Exploratory Analysis on the Market Reaction to Non-Financial Misconduct

Shayan Abbasi*

MSc. in Finance

Barcelona GSE

Advisor: Roberto Pascual, PhD

*shayan.abbasi@barcelonagse.eu

Abstract

Using a dataset of non-financial misconducts assessed by U.S. agencies, an event analysis along with an exploratory empirical analysis of market quality statistics have been observing the sensitivity of the US stock market around the announcement dates of non-financial fraud fines. We estimate Cumulative Average Abnormal Returns (CAAR) to check for abnormal volume around the events, computing daily volume in deviations concerning average daily volume applying different the event windows. We find that under certain classifications of events, there exist significant CAARs. Market Quality Statistics explanatory analysis performed to examine market reactions in intraday data suggesting asymmetric effects of unexpected good and bad events on market quality statistics. This paper provides a new approach to classify events that are not initially classified by their indication or the level of expectancy.

Keywords **-** Non-Financial Misconduct, Event Study, Cumulative Average Abnormal Returns (CAAR), Market Microstructure.

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1 Introduction

The main focus of this paper is to perform an event analysis regarding the public releases of convictions in non-financial misconduct litigations. Non-financial misconduct is considered important for two main reasons. First, there is an increasing awareness of corporate non-financial activities among investors (Eccles et al. 2014), second, non-financial misconduct can help predict financial misconduct (Raghunandan 2020).

The first group of questions asked in this paper is whether we can classify non-financial misconducts based on their indications in order to have better intuition and result. Which feature classifies the events better? Moreover, using the new approach accounting for overlapping the event windows (Kolari, Pape, and Pynnonen 2018), we struggled to find evidence of the superiority of the new approach. The second group of questions address the interpretation of results under efficient market hypothesis. What agencies or what industry sectors have poor surveillance system or poor legislation? What kinds of offenses have been neglected in keeping companies accountable? On the flip side of market reaction analysis, the study tries to find any evidence of financially significant change in market quality statistics.

The paper is structured around two main parts. The first part of it analyzes the case where abnormal returns are measured from some benchmark model (particularly market model), such as violations of regulations that may lead to harm for consumers, market participants, employees, or the industry in general. The other part is focused on analyzing the market reaction around the event day of the violations of a randomly selected group of firms from different major industries. In general, the rest of the paper proceeds as follows. In section 2, briefly review the event studies literature and describe the main ideas of the discussion over the last years. The sample and data are described in section 3, and the methodology design in section 4. In section 5, we present our main results, and in section 6 the conclusions. Finally, in section 7, we identify the limitations of our results and some possible further improvements, and possible future studies.

2 Literature Review

There is a rich literature in event analysis elaborating on the market reaction regarding events such as earnings announcements, corporate press releases, announcements on changes in mon-

etary policy or corporate governance regulations. However, the public releases of penalties for non-financial misconduct in litigation cases have never been considered in event analysis. The prior research classifies events into different categories and subcategories to separate good events, neutral events and bad events. For example, Neuhierl, Scherbina, and Schlusche (2010) study the market reaction to corporate press releases, classifying news into different categories such as awards, customers and partners, financial, legal, etc. with subcategories regarding if the press release can be classified as bad news or good news. For example, in the customer and partner category, the subcategories are customer loss, customer win, a new partnership, and reaching a milestone.

Prior research by Raghunandan (2020), distinguishes non-financial misconduct from financial misconduct as an operational decision taken to boost a firm's performance, while financial misconduct occurs when a firm misrepresents its underlying performance to investors. Financial misconduct refers to activities that could plausibly incur penalties from securities regulators even if, ultimately, the misconduct comes to light via shareholder lawsuit rather than regulatory action. Non-financial misconduct is a term frequently used in the popular press and within organizations, referring to activities that would not incur penalties from securities or banking regulators but could incur penalties from other regulators.

Investors care about a firm's non-financial conduct as much as its financial conduct because the firm's nonfinancial practices also reflect the company's trustworthiness. The High Sustainability firms pay attention to a much higher level of and deeper stakeholder engagement, coupled with mechanisms for making it as effective as possible, including reporting; greater attention to nonfinancial measures regarding employees; a greater emphasis on external environmental and social standards for selecting, monitoring, and measuring the performance of their suppliers; and a higher level of transparency in their disclosure of nonfinancial information (Eccles, Ioannou, and Serafeim 2014).

There is a growing literature on the positive relation of Corporate Social Responsibility (CSR) and firm value. Starks, Venkat, and Zhu (2017) find that investors with long-term investment horizons tend to prefer firms with higher environmental, social, and governance (ESG) performance significantly more than do short-term investors because ESG tends to pay off in the long run. Albuquerque, Koskinen, and Zhang (2019) provide evidence that CSR increases firm value by reducing firms' systematic risk. Li and Raghunandan (2021) extend this finding by stating

that federal violations may signal poor CSR performance and harm a firm's reputation, which in turn predicts a negative association between institutional ownership and the likelihood of non-financial misconduct. In their study, they investigate the effect of institutional investors on firms' non-financial performance and provide evidence suggesting that institutional investors view non-financial misconduct as value-destroying in the long run and thus urge to reduce the likelihood of violations.

3 Data and Sampling

3.1 Non-Financial Misconduct

Our main data is non-financial misconduct gathered by "Violation Tracker", prepared by Good Jobs First for the period between 2017 to 2020 in the United States of America. The types of violations and/or misconduct covered include malpractice in banking (e.g., mortgage abuses and toxic securities issuance), consumer protection (e.g., personal information breach), false claims (e.g., misrepresentation on benefits plans), environmental harm (e.g., oil spills, air pollution), wage and hour (e.g., underpayment, work visa violation), health and safety (e.g., hazardous workplace), employment discrimination (e.g., gender-based hiring discrimination), price-fixing (e.g., collusion in price-setting), bribery and other cases.

3.2 Event Sample Construction

A summary of the sample construction is provided in Table 1. The data contained 86677 violations. First, we chose a subset of non-financial misconducts and our data shrank to 84875 observations. We disaggregated the data based on the companies or their parent companies which had litigation cases against them. Thereafter, we added the stock symbol (ticker) based on the company or the parent company[1]. Moreover, we chose a subset of tickers that were in the S&P 500 constituents at the time of the penalty, which ended us up with 6209 observations. Regarding the missing values in the event sample (see Figure 1), we used different categories

[1]First, we added tickers by left-joining companies and subsidiary companies. Secondly, we added tickers by left joining on parent companies, and third, we added tickers by left joining on companies and parent companies using the Russell 3000 constituent's data.

such as major industry, offense, agency, penalty level (see penalty distribution in Figure 2), primary offense, secondary offense, and government level groups.

Finally, we chose two samples, each with 32 events, to pool intraday market data to use for market quality statistics. First sample was drawn from the industries with the highest significant cumulative average abnormal return and the second one was chosen out of the lowest (negative) significant cumulative average abnormal returns[2]. The first sample is simply mentioned as the positive sample and the second one as the negative sample.

3.3 Sample Descriptive Statistics

A sample descriptive statistic is provided on misconduct frequency and penalty distribution for different categories containing misconduct frequency, average penalty ratio[3], and total penalty share of each category (see Table 2). Considering that events cannot always be divided into categories with certain indications, the classifying process is essential in the inference of event analysis. In Panel A, the sample is classified by major industry. Moreover, Panel B shows classified samples by agencies imposing misconduct. Panel C focuses on misconducts at different government levels, Panel D sees Sample divided among offense groups. Panel E and Panel F show a similar representation categorized by primary offense groups and secondary offense groups. In addition, instead of presenting a table, Figure 1 shows different levels of penalty.

3.4 Cross-Section of Returns

The event sample contains 6209 misconduct related to 326 firms in S&P 500[4]. The cross-section of daily returns for these stocks have been provided by the Center for Research in Security Prices (CRSP) from 2016 to 2020, which is one year more than the event sample period to cover for the estimation window used in the methodology.

[2]With a 99% confidence interval.

[3]Average penalty of each major industry divided by average penalty over all major industries.

[4]In case Subsidiary and Parent firms are mapped into the same ticker for the parent company and are assumed as one firm.

3.5 Market Quality Statistics

The market intraday data was pooled from CRSP for the mentioned event sample. This high-frequency data is provided in two sets. The first one is consolidated trade which contains trade by trade prices and volumes. The other data set is consolidated quotes which contain the best bid (ask) prices and volumes in the order books for certain timestamps. Considering the unmatched timestamps, we merged consolidated quotes with consolidated trades by adding the best bid (ask) with the closest timestamp in the past for each trade.

