosecutions in the US, including defendant company, related parties, primary crime type, disposition type (trial result), jurisdiction, regulatory fines, and other penalties from 1992 to 2019. The sample firms include both private and public companies in the US. Before I move on to more details about this database, I would like to make an important distinction between corporate prosecution and civil litigation. The prosecution is filed by prosecutors or government whereas the litigation is initiated by private

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<sup>1</sup> The dataset encompasses most of the prosecution cases occurred in the US unless the case is off the record, and the dataset is being updated with new prosecution cases by the compilers.

parties such as injured or harmed individuals or corporations. In short, the prosecution is mostly about the public wrong whereas the litigation is about the private wrong.

Corporate Prosecution Registry does not provide any common company IDs in finance such as gvkey, cusip, or permno possibly because the database is compiled by the law schools. Therefore, I used a text-matching module in STATA, called “matchit”, to match necessary financial and accounting data of prosecuted firms based on company names. STATA’s “matchit” module is to match two datasets based on similar text patterns, and it uses vectoral decomposition of texts and weights of those vector’s elements to provide list of candidates with similarity scores. Therefore, after the module provides the list of candidates with similarity scores greater than 0.5, I manually checked and sorted out the correct match among the list. Unfortunately, “matchit” module does not work for companies with abbreviated names or that are subsidiaries of other company because those companies would have similarity scores less than 0.5 and would not be included in the list of candidates. Among the public companies in the sample, about 50 companies were in that kind, so I hand-collected their full company names on the web and found matches in Compustat and CRSP databases in order to maximize the sample size.

Total number of prosecution cases for both private and public companies in the data from Corporate Prosecution Registry is 3,409 from 1992 to 2019, and multiple prosecution cases have occurred for some companies during the sample period. The number of prosecution cases by the states is shown in Figure 1 in Appendix, and California has the highest number (darkest gray color) of prosecutions, having 331 cases, and New York and Florida (darker grays) are the next, having 241 and 238 cases respectively. Texas, Philadelphia, and Ohio also have high numbers of prosecution cases, and these results are as expected because those states are the ones with high population and where many of corporations are headquartered. Among 3,409 prosecutions cases, 3,046 cases are about the private companies, so those prosecution cases

were not included in this study because of the data availability. For the rest of 363 prosecution cases on the public companies, financial and accounting data were matched for the first-party firms (prosecuted firms), but some cases were excluded due to several issues. For example, El Al Israel Airlines, Ltd. is recorded as the US public company and prosecuted in 2009 for anti-trust violation according to Corporate Prosecution Registry data. However, the company is Israel's national airline and listed in neither NYSE nor NASDAQ, so its financial and accounting data are not available from Compustat and CRSP databases.

The prosecution cases of the public companies from Corporate Prosecution Registry have several important dates: filed date filed, agreement date, judgment date and press release date. Date filed is the date when the prosecution or indictment is first filed in the court, and agreement date is the date when the defendant company (prosecuted company) and the government, the US DOJ, entered into plea, deferred prosecution (DP), or non-prosecution (NP) agreements. Judgment date is the date of the court judgment, and only a plea agreement ends with the judgment whereas DP and NP agreements do not. Lastly, the press release date is the date when the US DOJ makes public the information regarding the prosecution.

In this study, the date filed is used as the first date of the prosecution because the date when prosecutors begin an investigation for the prosecution or the investigation becomes formalized as a criminal one is not recorded. In the United States, prosecutors neither record the date they officially begin an investigation nor announce it publicly because they are often unsure whether they will in fact prosecute the company or not. That is, prosecutors decide to prosecute the company or related employees if and only if they gather sufficient and appropriate evidence in the investigation. If not, they do not prosecute, and the investigation is off the record, but only known to related personnel and top management of the company. Judgment date is regarded as the last date of the prosecution and the press release date is used for the event study analysis. If date filed or judgment date is not available for the prosecution case, I searched every

document and article related to the prosecution cases for the first date when the prosecution is revealed and the last date when the final agreement or judgment is reached.

According to the Washington Post, Corporate Prosecution Registry provides the most detailed and comprehensive data on corporate prosecutions in the US, so it is worthwhile to utilize this dataset to examine the effect of prosecutions on corporate characteristics.

### **3.2. Other Data Sources**

I use the Compustat database for the data relating to firms' financials, including firm size (total assets), Tobin's Q, and ROA, and the Center for Research in Security Prices (CRSP) database for the stock market data such as stock prices, stock returns, and market values. The main independent variables in this study are the firm risk, corporate cash holdings, and capital investments, and they are also created using the CRSP and Compustat databases. More specifically, I use stock return volatility as a measure of firm risk, and three types of stock return volatility are used for the robustness of the results. The first type is a regular stock return volatility that is calculated as the standard deviation of daily stock returns over the fiscal year or quarter. The second and third types are idiosyncratic stock return volatilities that are the standard deviations of daily excess stock returns adjusted by Capital Asset Pricing Model (CAPM) and Fama-French 3-factor model (FF3), respectively, over the fiscal year or quarter. Idiosyncratic stock return volatility measures the inherent risk associated with the specific stock, so it is also called as idiosyncratic risk. In order to calculate idiosyncratic risk, I follow Dhaliwal et al. (2016) and use the residuals from regressing daily stock returns on market return or Fama-French 3-factors as daily excess stock returns. Lastly, I also implement Thomson Reuters' SDC Platinum database to examine the changes in the most important type of corporate investment, M&A activity, following corporate prosecution.