4 Methodology

4.1 Event Study

The event studies have been on the rise during the past decades (Khotari and Warner 2006). The current literature tends to measure and test the abnormal stock returns caused by new information (Ball and Brown 1968; Fama et al. 1969). The common event studies, divide the time interval into estimation window, gap, and the event window. Fortunately, an estimation window between 100-300 trading days, not overlap with the the event window, is well established (Peterson 1989). However, the length of the the event window is still the place of the dispute window. (McWilliams and Siegel 1997).

Event study is based on three assumptions: (1) efficient market hypothesis, (2) new information or unanticipated events, and (3) no confounding events which suggest the absence of other events in the the event window. Having in mind that long the event windows can carry confounding events, the researchers should justify the length of the the event window (McWilliams and Siegel 1997). On the other hand, researchers should find an event date overlapping with the information leakage interval rather than the announcement of the event along with the consideration of decreasing reliability of longer the event windows (Brown and Warner 1980). The studies have shown market reaction as fast as 15 to 90 minutes (Dann, Mayers, and Raab 1977; Mitchell and Netter 1989). However, longer the event windows up to nine months are quite popular (MacKinlay 1989). Due to the nature of some information that can leak long before the official event announcement, the author suggests long the event windows with a strong

commitment to deal with confounding events.

To account for confounding event-firm elimination from the sample, grouping firms with similar event types, elimination of confounding event day, and neutralizing the confounding effects from the abnormal returns are suggested (Foster 1980; McWilliams and Siegel 1997). To address this issue, since the relation between events and firms, are sometimes on the subsidiary level and the corresponding return is on the parent company level, we decided to group events based on their characteristics and assume that similar events with the same feature have similar effects (the events effects do not cancel out).

In the classic approach, the abnormal return is calculated for the the event window for each firm i on day t, AR_{it}, is defined as:

$$AR_{it} = R_{it} - \mathbb{E}(X_t),$$

Where R_{it} is the actual return and $\mathbb{E}(X_t)$ represents the expected (or normal) return. Assuming the market model, the expected return is specified as:

$$\mathbb{E}(X_t) = \hat{\alpha}_i + \hat{\beta}_i R_{mt},$$

Where R_{mt} is the market portfolio return at day t, which has been proxied by S&P 500 index, and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated with OLS regression between the asset return and market portfolio return in the estimation window.

To test null hypotheses, it is essential to calculate the cumulative abnormal returns that aggregated the abnormal returns for each asset throughout the the event window as follow:

$$CAR_{t_1,t_2} = \sum_{t_1}^{t_2} AR_{it}$$

Where t_1 is the start and t_2 is the end of the the event window. Afterward, to test more general hypothesis, it is necessary to aggregate over the assets leading to average cumulative abnormal return defined below:

$$CAAR = \frac{\sum_{i=1}^{N} CAR_i}{N}$$

Where N is the number of assets.

In the next step, we test if the null hypothesis (H_0: $CAAR = 0$) is rejected or not. Regarding that there is no superior test among tests designed for event study (Bartholdy, Olson, and Peare 2007), we chose the most common test known as cross-sectional t-test (one-sample t-test) as follow:

$$t = \frac{CAAR_{t_1,t_2}}{\sigma(CARR_{t_1,t_2})}\sqrt{N}$$

Where the unbiased by sample size variance is defined as:

$$\sigma^2 = \frac{\sum_{i=1}^{N} [CAR_i - CAAR]^2}{N-1}$$

4.2 Event Study accounting for partially overlapping the event windows

To account for problems known as event-induced cross-correlation (Jaffe 1974; Kolari and Pynnonen 2011), event-induced autocorrelation (Ahlgren and Antell 2017) and event-induced volatility (Boehmer, Masumeci, and Poulsen 1991; Harrington and Shrider 2007) which affect the estimation of the standard deviation of $CAAR$, a sample design and t-test addressing the overlapping the event window for different firm events is presented by Kolari, Pape, and Pynnonen (2018). The new $CAAR$ in this method is defined as:

$$CAAR = \frac{1}{N}\sum_{t=1}^{T} AR_t$$

Where $t = 1, ..., T$ is the calendar day and AR_t is the following:

$$AR_t = \sum_{AR_{i\mu} \in D_t} AR_{i\mu}$$

Where μ is the event day in the window and D_t is the set of abnormal returns at time t in the calendar day t (here the same as trading day).

Accounting for serial correlation and cross-sectional correlation, the variance becomes:

$$\text{Var}\left[CAAR_\tau\right] = \frac{1}{N^2}\left(\sum_{i=1}^{n}\text{Var}\left[CAR_{i\tau}\right] + \sum_{t=1}^{T}\text{Var}\left[AR_t\right] - \sum_{i=1}^{n}\sum_{\mu=\tau_1}^{\tau_2}\text{Var}\left[AR_{i\mu}\right]\right)$$

Where the estimation used is suggested as:

$$\text{Var}\left[CAAR_\tau\right] = \frac{1}{n}\bar{\sigma}^2\tau\left(1+\delta(n-1)\theta\right)$$

Where $\delta = \bar{\tau}/\tau$ and $\theta = \bar{v}/\bar{\sigma}^2$ with the following variable description:

- $\bar{\tau}$: Average number of overlapping calendar days of the event window
- τ: Length of the event window
- $\bar{v}$: Average covariance between abnormal returns
- $\bar{\sigma}^2$: Average variance

Finally, we need to estimate θ as follows:

$$\hat{\theta} = \frac{N}{M}\left(\frac{\hat{\bar{\sigma}}^2_{cr}}{\hat{\bar{\sigma}}^2} - 1\right)$$

Where robust estimator of the average of the residual variances $\left(\hat{\bar{\sigma}}^2_{cr}\right)$, (non-robust) average residual variance estimator $\left(\hat{\bar{\sigma}}^2\right)$ both in the estimation window, along with N and M are defined as:

$$N = \sum_{t=1}^{L} n_t, \quad M = \sum_{t=1}^{L} n_t(n_t-1), \quad \hat{\bar{\sigma}}^2_{cr} = \frac{1}{N}\sum_{t=1}^{L}\hat{\epsilon}^2_t, \quad \hat{\bar{\sigma}}^2\frac{1}{N}\sum_{t=1}^{L}\sum_{k=1}^{n_t}\hat{\epsilon}^2_{kt}$$

With $\hat{\epsilon}^2_t$ calculated as:

$$\hat{\epsilon}^2_t = \sum_{k=1}^{n_t}\epsilon_{kt},$$

Where $\hat{\epsilon}_{kt}^2$ is the residual of the market model regression and n_t is the number of stocks with available return on calendar day t of the estimation window.

4.3 Market Quality Statistics Exploratory Analysis

The market microstructure examines how assets are traded and priced under different mechanisms and different trading environments. Despite the market intraday data availability has improved over the last few years, it is still unavailable for all markets and periods leading to studies focusing on big firms with enough data (e.g., firms in S&P 500). We follow the methodology used by Bohmann et al. (2019) and compute different high-frequency market quality statistics from the data.

The first high-frequency, and one of the most common measures, is the *quoted spread* which captures the round-trip transaction costs. In other words, is simply the difference between the bid and ask prices divided by bid-ask midpoint:

$$\text{Quoted Spread}_k = \frac{Ask_k - Bid_k}{Midpoint_k}$$

Where:

$$Midpoint_k = \frac{(Bid_k + Ask_k)}{2}$$

And Bid_k and Ask_k are the best bid and ask quotes at time k.

The second market quality measure is *effective spread*, which captures the round-trip costs of a liquidity demanding trade. This is the percentage difference between the transaction price and the bid-ask *midpoint*:

$$\text{Effective Spread}_k = 2D_k \left(P_k - Midpoint_k\right)$$

where P_k is the price of the trade k, and D_k is $+1$ for buy-side trades and -1 for sell-side trades classified by Lee and Ready (1991). Meanwhile, the relative measure is:

$$\text{Relative Effective Spread}_k = \frac{\text{Effective Spread}_k}{Midpoint_k}$$

And so on for the rest of the measures.

The third measure is the *realized spread* which captures the cost of a liquidity demanding trade net of the price impact of the trade.

$$\text{Realized Spread}_{k,\delta} = 2D_k \left(P_k - Midpoint_{k+\delta}\right)$$

Where δ is a lag in the midpoint.

The fourth measure is the *price impact* which captures the permanent price change following a transaction:

$$\text{Price Impact}_{k,\delta} = \text{Effective Spread}_k - \text{Realized Spread}_{k,\delta}$$

We choose $\delta = 30$ minutes to calculate the *realized spread* and *price impact* which is computationally simpler than shorter lags. Moreover, *price impact* to *effective spread ratio* and *realized spread* to *effective spread ratio* was considered.

5 Results and Discussion

5.1 Event Study Results

Table 3 provides individual $CAAR$, standard deviation, t-statistics, and p-value (two-tailed) measured with classic approach and newer approach accounting for overlapping events for different the event windows and estimation window length 200 for different categories of the event sample. For simplicity, we call the classic event study the first approach and the methodology lately suggested by Kolari, Pape, and Pynnonen (2018) the second approach. Overall, the second approach was more successful regarding the ability to reject the null hypothesis. In another aspect, major industry categories performed better in separating events with different indications and rejecting the null hypothesis.

At a glance, in most cases increasing the the event window $CAAR$ and standard deviation increase (see the average value for each panel in Table 3). Regarding the significance of the t-test,the longer the event windows show more robust results. In shorter windows the rare significant results could be a result of multiple testing. This calls for long-horizon event study.

Moreover, the results show that the idea of being penalized does not always indicate an unexpected bad event. Thus, this could demonstrate the idea of non-financial misconduct as an operational decision taken to boost the firm's performance mentioned by Raghunandan (2020). Nevertheless, we encourage further improvements at the end of this paper to provide more evidence regarding the idea.

Considering the simulation suggesting possible over-rejection in the first approach (Kolari and Pynnonen 2011), we carried on the second approach facing the unexpected results. The lower standard deviation of the second approach compared to the first approach calls for simulations similar to prior research by Kolari and Pynnonen (2011) to address the power of the second approach and showing no relations between rejection rates and the event windows in the second approach.

Regarding the level of $CAAR$ along with the test significance in the second approach, major industry with an average $CAAR$ of 2.4%, agencies with an average $CAAR$ of 1.1%, and secondary offense group with an average $CAAR$ of 1.5% are best the categories in (-20,20) the event window. Surprisingly, the results show that groups with higher average penalty ratio, total penalty share or misconduct frequency does not necessarily have the highest (lowest) $CAAR$s.

In Figures 3 to 6, CAR values for the entire (-20,20) the event window can be seen, suggesting general trends. This result calls for long horizon event studies. In the major industry category, retailing, financial services, pharmaceuticals, and utilities, and power generation have upward CAR trends. Assuming the long-run benefits of boosted misconduct-related performance, these sectors may have poor regulations or loopholes in the judicial or surveillance agencies that allow them to gain a net benefit from the misconducts. CAR trends in agencies suggest that OSHA and EBSA may be among agencies with poor surveillance system system or poor legislation. However, to have such a conclusion, we are trusting the judgment of the market and no prior over-reactions in the market.

In other aspects, figures 5 and 6 suggest possible poor surveillance system or poor legislation in

consumer protection and benefit plan administration in primary offenses along with misclassification, off-the-clock work, Davis-Bacon Act and related, and antiboycott violations in secondary offenses.

5.2 Market Microstructure Analysis Results

Aggregated market quality statistics have been provided in Figures 7 to 15 along with HP filter with $\lambda = 1600$ and the average line for days before and after the event day. The consolidated trade used in the aggregation has 30 min intervals and a 65-period rolling standard deviation is provided as a subplot. The results show market reaction in forms of market quality statistics for the positive and the negative sample. However, the volatility of such measures stops us to have a firm idea about the reaction, and only opens a door to the posibility of event study through the market quality statistics.

Figure 7 shows a 21.98% increase in quote spread for the negative sample, while the equivalent percentage for the positive sample is -4.66%. The result indicated an opposite reaction of quoted spread regarding the two samples showing that negative unexpected events can increase transaction costs and positive unexpected events can decrease transaction costs though on a much less level. Figure 8 shows a 15.82% increase in the average effective spread for the negative sample comparable with 4.78% decrease in the positive sample indicating the same conclusion as before regarding the true transaction cost assuming the midpoint as the true price.

In Figure 9, realized spread for both samples has been illustrated. The average 30 minutes realized spread indicates that the theoretical profit of a liquidity provider of stocks carrying negative events has increased by 7.18% and for the stocks carrying the the positive events have decreased by 13.99%. Price impact showing the permanent price change for a 30 minutes interval is illustrated in Figure 10. The result shows an 18.89% increase on average for the negative samples and a 4.92% decrease on average for the positive sample. Figure 11 shows a 1.91% decrease in average relative effective spread for the negative sample which is compatible with the result for effective spread, and shows an even stronger reaction in the theoretical price that the market statistics. It's even makes more sense when we observe a 21.35% increase in the average relative effective spread for the positive sample. The same contradiction happens in Figure 12 where the average relative 30 minute realized spread decreases by 24.62% for the

negative sample and a decreases by 21.89% for the positive sample. Figure 13, shows a 1.23% decrease in average relative price impact for the negative sample and a 1.57% increase for the positive sample. The same changes remain increasing and under 1% for price impact to effective spread ratio in Figure 14, and a 26.39% decrease in average realized spread to effective spread for the negative sample, along with a 1.60% decrease for the positive sample.

We believe that the relative values are more reliable and the results in absolute values since they are not recalculating the events effect on price and mid-point sequence. Moreover, the volatility indicated by rolling standard deviation shows that the intra-day statistics are very noisy even after a 30-minutes aggregation. The changes discussed in the previous paragraph can easily be disregarded with a simple t-test. This calls for more complicated models to examine market reaction on intra-day data.

6 Conclusions

This paper elaborated on the hypothesis of market reaction existence for non-financial misconducts. It concluded that considering features such as major industry, agencies, primary offense, and secondary offense as classifiers, along with calendar-day clustering, the market reaction can be observed on the daily returns as positive and negative *CAARs*. This paper discussed possible poor surveillance system in two agencies, OSHA and EBSA, among with four industries, concluding retailing, financial services, pharmaceuticals, and utilities and power generation, continuing with two primary offenses, consumer protection and benefit plan administration, and four secondary offenses, misclassification, off-the-clock work, Davis-Bacon Act and related, and antiboycott. Moreover, evidence regarding non-financial misconduct as a long-horizon affecting event has been shown. More on the market reaction, market quality statistics showing transaction costs and theoretical profit of liquidity providers and price impacts showed compatible reactions to good events and bad events indicated by classifiers. Although, due to the high volatility of intra-day data, the reliability of those statistics is doubtful.

7 Further Improvements

7.1 Adding subcategories for the extended sample period

In the current categories, market reaction is approved. However, it is advisable to consider non-financial misconduct provided by Violation Tracker for a longer period than 2017 to 2020. Therefore, with more observation, the event study can be carried on sub categorical level to provide inferences with even more detail. For example, one can choose the agency categories and choose offense groups as subcategories, assuming the efficient market hypothesis, to investigate the efficiency of agencies regarding the prevention of future misconduct repeat. Moreover, regarding the idea that misconducts have an expected net benefit, a legislation/agency performance analysis can be carried on to prevent non-financial misconduct. To carry on the following research, it is suggested to focus on the industries, agencies, primary and secondary offenses with upward CAR mentioned in section 5.1 along with accounting for no prior over-reactions in the market (i.e. private information analysis before the event date).

7.2 More focus on confounding event

This paper benefited from the assumption that for large samples (e.g., more than 30 obs.), the effect of confounding events in the the event window will cancel out. Using cross-sectional models and alternative data on confounding events along with longer sample periods, one can account for confounding events in an event study.

7.3 Using non-parametric tests

More on relaxing assumptions, the statistical tests used in this paper assumed normal distribution of abnormal returns. Thus, it is advisable to add non-parametric tests like rank tests for partially overlapping the event windows suggested by Pynnonen (2021).

7.4 Private information in non-financial misconduct litigations

Along with cross-sectional models and accounting for confounding events and other controls, further investigations can provide evidence on private information using long the event windows before the event date.