### 3.3. Empirical Design

I implement several empirical methods to investigate the arguments in this study. First, in accordance with the prior research, I conduct an event study on press releases of corporate prosecutions by the US Department of Justice (DOJ) to examine the stock market reactions. Daily abnormal stock returns (AR) and accumulative abnormal stock returns (CAR) are calculated in an event window around the press releases from the US DOJ. The AR is calculated as in Eq. 1.

$$AR_{i,t} = R_{i,t} - \hat{R}_{i,t} \quad (1)$$

where  $R_{i,t}$  and  $\hat{R}_{i,t}$  are the actual daily return and expected daily return of stock  $i$  on day  $t$ . The expected daily return  $\hat{R}_{i,t}$  is calculated in three ways as Eq. 2, 3, and 4.

$$\hat{R}_{i,t} = \hat{\alpha}_i + \hat{\varepsilon}_{i,t} \quad (2)$$

$$\hat{R}_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} + \hat{\varepsilon}_{i,t} \quad (3)$$

$$\hat{R}_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} + \hat{\gamma}_i SMB_t + \hat{\delta}_i HML_t + \hat{\varepsilon}_{i,t} \quad (4)$$

where  $R_{m,t}$  is the market return,  $SMB_t$  is a small minus big factor, and  $HML_t$  is a high minus low factor from Fama-French 3-factor model on day  $t$ . The parameters in Eq. 2, 3, and 4 are estimated over a period of 221 days starting from one year (251 days) prior to the press release of corporate prosecution up to 30 days prior to the press release.

In addition, CAR is calculated as in Eq. 5.

$$CAR_{(t_1,t_2)} = \sum_{t_1}^{t_2} AR_t \quad (5)$$

where  $t_1$  and  $t_2$  indicate the beginning and the end of the event window.

In addition to the event study, I carry out univariate tests to examine changes in the stock turnover ratio (trading volume) and buy-and-hold returns after the prosecution because the stock turnover ratio is likely to reflect the uncertainty associated with a firm in the stock market.

Then, I employ a difference-in-differences regression method, instead of a simple ordinary least squares (OLS) regression, to further investigate the impact of corporate prosecutions on firm risk and corporate financial policy. In order to conduct a difference-in-differences analysis, it is essential to pick out control (non-prosecuted) firms based on the similar size, book-to-market ratio, and the same Fama-French industry classification to treatment (prosecuted) firms. Then, I exclude any observation that has missing values for the main variables in the analysis. The regression models for difference-in-differences analysis of firm risk and corporate financial policy are present below:

$$\begin{aligned} \text{Dependent Variables}_{i,t}^2 = & \alpha + \beta \text{ Prosecution Dummy} \times \text{Time Dummy} \\ & + \gamma \text{ Control Variables}^3 + \text{Time Fixed Effects} + \text{Firm Fixed Effects} + \varepsilon_{i,t} \end{aligned}$$

## 4. Empirical Results

### 4.1. Summary Statistics and Event Study on Press Release from the US DOJ

Table 1 describes summary statistics on firm-quarter observations<sup>4</sup> of the main variables used in the difference-in-differences analysis from 1990 to 2018. As I employ a difference-in-differences methodology in this study, I present the summary statistics separately for both prosecuted firms and control firms, in addition to the difference in the mean and median values for each variable. The univariate test results in Table 1 indicate that control (non-prosecuted)

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<sup>2</sup> The main dependent variables in this study are firm risk, measured by adjusted stock return volatility, cash holding ratio, capital expenditure, and variables related to M&A activity.

<sup>3</sup> Control variables are also different based on the main dependent variable. For firm risk, I follow Pan, Wang, and Weisbach (2015) and Dhaliwal et al. (2016) to include ln (market equity value), ln (firm age), cash flow ratio, market beta, market to book ratio, market leverage, ROA, R&D expenditures, property, equipment, and plant, and dividend payout ratio. For cash holding ratio, I follow Han and Qiu (2007), Harford, Mansi, and Maxwell (2008), Demir and Ersan (2017), and Phan et al. (2019) to include cash flow ratio, ln (total assets), Tobin's Q, ROA, book leverage ratio, net working capital, and dividend payout. Lastly, I follow Gulen and Ion (2016) for capital investment, and Harford (2005) for mergers and acquisitions.

<sup>4</sup> The values were similar when using firm-year observations. I use firm-quarter observations for most of the analysis, but use firm-year observations when I examine the effect on M&A activity.

firms hold more cash than prosecuted firms on average, which is inconsistent with the second hypothesis. However, the difference in median values of cash holdings, although not significant, is positive and consistent with the second hypothesis. The last three rows in Table 1 show the summary statistics of measures of firm risk, and the differences between prosecuted and control firms are very small and insignificant. I winsorize all the variables in this study at the 1% level in order to prevent outliers from driving the empirical results. Table 2 shows the correlation matrix of variables used in the main analysis, and no significant correlation between the main variables is observed except between cash flow ratio and ROA.

[Insert Tables 1 and 2 here]

Corporate prosecutions of public companies end in either plea, deferred prosecution (DP), or non-prosecution (NP) agreements in most of the cases. Plea, DP, and NP agreements are all agreement between the defendant company and the court that the company admits its allegation and follows the court's ruling. To be specific, DP and NP agreements are alternative settlement agreements of plea agreement in the US DOJ. Under a plea agreement, a defendant company is convicted of a crime, has to pay various types of penalties and conduct remedial actions following the court's order. A DP agreement is a voluntary alternative to adjudication whereby the prosecutor grants amnesty in exchange for the defendant's agreement to provide full cooperation in the investigation and to fulfill certain requirements including the payment of fines, implementation of corporate reforms and in some cases, appointment of an independent monitor to oversee compliance. Generally, prosecutors in the DOJ files criminal charges in court against the company but agrees to waive the charges once the company meets the terms of the deferred prosecution agreement. A NP agreement is similar to a DP agreement in that the DOJ and defendant company enter into an agreement wherein the company agrees to cooperate with the government and take remedial actions to correct the wrongdoing. However, no charges are filed against the defendant so long as there is no breach in the agreement.

Therefore, NP agreements are usually less detailed than DP agreements and often do not require a corporate monitor. In addition, a final judgment takes place for a plea agreement whereas no judgment, but only agreement occurs for DP and NP agreements.

In other words, one can expect that a plea agreement is the worst case for the prosecuted firm, a NP agreement is the best, and a DP agreement is somewhat better than a plea agreement, but worse than a NP agreement. Therefore, I conduct univariate tests for the regulatory fines of the public companies based on the disposition types to test if there is a difference between the fine amounts. The univariate test results are presented in Table 3, and as expected, the mean regulatory fine is the highest for the plea agreement, but not significantly different from the mean value of the DP agreement. However, the mean regulatory fine for the NP agreement is significantly less than the mean values of the DP agreement and the plea agreement.