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Appendix

Figures

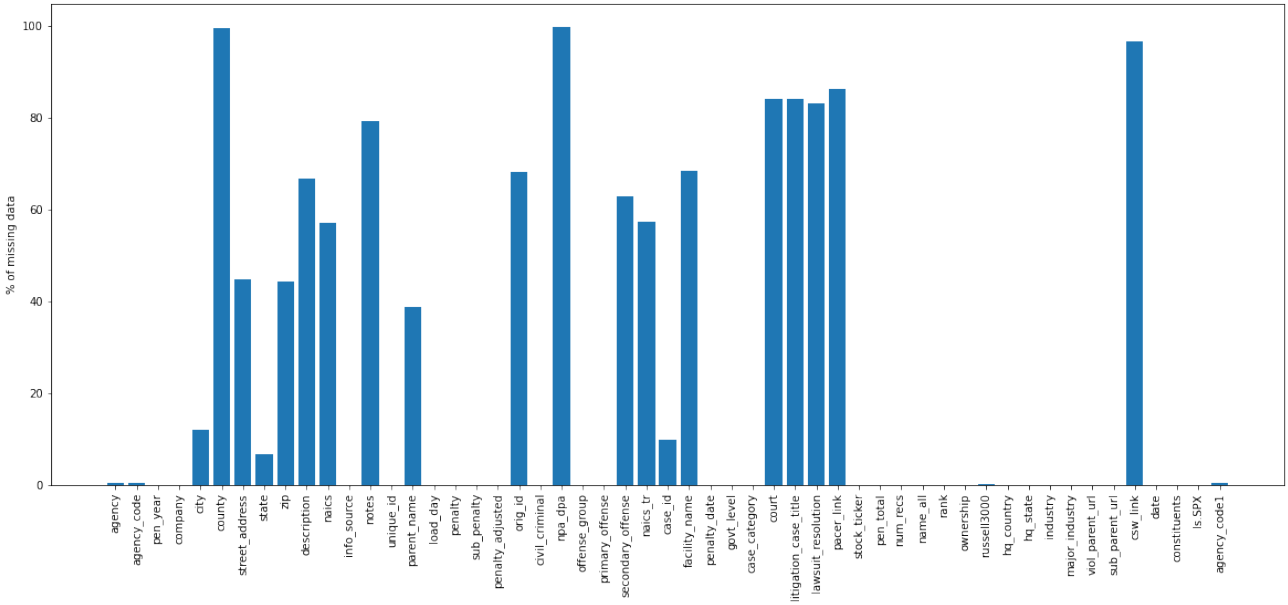

Fig. 1: Missing Values

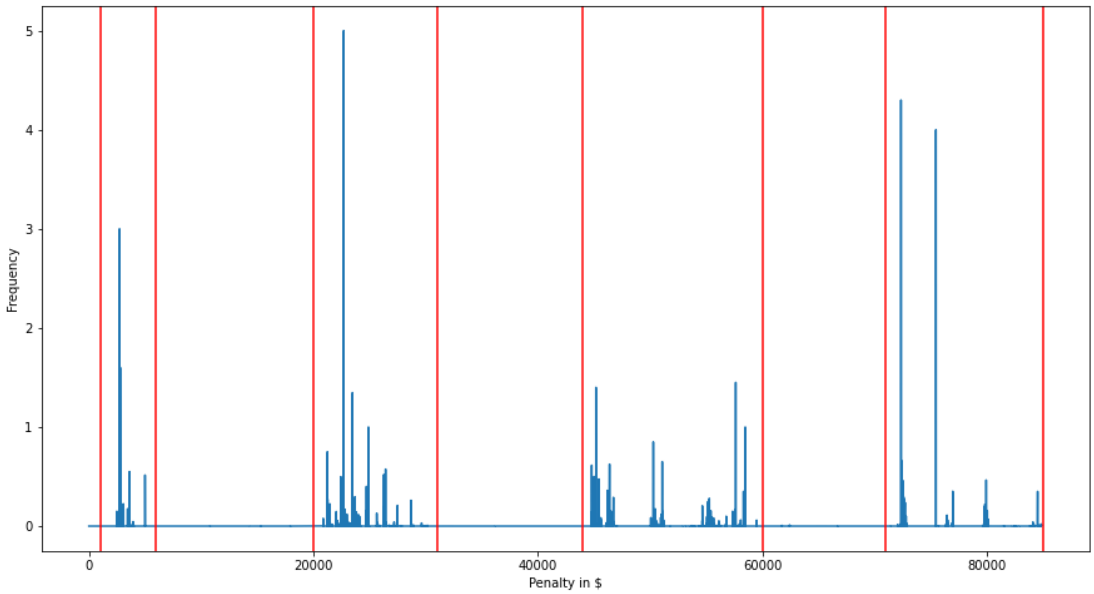

Fig. 2: Penalty Distribution

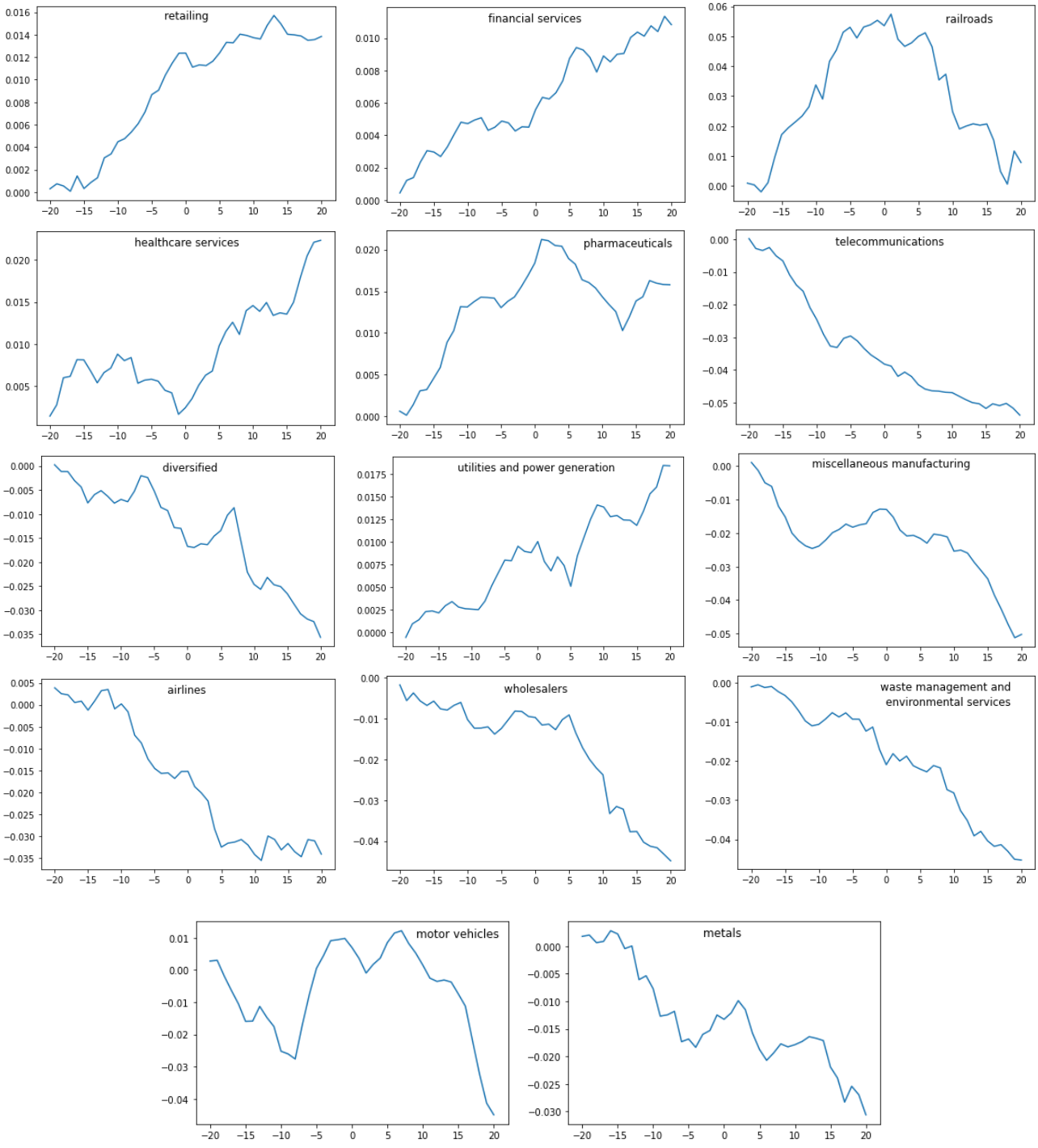

Fig. 3: CAR performance for Major Industries

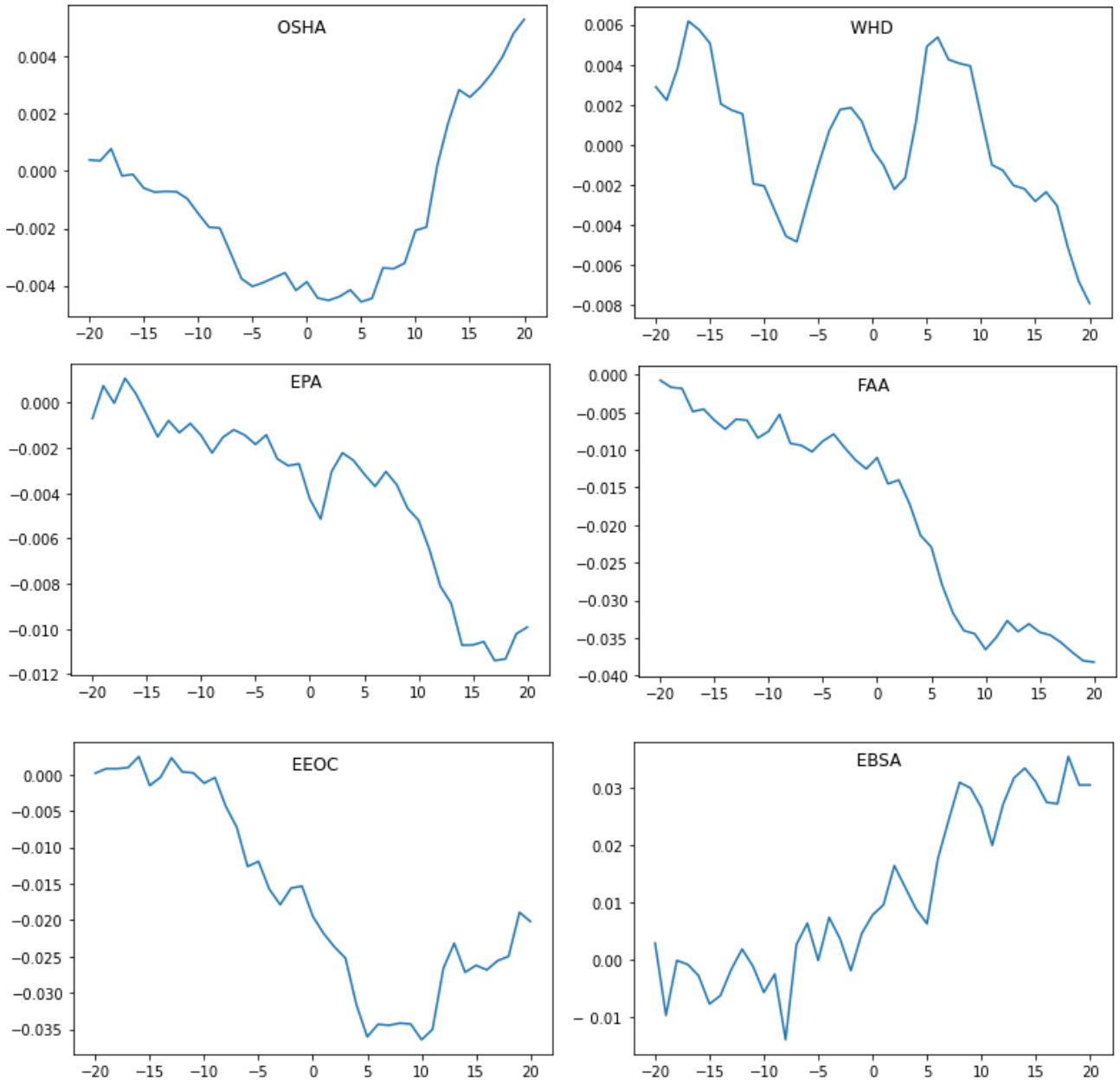

Fig. 4: CAR performance for different Agencies

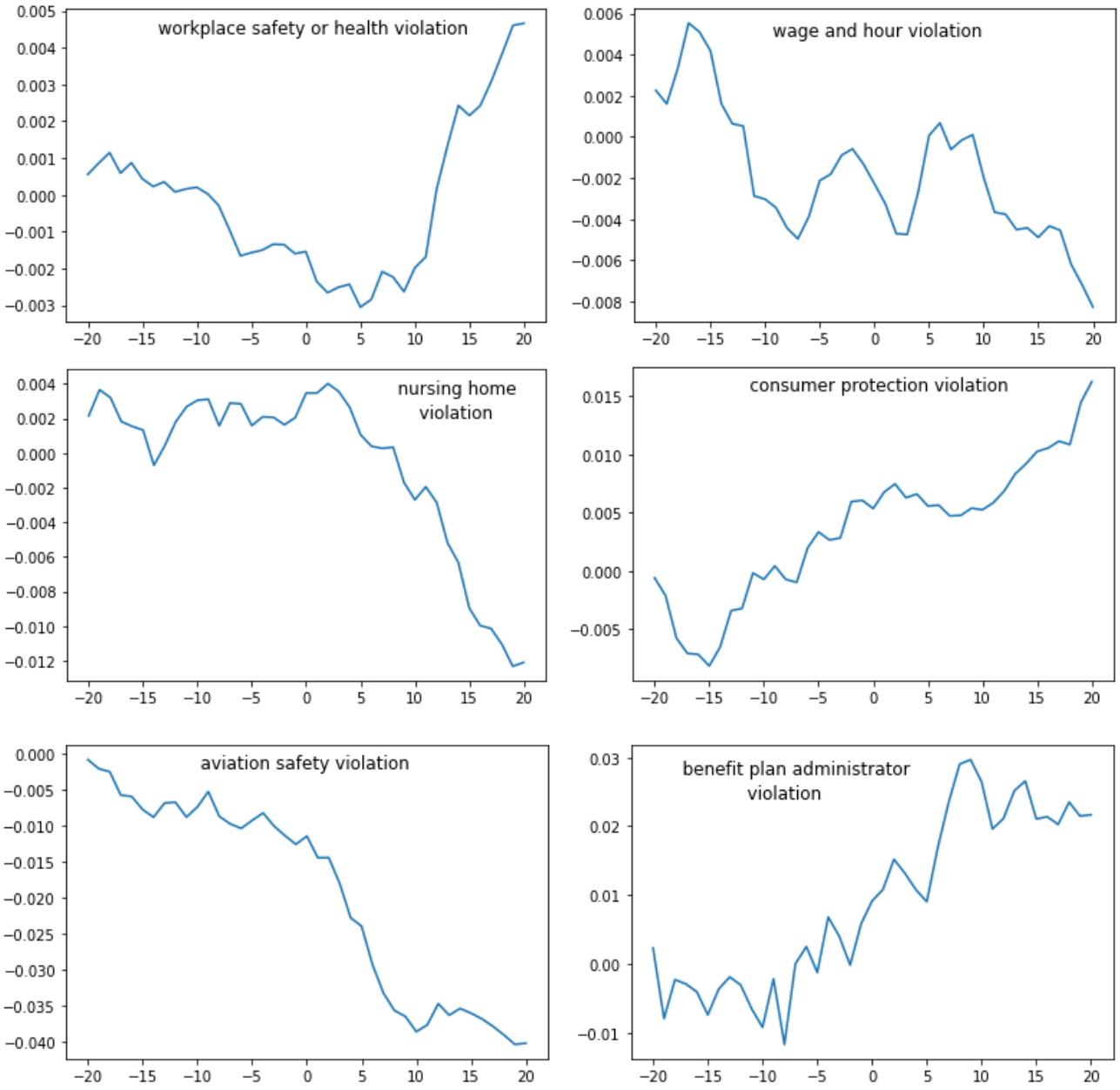

Fig. 5: CAR performance for Primary Offense Group