[Insert Table 3 here]

The results from the event study on the press releases from the US DOJ is presented in Table 4. In order to minimize the measurement errors in the event study methodology, I only use the prosecution cases with the press releases from the US DOJ, which provide the clear and accurate event date. Many of the prosecution cases are not press-released by the US DOJ even though they are recorded in the database. According to the results in Table 4, prosecuted firm experiences about 2-3% of negative abnormal returns on average when the US DOJ writes a press release regarding the prosecution. This is perfectly in line with the empirical evidence of the previous literature on corporate misconduct.

[Insert Table 4 here]

#### **4.2. Corporate Prosecutions, Firm Risk, and Corporate Cash Holdings**

Before testing the major hypotheses with the difference-in-differences analysis, I first perform univariate tests on trading volume and buy-and-hold stock returns of prosecuted firms. The trading volume is calculated as the sum of trading volumes over a fiscal quarter normalized

by the number of shares outstanding, and the buy-and-hold stock return is the return for holding the stock over the fiscal quarter. The univariate test results in Table 5 demonstrate that quarterly trading volume of prosecuted companies increase significantly from 1.6 to 2.2 whereas quarterly buy-and-hold stock returns decrease significantly from 5% to 3% on average right after the prosecutions. The trading volume of 1.6 means that 1.6 times the total number of shares outstanding are traded over the fiscal quarter. Therefore, the number of shares traded in the market over a fiscal quarter is, on average, increased by 60% of the total number of shares outstanding after the prosecution, implying increased uncertainty of the prosecuted companies.

[Insert Table 5 here]

The univariate tests cannot control for other firm-specific factors that may drive the results, and the OLS regression method cannot solve for the possible endogeneity issues. Therefore, I implement a difference-in-differences analysis to test the first hypothesis and examine the pure effect of corporate prosecution on firm risk. As a measure of the firm risk, I use stock return volatilities, adjusting with both CAPM and Fama-French 3-factor model. Table 6 shows the results from the difference-in-differences analysis on the firm risk. *SVOL* is the realized stock return volatility without any return adjustment, and *IDVOL<sub>CAPM</sub>* and *IDVOL<sub>FF3</sub>* are the volatilities of excess stock return adjusted by CAPM and Fama-French 3-factor model, respectively. *After Prosecution Dummy* indicates whether the sample period is before the prosecution, getting a value of 0, or after the prosecution, getting a value of 1. *Prosecuted Firm Dummy* indicates whether the firm is prosecuted or not at all during the sample period. Like other studies implementing a difference-in-differences method, the main variable of interest in Table 6 would be the interaction term between *After Prosecution Dummy* and *Prosecuted Firm Dummy*. Meanwhile, because *After Prosecution Dummy* has a perfect-collinearity problem with the year fixed effects, I do not control for the year fixed effects when I include *After Prosecution Dummy*. However, I do not include *Prosecuted Firm Dummy* in the first place, but

always control for the firm fixed effects to get results that are more robust and conservative. Therefore, columns (2), (4), and (6) of Table 6 present the most robust results with both year and firm fixed effects. I narrow down the sample period to 3 years before and after the prosecution occurred in order to eliminate other events and factors that might influence the dependent variables<sup>5</sup>. All the coefficients on the interaction terms are positive and statistically significant at 5 or 10% level and also meaningful economically, indicating that the firm risk substantially increases after the prosecution. Interpreting the magnitude of the coefficient of the most conservative result in column (6), the volatility of prosecuted firm's excess stock return adjusted by Fama-French 3-factor model is increased by 0.084, which is about 4% of the sample mean, compared to non-prosecuted firm with similar firm characteristics.

[Insert Table 6 here]

Then, I also examine the impact on corporate cash holdings, testing the second hypothesis. Table 7 show the results from the difference-in-differences analysis on cash holdings. When measuring corporate cash holdings, I follow Opler et al. (1999) and Harford, Mansi, and Maxwell (2008) to use the ratio of cash and cash equivalents (short-term investments) to net assets, which is the total assets net of cash and cash equivalents. For the robustness check, I also use an industry-adjusted measure of the firm's cash to sales ratio for an alternative measure of cash holdings because industry classification is one of the important factors in the determination of cash holdings according to Harford, Mansi, and Maxwell (2008)<sup>6</sup>. The main variable of interest is the interaction term of two dummies as well, and the positive and statistically significant coefficients of the interaction terms in Table 7 support the second hypothesis. The coefficient of the interaction term in column (2) is 0.011, implying that

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<sup>5</sup> I also try 2 years before and after the prosecution for the study period, and the results were even stronger.

<sup>6</sup> I also use a regular cash holding measure, the ratio of cash and cash equivalents to total assets, in un-tabulated analysis, and the results were very similar.

prosecuted firms increase their cash holdings by 5%, compared to non-prosecuted firms, after they are prosecuted.

[Insert Table 7 here]

I also implement the annual data for the previous analyses, but the results were the same. Therefore, the results from difference-in-differences analyses on firm risk and cash holdings strongly support the first and second hypotheses that prosecuted firms experience increased uncertainty and risk and increase their precautionary cash holdings in response to the prosecutions.

### **4.3. Corporate Responses based on the Outcomes of Prosecutions**

Now, I move on to the most interesting part of this study, testing the third hypothesis. I examine how prosecuted firms react and adjust their corporate financial policy after the judgments of prosecutions come out. In order to investigate the interesting dynamics in corporate reactions based on the severity of the judgment, I first split the sample firms into two groups; firms with regulatory fines below the median fine amount and firms above the median value<sup>7</sup> because prosecuted companies will respond differently based on the terms in the judgment such as the fine amount. Then, I compare corporate cash holdings before the prosecution is filed to cash holdings during the prosecution (after the prosecution is filed, but before the judgment) as well as cash holdings during the prosecution vs. cash holdings after the judgment. The results on the prosecuted firms with low regulatory fines are presented in Table 8, and they show interesting and important corporate behaviors as expected. The coefficients of interaction term between *Prosecuted Firm Dummy* and *During Prosecution Dummy* in column (1) and (2) are positive and significant at the 10% level whereas the

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<sup>7</sup> I also try with top quartile and bottom quartile values of the regulatory fine, but then the results were much stronger.

coefficients are significantly negative in column (3) and (4) at the 10% and 1% levels. Those coefficients imply that prosecuted firms, when the prosecution is first filed, increase their cash holdings by around 5 to 10%, compared to non-prosecuted firms with similar characteristics, but they significantly reduce their increased cash holdings by about 8% right after the judgment with low regulatory fines. The results in Table 8 also suggest that prosecuted firms increase their cash holdings for the precautionary motives and decrease the cash holdings when the uncertainty and concern related to the prosecution is somewhat relieved along with the judgment.

[Insert Table 8 here]

Moreover, I examine firm risk, cash holdings, and capital investment on the prosecuted firms, charged heavy regulatory fines. This time, I only use the sample period after the prosecution is filed (during the prosecution vs. after the judgment) because the results from the sample period before and during the prosecution are very similar to Table 8. The coefficients of the interaction terms in column (1) and (2) of Table 9 are positive, but weakly significant at the 15% level, implying that the risk of prosecuted firms does not decrease, but rather increases when they are imposed heavy regulatory fines. In addition, unlike the results in Table 8, the coefficients of the interaction terms in column (3) and (4) indicate that prosecuted firms do not reduce their increased cash holdings after the judgment. The magnitudes of the coefficients in column (1) to (4) are all economically meaningful although they are weakly significant at around 15% level. By contrast, the coefficients in column (5) and (6) of Table 9 indicate that prosecuted firms significantly decrease their capital investment by 0.004 and 0.003, which are more than 20% of the mean capital expenditures shown in Table 1, if the judgment comes out with heavy regulatory fines.

[Insert Table 9 here]

The interesting results based on the regulatory fine amount demonstrate the uniqueness and strength of this prosecution dataset, supporting the major hypotheses in this study that corporate prosecution increases uncertainty and risk associated with the firm, and the prosecuted firm increase their precautionary cash holdings in response. In addition, if the result/judgment of the prosecution is favorable to the firm (low regulatory fine), prosecuted firm reset its increased cash holding, but if not favorable (high regulatory fine), the firm maintain its increased cash holding, but even reduce its capital investment.

#### **4.4. Corporate Prosecutions and M&A Activities**

Furthermore, I investigate the effect of corporate prosecutions on M&A activities, which are the most important investment activities of corporations in this era. According to Gormley and Matsa (2011), companies, when their liability risk rises considerably, acquire (unrelated) large businesses that can provide enough cash for the possible litigations. Therefore, I examine if prosecuted firms also acquire other businesses with ample cash in response to the increased risk from the prosecutions. However, I could not make the same conjecture as Gormley and Matsa (2011) because corporate prosecutions are very different from civil litigations in nature. Table 10 presents the surprising results on M&A activities that are the exact opposite to those in Gormley and Matsa (2011).

[Insert Table 10 here]

In columns (1) and (3), I include *After Prosecution Dummy* instead of the year fixed effects while I include both the year fixed and firm fixed effects in columns (2) and (4). The significantly negative coefficients of all the interaction terms between *After Prosecution Dummy* and *Prosecuted Firm Dummy* indicate that prosecuted firms significantly reduce their M&A activities, both in the number and the size. This opposite result might be explained by the difference between civil litigation and criminal prosecution. As mentioned in the data description and earlier result sections, prosecuted firms, unlike civil litigation cases, admit their

crimes and make an agreement with the prosecutor or government that they will fulfill remedial actions including implementation of corporate reforms and outside monitors to oversee corporate activities for quite a long time. Therefore, even though the judgment or agreement of the prosecution is reached, prosecuted firms have to be careful about their activities and compliances. Consequently, they cannot easily invest in large projects or acquire unrelated businesses just for precautionary motives. In other words, criminal prosecutions are much more complicated and uneasy for firms than civil litigations. Actually, these interesting results on M&A activities are in line with the results on capital investments in Table 9.

## **5. Summary and Conclusions**

In this study, I investigate the stock market reactions to corporate prosecutions, and the impact of corporate prosecutions on corporate financial policy, including precautionary cash holdings, capital investment, and M&A activities. I utilized an event study and difference-in-differences methodologies to test the main argument and hypotheses in this study. The empirical results are consistent with the previous studies on firm risk and corporate cash holdings, but are somewhat opposite on corporate investment, especially M&A activities.

More specifically, prosecuted firms experience negative (cumulative) abnormal returns when the US DOJ release the information regarding the prosecutions even though their crimes may be already announced a long time ago. The results on univariate tests and difference-in-differences analyses further support that prosecuted firms increase their precautionary cash savings but decrease their investment such as capital expenditures and M&A activities in response to their increased uncertainty and risk. Mostly importantly, I found interesting dynamics in corporate reactions depending on the severity of the judgment of the prosecution. Therefore, this study contributes greatly to the literature on corporate misconducts and corporate financial policy.

For the future research, deeper analyses based on the crime types and for firms with multiple prosecutions or charges would be conducted, and the consequences of corporate prosecutions on other corporate outcomes such as bankruptcy, CEO turnover, and innovations prosecutions would also be interesting to study.