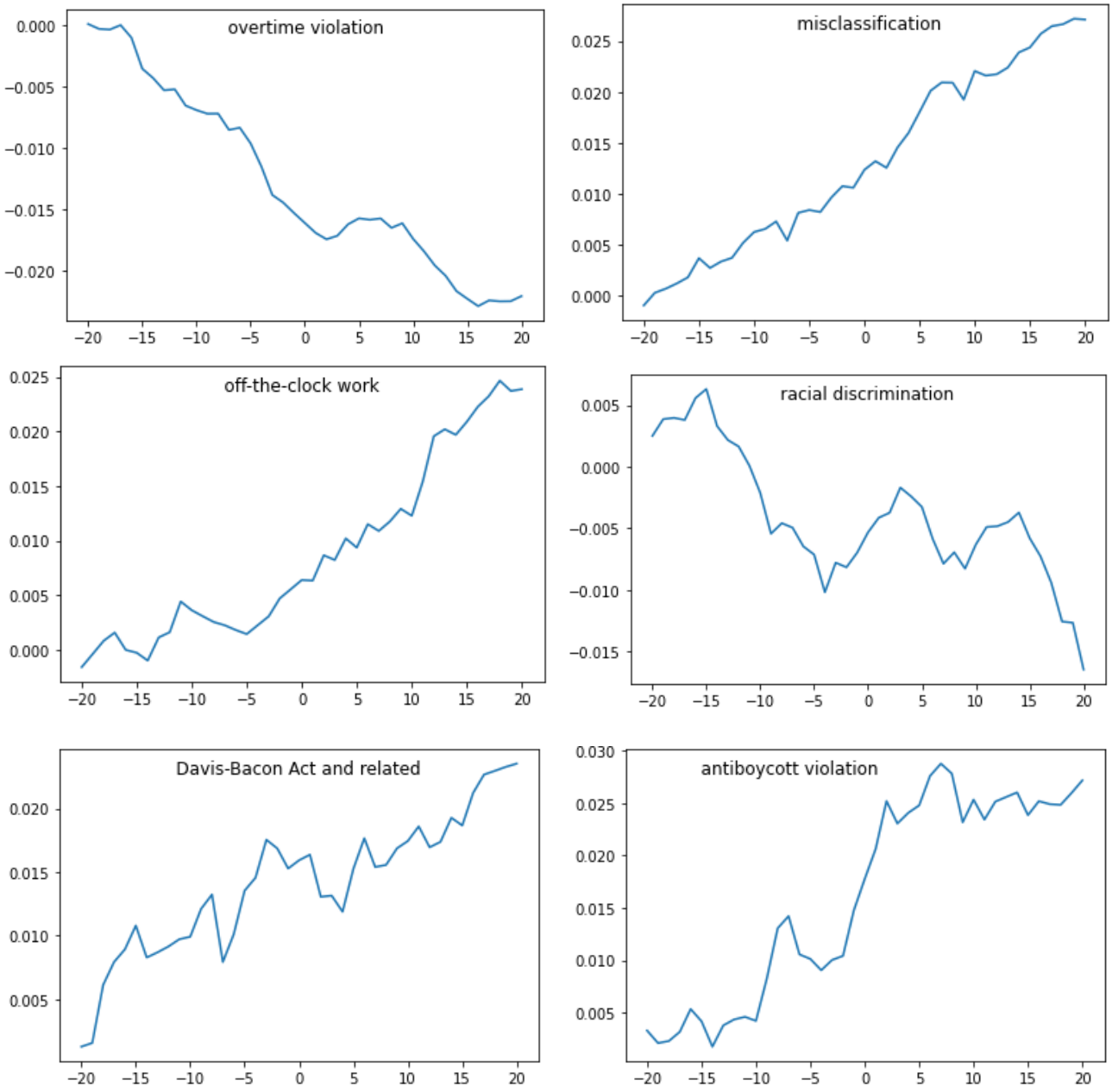

Fig. 6: CAR performance for Secondary Offense Group

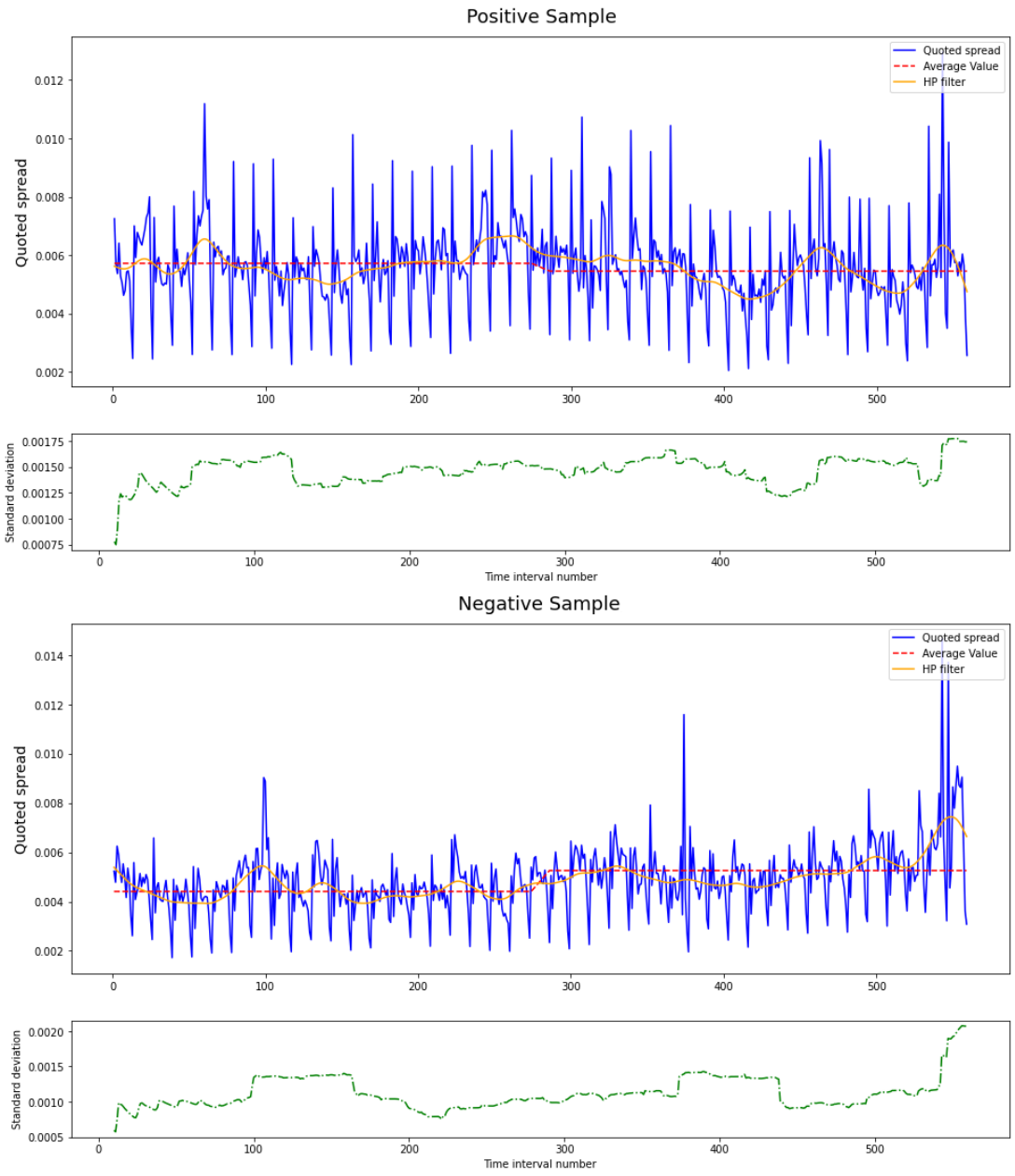

Fig. 7: Positive and Negative Aggregated Quoted Spread

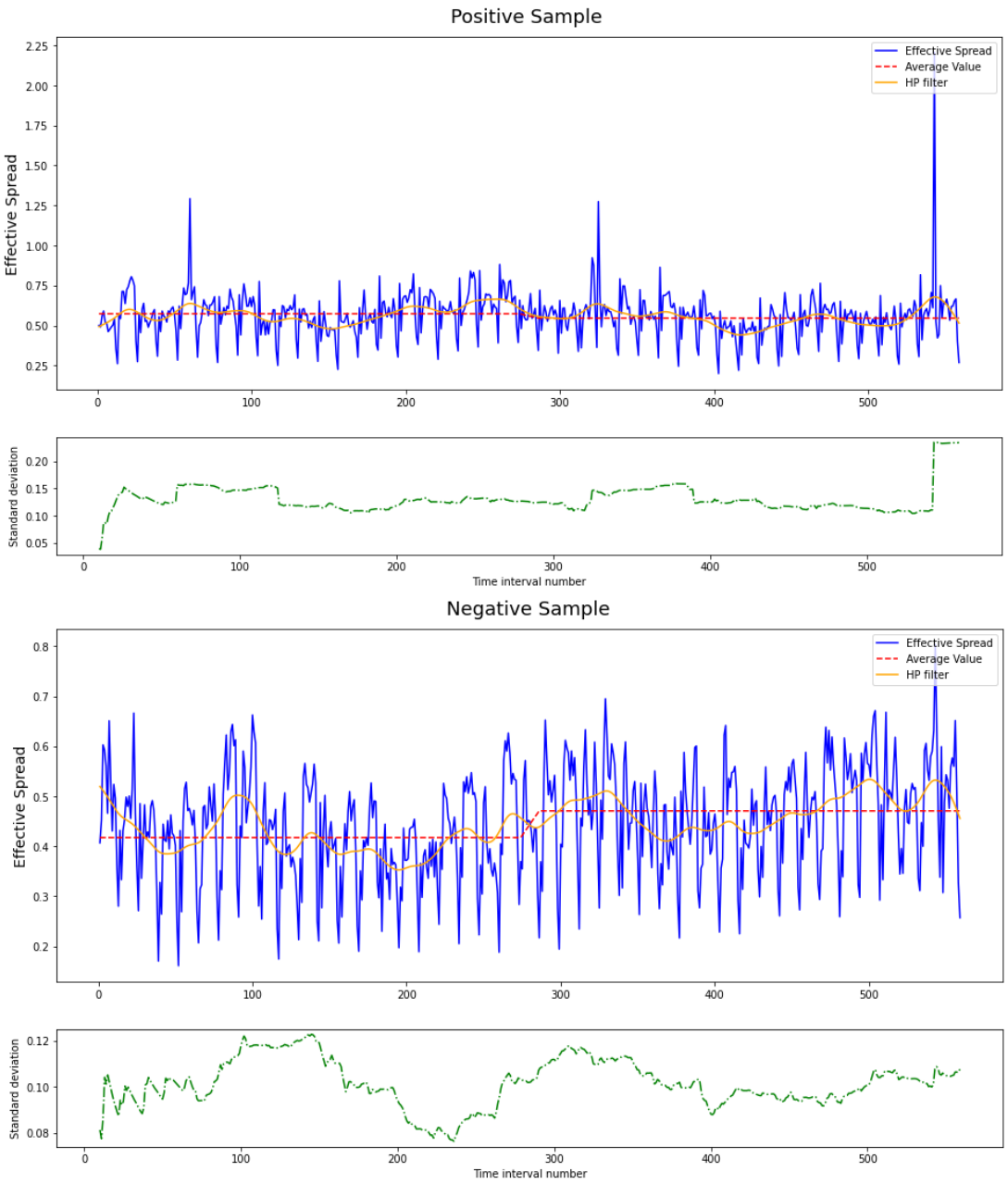