## Appendix

## Variable Definition

Variable	Definition
<b>Variables related to Corporate Prosecution</b>	
<i>Regulatory Fines</i>	Total payment to civil enforcers by the firm (in \$ millions)
<i>Probation Length</i>	Length of probation in months
<b>Firm-level characteristics (Compustat)</b>	
<i>Cash Holding Ratio</i>	Cash holding ratio, which is calculated as the sum of cash and short-term equivalents ( <i>che</i> ) divided by total assets ( <i>at</i> )
<i>Capital Investment</i>	Capital expenditure ratio, the ratio of capital expenditures ( <i>capx</i> ) to total assets ( <i>at</i> )
<i>Cash Flow</i>	Cash flow ratio, calculated as the sum of income before extraordinary items ( <i>ibc</i> ) and depreciation and amortization ( <i>dp</i> ) divided by total assets ( <i>at</i> ) of the previous period
<i>Total Assets</i>	The total value of a firm's assets (in \$ million)
<i>Market Value of Firm</i>	The market value of a firm is calculated by adding the total market value ( <i>mkvalt</i> ) and total assets ( <i>at</i> ) and subtracting common/ordinary equity ( <i>ceg</i> ) and deferred taxes ( <i>txdb</i> )
<i>Firm Age</i>	Firm age based on the years that appear in Compustat database
<i>Tobin's Q</i>	Tobin's Q, calculated as the ratio of the market value of assets to the replacement value of assets (book value of total assets), following Fama and French (1992)
<i>Book Leverage</i>	The book leverage ratio, calculated as the sum of long-term debt ( <i>dltt</i> ) and current liabilities ( <i>dlc</i> ) divided by total assets ( <i>at</i> )
<i>Market Leverage</i>	The market leverage ratio, calculated as the sum of long-term debt ( <i>dltt</i> ) and current liabilities ( <i>dlc</i> ) divided by the market value of the firm
<i>Dividend Payout Ratio</i>	The annual (quarterly) dividend payout ratio, calculated as the cash dividend amount divided by net income
<i>R&amp;D Expense Ratio</i>	Research and Development (R&D) expense ratio, calculated as the ratio of R&D expenses to total assets (R&D expenses value set to zero if missing)
<i>PPENT Ratio</i>	Property, Plant, and Equipment (PPENT) ratio, calculated as net property, plant, and equipment divided by total assets
<i>NWC Ratio</i>	Net Working Capital (NWC) ratio, calculated as the difference between current assets and current liabilities divided by total assets
<i>ROA</i>	Return on assets, calculated as the ratio of operating income before depreciation ( <i>ni</i> ) to total assets ( <i>at</i> )
<i>Sales Growth</i>	Sales growth rate, calculated as the quarter-on-quarter growth in sales
<i>Asset Tangibility</i>	Asset tangibility is measured as $0.715 * \text{Receivables (rectq)} + 0.547 * \text{Inventory (inv tq)} + 0.535 * \text{Capital (ppentq)}$ normalized by total assets ( <i>atq</i> ) following Berger et al. (1996) and Almeida and Campello (2007)

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**Firm-level Characteristics (CRSP)**

<i>Market Beta</i>	Market beta, which is the coefficient on market return from regressing on daily stock returns using CAPM model over the fiscal quarter
<i>M/B</i>	Market to Book ratio, calculated as the ratio of market value of equity to book value of equity
<i>ME or Mkvlt</i>	The market value of equity
<i>SVOL</i>	Realized stock return volatility, which is the standard deviation of daily stock returns over the fiscal year
<i>IDVOL<sub>CAPM</sub> / IDVOL<sub>FF3</sub></i>	Idiosyncratic stock return volatility, which is the standard deviation of daily “excess” stock returns over the fiscal year. Daily excess stock returns are the residuals obtained from regressing daily stock returns with CAPM or Fama-French 3-factor model

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**Figure 1. Number of Disclosed Prosecution Cases by States in the US**

This figure graphically shows the number of disclosed prosecution cases by states in the US during 1990 – 2019. The states in darker (lighter) gray have more (less) prosecution cases. California has the most prosecution cases (331) and South Dakota has the least prosecution cases (5).



**Table 1. Summary Statistics of Firm-quarter Observations from 1990 to 2018**

This table shows summary statistics of main dependent and independent variables used in the study with the mean, median, and standard deviation values for the whole firm-quarter observations of prosecuted companies over 1990-2018 in the United States. Please refer to the variable description table in Appendix for the full description of the variables. This table also displays significances for differences in means and medians based on t-test statistics and Wilcoxon rank-sum (Mann-Whitney) test statistics between prosecuted firms and non-prosecuted (control) firms. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels.

Variables	Prosecuted Firms				Control Firms				Differences	
	Obs.	Mean	SD	Median	Obs.	Mean	SD	Median	Mean	Median
<i>Cash Holding Ratio</i>	12,921	0.223	0.622	0.083	10,915	0.271	0.983	0.082	-0.048***	0.001
<i>CAPEX Ratio</i>	12,921	0.014	0.018	0.009	10,915	0.016	0.025	0.010	-0.002***	-0.001***
<i>Cash Flow Ratio</i>	12,921	0.021	0.036	0.022	10,915	0.025	0.040	0.025	-0.004***	-0.003***
<i>R&amp;D Expense Ratio</i>	12,921	0.009	0.019	0	10,915	0.009	0.020	0	0	0
<i>PPENT Ratio</i>	12,921	0.262	0.221	0.200	10,915	0.286	0.237	0.214	-0.024***	-0.014***
<i>Net Working Capital Ratio</i>	12,921	0.269	0.628	0.158	10,915	0.326	0.951	0.162	-0.057***	-0.004***
<i>Total Assets (\$ millions)</i>	12,921	44,265	190,110	5,062	10,915	22,740	83,794	3,511	21,525***	1,551***
<i>ROA</i>	12,921	0.009	0.050	0.012	10,915	0.014	0.042	0.014	-0.005***	-0.002***
<i>Tobin's Q</i>	12,921	1.909	1.590	1.459	10,915	2.182	2.265	1.629	-0.273***	-0.17***
<i>Book Leverage</i>	12,921	0.241	0.165	0.225	10,915	0.243	0.181	0.231	-0.002	-0.006
<i>Firm Age (in years)</i>	12,921	28.59	18.04	24.27	10,915	27.35	17.42	23.77	1.24***	0.5***
<i>Dividend Payout Ratio</i>	12,921	0.164	0.270	0	10,915	0.168	0.269	0	0.004	0
<i>Market Beta</i>	12,921	0.985	0.846	0.951	10,915	0.971	0.923	0.923	0.014	0.028**
<i>SVOL</i>	12,921	2.167	1.403	1.795	10,915	2.219	1.547	1.777	-0.052	0.018
<i>IDVOL<sub>CAPM</sub></i>	12,921	2.089	1.363	1.725	10,915	2.134	1.510	1.706	-0.045	0.019
<i>IDVOL<sub>FF3</sub></i>	12,921	2.010	1.315	1.661	10,915	2.054	1.461	1.630	-0.044	0.031

**Table 2. Correlation Matrix for Main Variables**

This table shows the correlation matrix for main variables used in the analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) <i>Cash Holding Ratio</i>	1.000										
(2) <i>CAPEX Ratio</i>	-0.0587	1.000									
(3) <i>IDVOL<sub>FF3</sub></i>	0.147	0.069	1.000								
(4) <i>Regulatory Fine</i>	0.102	-0.036	-0.071	1.000							
(5) <i>Cash Flow Ratio</i>	-0.146	0.173	-0.191	0.007	1.000						
(6) <i>ln (Total Assets)</i>	-0.180	-0.087	-0.447	0.293	0.038	1.000					
(7) <i>ROA</i>	-0.095	0.060	-0.205	0.015	0.814	0.068	1.000				
(8) <i>Tobin's Q</i>	0.179	0.081	0.059	0.077	0.213	-0.192	0.160	1.000			
(9) <i>Leverage Ratio</i>	-0.182	0.032	-0.023	0.085	-0.112	0.253	-0.104	-0.247	1.000		
(10) <i>ln (Firm Age)</i>	-0.189	-0.121	-0.345	-0.026	0.039	0.396	0.071	-0.149	0.121	1.000	
(11) <i>Dividend Dummy</i>	-0.184	-0.055	-0.314	0.053	0.096	0.383	0.110	-0.126	0.114	0.398	1.000

**Table 3. Univariate Tests of Regulatory Fines based on Disposition Types**

This table reports univariate tests based on the disposition type (prosecution result). For differences in means, t-test statistics are used and Wilcoxon rank-sum (Mann-Whitney) test statistics for differences in medians of total regulatory payments/fines between plea agreement and deferred prosecution agreement cases. The values in the parentheses are t-statistics for means and wilcoxon z-values for medians. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels, respectively.

<b>Panel A: Plea vs. Deferred Prosecution (DP)</b>						
	<b>Plea Agreement</b>		<b>DP Agreement</b>		<b>Difference</b>	
Variable	Mean	Median	Mean	Median	Mean	Median
Regulatory Fines	\$158 mil (4.08)	\$12.6 mil (10.41)	\$154 mil (5.23)	\$38.2 mil (8.54)	\$4 mil (0.089)	-\$25.6 mil*** (-3.58)
Observations	144		97			
<b>Panel B: Plea vs. Non-Prosecution (NP)</b>						
	<b>Plea Agreement</b>		<b>NP Agreement</b>		<b>Difference</b>	
Variable	Mean	Med.	Mean	Med.	Mean	Med.
Regulatory Fines	\$158 mil (4.08)	\$12.6 mil (10.41)	\$91.5 mil (4.90)	\$10.5 mil (8.51)	\$66.5 mil* (1.76)	\$2.1 mil (0.12)
Observations	144		99			
<b>Panel C: Deferred Prosecution (DP) vs. Non-Prosecution (NP)</b>						
	<b>DP Agreement</b>		<b>NP Agreement</b>		<b>Difference</b>	
Variable	Mean	Med.	Mean	Med.	Mean	Med.
Regulatory Fines	\$154 mil (5.23)	\$38.2 mil (8.54)	\$91.5 mil (4.90)	\$10.5 mil (8.51)	\$62.5 mil* (1.80)	\$27.7 mil*** (3.69)
Observations	97		99			

**Table 4. Cumulative Abnormal Returns around the Press Release Date**

This table shows the result on the event study of prosecuted firms around the press release from the Department of Justice (DOJ). Only the prosecuted firms that have the press releases from DOJ are used for the event study analysis. The stock returns are adjusted with Risk-free rate, CAPM, or Fama-French 3-factor model. The estimation window for the analysis is from a year to a month before the press release date. The numbers in parentheses are t-values, and \*, \*\*, and \*\*\* indicate statistical significances at the 10, 5, and 1 percent levels, respectively.

<i>Press Release from Department of Justice</i>									
Return Adj. Model	$R_f$	CAPM	FF3 Factors	$R_f$	CAPM	FF3 Factors	$R_f$	CAPM	FF3 Factors
Average CAR	-3.6%* (1.89)	-3.7%** (2.45)	-3.8%** (2.57)	-2.9%* (1.67)	-3.4%** (2.01)	-3.4%** (2.13)	-2.7% (1.55)	-3.1%* (1.96)	-2.9%** (2.03)
Day Windows	0			(-1, +1)			(-2, +2)		
Number of Firms	47			47			47		

**Table 5. Univariate Tests on Trading Volume and Buy-and-hold Stock Returns of Prosecuted Firms Before and After the Prosecutions**

This table shows univariate test results of the trading volume and the buy-and-hold stock return of prosecuted firms before and after the prosecutions. Trading volume is quarterly average trading volume normalized by the number of shares outstanding in the stock market. Buy-and-hold stock return is the stock return for holding the stock for past 3 months (one quarter). This table reports t-test statistics for differences in means and Wilcoxon rank-sum (Mann-Whitney) test statistics for differences in medians between sample quarters before the prosecutions and sample quarters after the prosecutions. The values in the parentheses are t-statistics for means and wilcoxon z-values for medians. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels.

	Last Quarter before Prosecutions		First Quarter after Prosecutions		Differences	
	Mean	Median	Mean	Median	Mean	Median
Trading Volume	1.587	0.956	2.192	1.619	0.605*** (10.43)	0.663*** (34.55)
Buy-and-hold Stock Return	4.76%	3.59%	2.89%	2.60%	-1.87%*** (5.24)	-0.99%*** (4.15)
Observations	11,768		4,740			