Fig. 8: Positive and Negative Aggregated Effective Spread

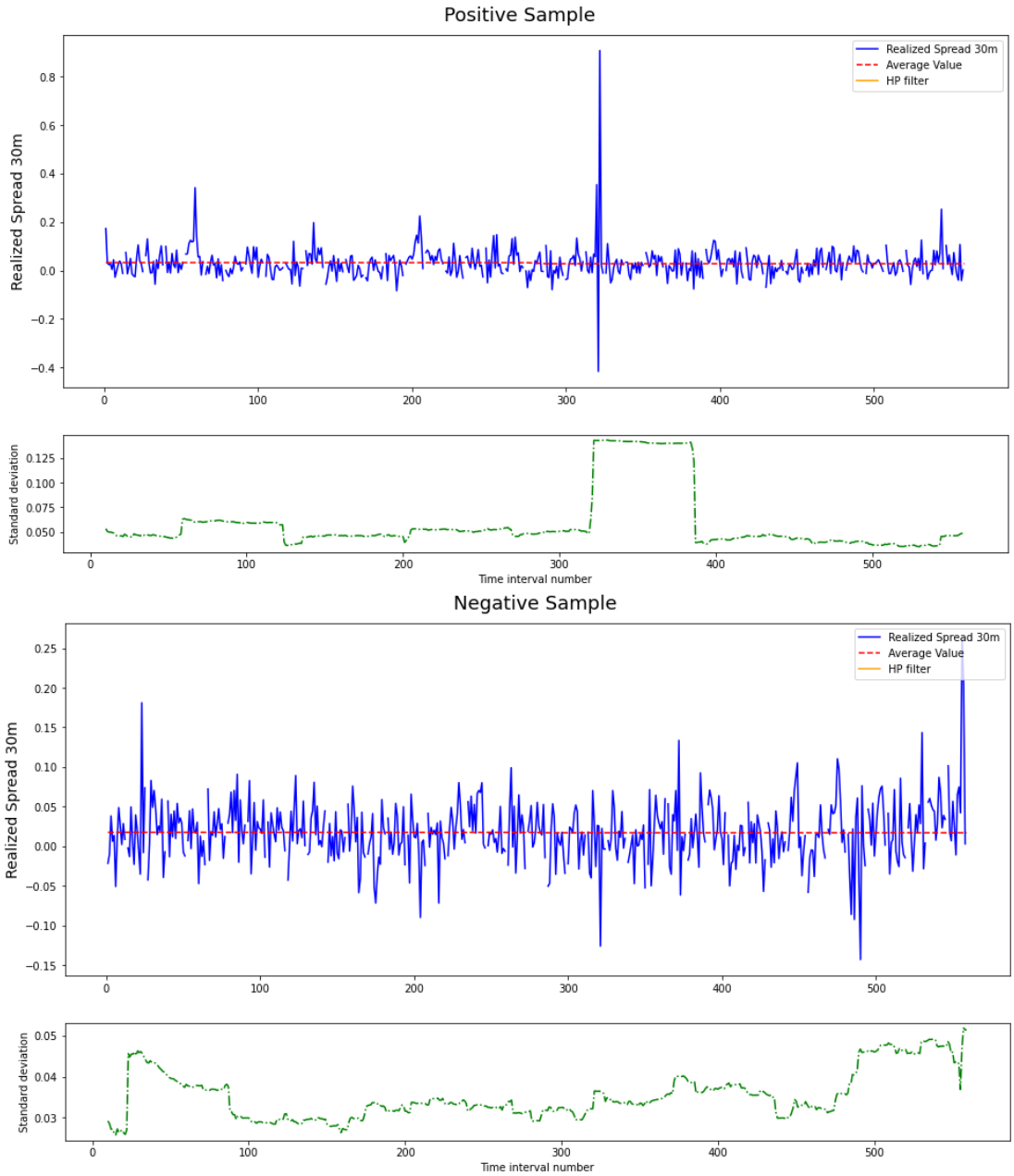

Fig. 9: Positive and Negative Aggregated Realized Spread

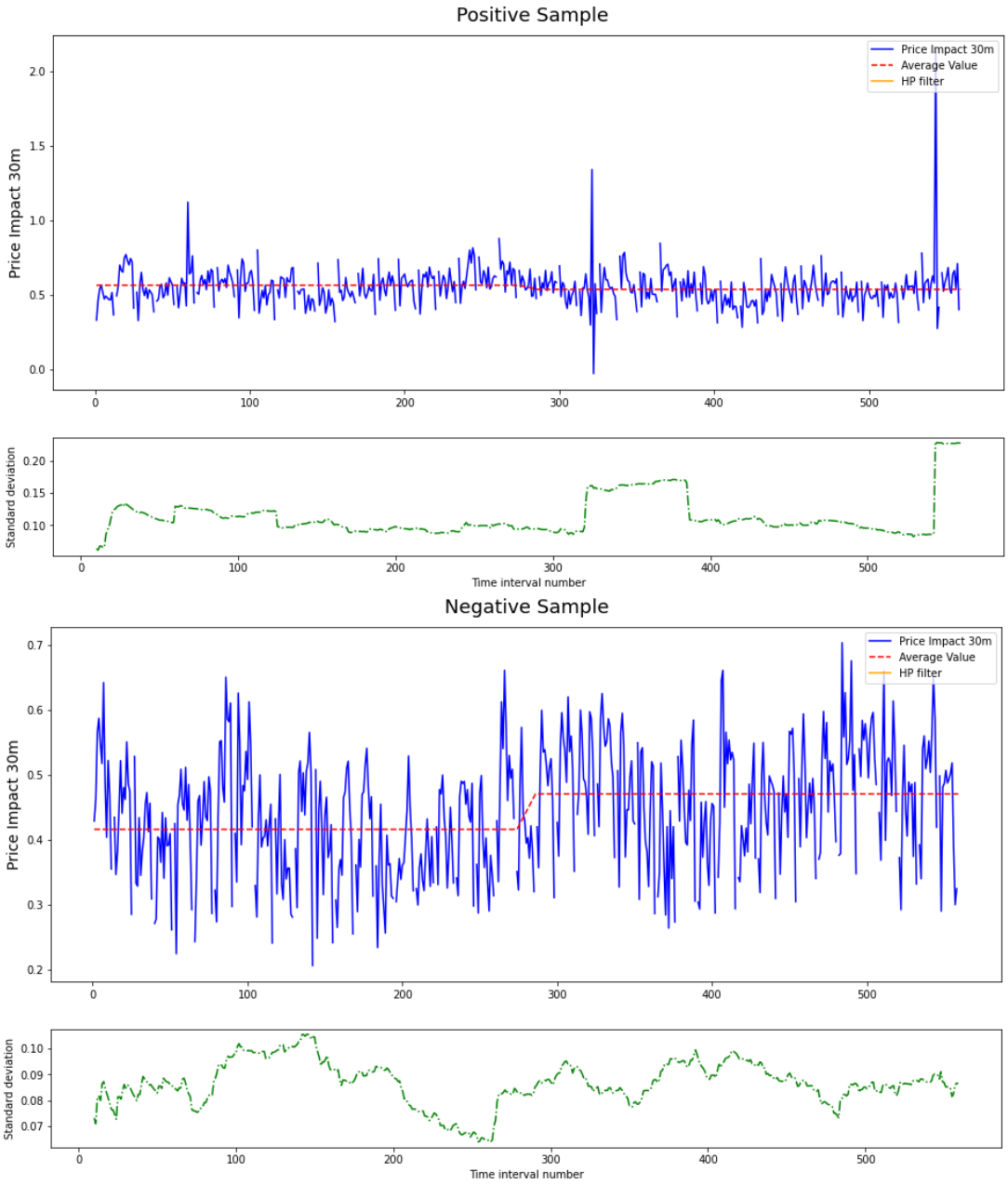

Fig. 10: Positive and Negative Aggregated Price Impact