**Table 6. Diff-in-Diff Analysis on Firm Risk**

This table shows difference-in-differences analysis of corporate prosecution on firm risk with quarterly data. After Prosecution Dummy variable takes a value of 1 if it is after the prosecution is filed, and 0 if it is before the prosecution is filed. Prosecuted Firm Dummy variable takes a value of 1 if it is treatment (ever-prosecuted) firm, and 0 if control (never-prosecuted) firm. I narrow down the sample period to 3 years before and after the prosecution is filed to alleviate possible effects of other events and factors. I control the quarter fixed effects or firm fixed effects and cluster standard errors at a firm level. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels. The numbers in parentheses are t-values. All variables are winsorized at the 1% level on either tail.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	SVOL		IDVOL <sub>CAPM</sub>		IDVOL <sub>FF3</sub>	
<i>After Prosecution Dummy</i> <sub><i>i, t</i></sub>	-0.200*** (-2.67)		-0.187*** (-2.63)		-0.178*** (-2.66)	
<i>Prosecuted Firm Dummy x</i> <i>After Prosecution Dummy</i>	0.202** (2.20)	0.088* (1.80)	0.188** (2.18)	0.086* (1.79)	0.179** (2.19)	0.084** (2.05)
<i>ln (ME)</i> <sub><i>i, t</i></sub>	-0.172 (-1.45)	-0.211** (-2.04)	-0.148 (-1.31)	-0.183* (-1.81)	-0.143 (-1.33)	-0.173* (-2.02)
<i>ln (Firm Age)</i> <sub><i>i, t</i></sub>	-0.716*** (-2.74)	-0.307 (-1.47)	-0.699*** (-2.80)	-0.331 (-1.56)	-0.682*** (-2.87)	-0.324 (-1.06)
<i>Cash Flow Ratio</i> <sub><i>i, t</i></sub>	1.642 (0.49)	-2.536 (-0.97)	1.413 (0.45)	-2.142 (-0.85)	1.264 (0.42)	-2.151 (-0.85)
<i>Market Beta</i> <sub><i>i, t</i></sub>	0.246** (2.04)	0.345*** (2.81)	0.167 (1.44)	0.259** (2.19)	0.134 (1.18)	0.219** (2.19)
<i>Market to Book Ratio</i> <sub><i>i, t</i></sub>	-0.121 (-1.33)	-0.001 (-0.01)	-0.096 (-1.09)	0.003 (0.04)	-0.099 (-1.17)	-0.005 (-0.06)
<i>Market Leverage</i> <sub><i>i, t</i></sub>	0.689*** (4.34)	0.520*** (3.83)	0.687*** (4.54)	0.532*** (4.00)	0.647*** (4.38)	0.505*** (2.86)
<i>ROA</i> <sub><i>i, t</i></sub>	-4.351 (-1.31)	-0.886 (-0.32)	-4.432 (-1.41)	-1.395 (-0.52)	-4.511 (-1.52)	-1.608 (-0.59)
<i>R&amp;D Expense Ratio</i> <sub><i>i, t</i></sub>	4.149 (0.96)	5.771* (1.78)	3.781 (0.90)	5.245 (1.63)	3.308 (0.81)	4.650 (0.93)
<i>PPENT Ratio</i> <sub><i>i, t</i></sub>	-1.513** (-2.58)	-1.309*** (-3.47)	-1.496*** (-2.70)	-1.309*** (-3.53)	-1.412*** (-2.70)	-1.238*** (-3.10)
<i>Dividend Payout Ratio</i> <sub><i>i, t</i></sub>	-0.003 (-0.17)	-0.021 (-1.46)	-0.001 (-0.09)	-0.018 (-1.32)	-0.003 (-0.18)	-0.019 (-0.55)
Sample Period	[3 Years Before and After the Prosecution]					
Quarter Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.448	0.560	0.455	0.553	0.457	0.548
Observations	8,452	8,452	8,452	8,452	8,452	8,452

**Table 7. Diff-in-Diff Analysis on Precautionary Cash Holdings**

This table shows difference-in-differences analysis of corporate prosecution on cash holding ratio with quarterly data. After Prosecution Dummy variable takes a value of 1 if it is after the prosecution is filed, and 0 if it is before the prosecution is filed. Prosecuted Firm Dummy variable takes a value of 1 if it is treatment (ever-prosecuted) firm, and 0 if control (never-prosecuted) firm. I control the quarter fixed effects or firm fixed effects and cluster standard errors at a firm level. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels. The numbers in parentheses are t-values. All variables are winsorized at the 1% level on either tail.

VARIABLES	(1) <i>Cash Holding Ratio</i>	(2)	(3) <i>Cash Sales Ratio</i>	(4)
<i>After Prosecution Dummy<sub>i,t</sub></i>	-0.002 (-0.44)		0.001 (0.02)	
<i>Prosecuted Firm Dummy x After Prosecution Dummy</i>	0.016** (2.24)	0.011** (1.99)	0.231** (2.37)	0.176** (2.45)
<i>Cash Flow<sub>i,t</sub></i>	0.072 (0.30)	0.077 (0.32)	-0.208 (-0.13)	-0.221 (-0.13)
<i>ln (Total Assets)<sub>i,t</sub></i>	0.003 (0.33)	-0.001 (-0.12)	0.177 (1.42)	0.169 (1.27)
<i>Tobin's Q<sub>i,t</sub></i>	0.009** (2.13)	0.008* (1.82)	-0.138** (-2.31)	-0.114** (-2.04)
<i>ROA<sub>i,t</sub></i>	-0.216 (-0.87)	-0.214 (-0.86)	-1.335 (-0.91)	-1.370 (-0.85)
<i>Book Leverage<sub>i,t</sub></i>	0.068** (2.56)	0.077*** (2.67)	1.115*** (3.21)	1.046*** (3.02)
<i>Net Working Capital<sub>i,t</sub></i>	0.866*** (32.67)	0.863*** (31.20)	2.394*** (11.14)	2.346*** (10.69)
<i>Dividend Payout Ratio<sub>i,t</sub></i>	0.000 (0.75)	0.000 (0.58)	-0.001 (-0.14)	0.017 (1.23)
Sample Period	[3 Years Before and After the Prosecution]			
Quarter Fixed Effects	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R-squared	0.958	0.958	0.892	0.894
Observations	8,564	8,564	8,562	8,562

**Table 8. Diff-in-Diff Analysis on Cash Holdings with Low Regulatory Fines**

This table shows the results from difference-in-differences analysis on cash holding ratio for the prosecution cases that incur the regulatory fines below the sample median. During Prosecution Dummy variable takes a value of 1 if it is during the prosecution (after the filed date but before the judgment date) and 0 if it is before the prosecution is filed. After Judgment Dummy variable takes a value of 1 if it is after the judgment, and 0 if it is during the prosecution. Prosecuted Firm Dummy variable takes a value of 1 if it is treatment (ever-prosecuted) firm, and 0 if control (never-prosecuted) firm. I control the quarter fixed effects or firm fixed effects and cluster standard errors at a firm level. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels. The numbers in parentheses are t-values. All variables are winsorized at the 1% level on either tail.

VARIABLES	(1)	(2)	(3)	(4)
	Before vs. During Prosecution		During vs. After Prosecution	
	<i>Cash Holding Ratio</i>			
<i>During Prosecution Dummy</i> <sub><i>i, t</i></sub>	0.035*			
	(1.87)			
<i>After Judgment Dummy</i> <sub><i>i, t</i></sub>			0.004	
			(0.49)	
<i>Prosecuted Firm Dummy</i> x <i>During Prosecution Dummy</i>	0.021*	0.013*		
	(1.71)	(1.86)		
<i>Prosecuted Firm Dummy</i> x <i>After Judgment Dummy</i>			-0.016*	-0.019***
			(-1.82)	(-2.63)
<i>Cash Flow</i> <sub><i>i, t</i></sub>	-0.359	-0.474	-0.699***	-0.685**
	(-1.04)	(-1.39)	(-2.74)	(-2.55)
$\ln(\text{Total Assets})_{i, t}$	0.012	0.019	0.054***	0.051**
	(0.97)	(1.33)	(2.66)	(2.48)
<i>Tobin's Q</i> <sub><i>i, t</i></sub>	0.016	0.022*	0.006	0.007
	(1.59)	(1.80)	(0.84)	(1.00)
<i>ROA</i> <sub><i>i, t</i></sub>	0.113	0.237	0.507**	0.516**
	(0.33)	(0.68)	(2.02)	(2.02)
<i>Book Leverage</i> <sub><i>i, t</i></sub>	-0.008	0.017	0.086	0.094
	(-0.16)	(0.32)	(1.45)	(1.58)
<i>Net Working Capital</i> <sub><i>i, t</i></sub>	0.736***	0.728***	0.709***	0.711***
	(13.29)	(12.86)	(14.11)	(13.93)
<i>Dividend Payout Ratio</i> <sub><i>i, t</i></sub>	0.002*	0.003	0.002	-0.000
	(1.78)	(1.26)	(0.88)	(-0.02)
Quarter Fixed Effects	No	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.954	0.954	0.956	0.956
Observations	2,013	2,013	2,096	2,096

**Table 9. Firm Risk, Cash Holdings, and Capital Investment with High Regulatory Fines**

This table shows difference-in-differences analysis on firm risk, cash holding ratio, and capital investment with quarterly data. After Judgment Dummy variable takes a value of 1 if it is after the judgment, and 0 if it is during the prosecution. Prosecuted Firm Dummy variable takes a value of 1 if it is treatment (ever-prosecuted) firm, and 0 if control (never-prosecuted) firm. I control the quarter fixed effects or firm fixed effects and cluster standard errors at a firm level. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels. The numbers in parentheses are t-values. All variables are winsorized at the 1% level on either tail.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	<i>IDVOL<sub>FF3</sub></i>		<i>Cash Holding Ratio</i>		<i>Capital Investment</i>	
<i>After Judgment Dummy<sub>i,t</sub></i>	-0.226 (-1.36)		-0.003 (-0.24)		0.002 (1.28)	
<i>Prosecuted Firm Dummy x After Judgment Dummy</i>	0.083 (1.44)	0.068 (1.60)	0.007 (1.42)	0.008 (1.56)	-0.004** (-2.11)	-0.003** (-2.35)
Firm Characteristic Controls <sup>8</sup>	Yes	Yes	Yes	Yes	Yes	Yes
Quarter Fixed Effects	No	Yes	No	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.630	0.705	0.957	0.957	0.826	0.836
Observations	1,124	1,124	1,124	1,124	1,124	1,124

<sup>8</sup> For the regression analysis on the volatility of excess stock return adjusted by Fama-French 3-factor model, I use control variables from Pan, Wang, and Weisbach (2015) and Dhaliwal et al. (2016), which are logarithmic value of the market equity, cash flow ratio, market to book ratio, market leverage, market beta, ROA, R&D expense ratio, PPENT ratio, dividend payout ratio, logarithmic value of the firm age. For the analysis on cash holdings, I control for cash flow ratio, logarithmic value of total assets, tobin's q, ROA, book leverage ratio, net working capital ratio, and dividend payout ratio following Han and Qiu (2007), Harford, Mansi, and Maxwell (2008), and Demir and Ersan (2017). For capital investment, I control for cash flow ratio, tobin's q, sales growth ratio, and asset tangibility following Malmendier and Tate (2005) and Gulen and Ion (2016). Please refer to the variable description table in Appendix for the full description of the variables.

**Table 10. Diff-in-Diff Analysis on M&A Activities**

This table shows difference-in-differences analysis of corporate prosecution on M&A activities with annual data. M&A Deals indicate the number of completed M&As by firm  $i$  in year  $t$ . M&A Deal Values are the sum of the transaction values of completed M&As by firm  $i$  in year  $t$ . Horizontal M&As / Total M&As represent the ratio of the number of horizontal (alike) M&As to the total number of M&As. After Prosecution Dummy variable takes a value of 1 if it is after the prosecution is filed, and 0 if it is before the prosecution is filed. Prosecuted Firm Dummy variable takes a value of 1 if it is treatment (ever-prosecuted) firm, and 0 if control (never-prosecuted) firm. Firm characteristics that may affect M&A activities, including cash flow, ROA, R&D expenditures, capital expenditures, and sales growth, are controlled following Healy et al. (1992) and Mitchell and Mulherin (1996). I control the year fixed, firm fixed effects, or both and cluster standard errors at a firm level. \*, \*\*, and \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels. The numbers in parentheses are t-values. All variables are winsorized at the 1% level on either tail.

VARIABLES	(1) ln (M&A Deals + 1)	(2)	(3) ln (M&A Deal Values + 1)	(4)
<i>After Prosecution Dummy<sub>i,t</sub></i>	-0.019 (-0.67)		0.132 (1.22)	
<i>Prosecuted Firm Dummy x After Prosecution Dummy<sub>i,t</sub></i>	-0.065* (-1.81)	-0.086** (-2.54)	-0.294* (-1.92)	-0.325** (-2.57)
Firm Characteristics	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.372	0.377	0.233	0.241
Observations	6,973	6,973	6,973	6,973

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