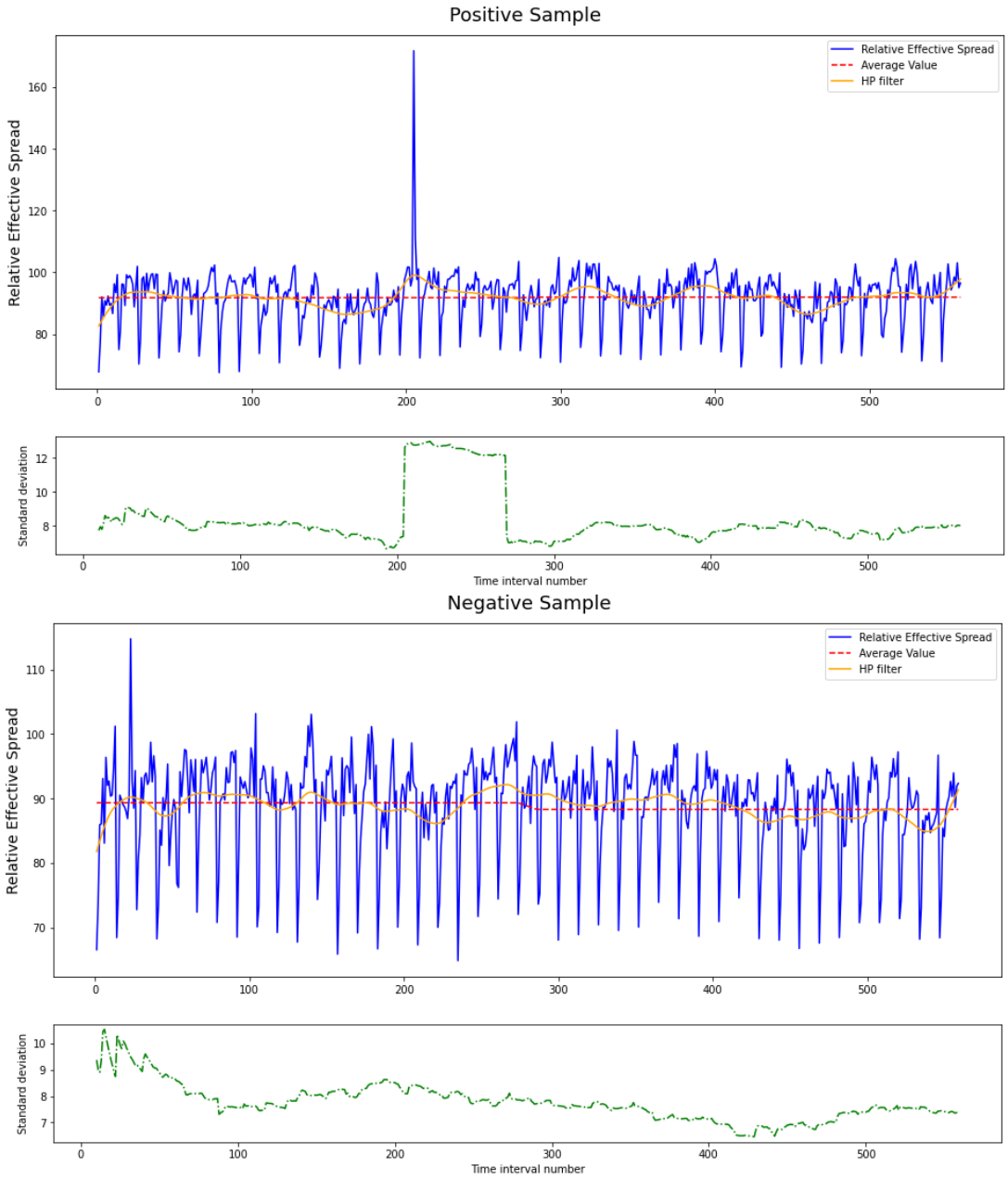

Fig. 11: Positive and Negative Aggregated Relative Effective Spread

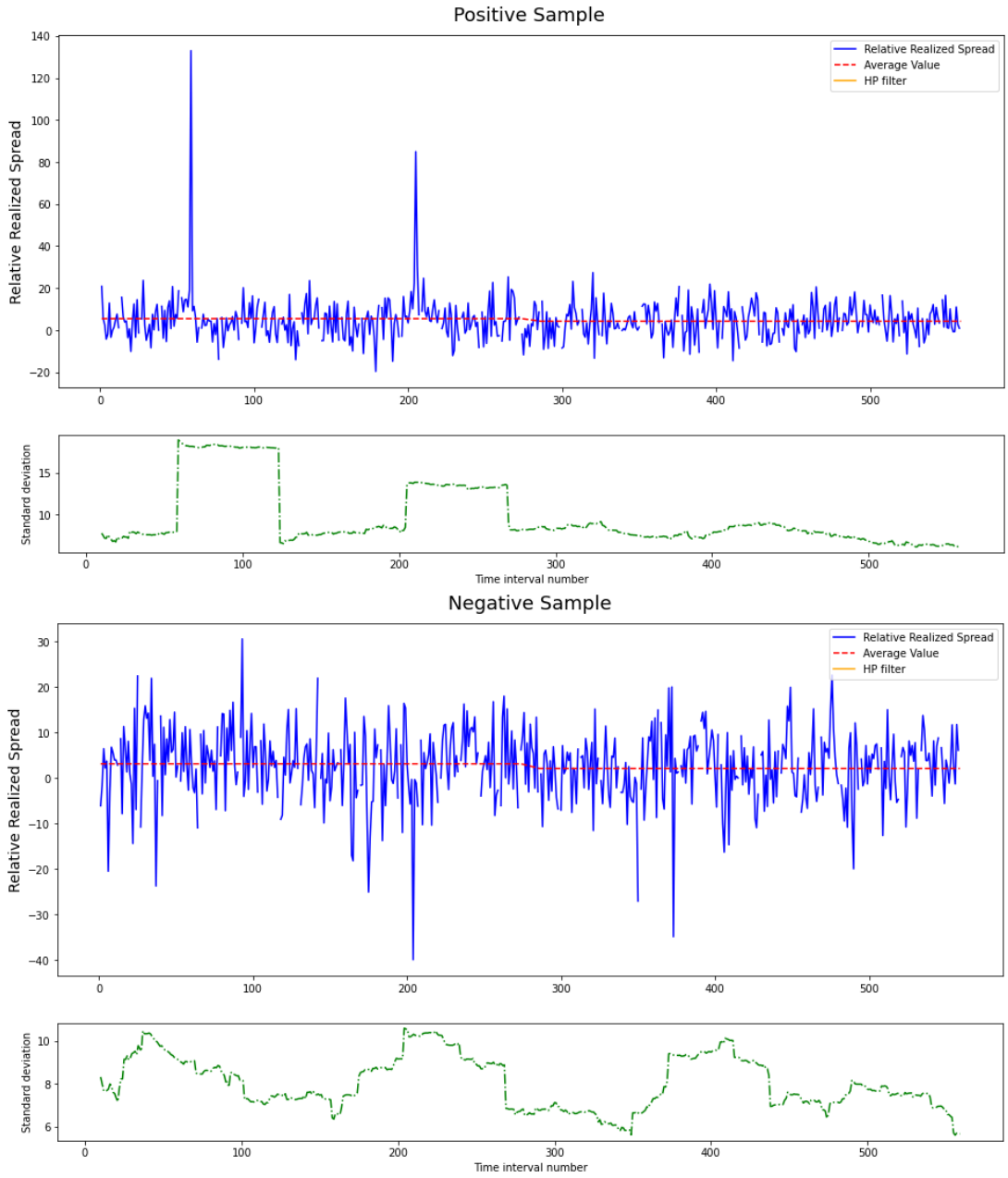

Fig. 12: Positive and Negative Aggregated Relative Realized Spread

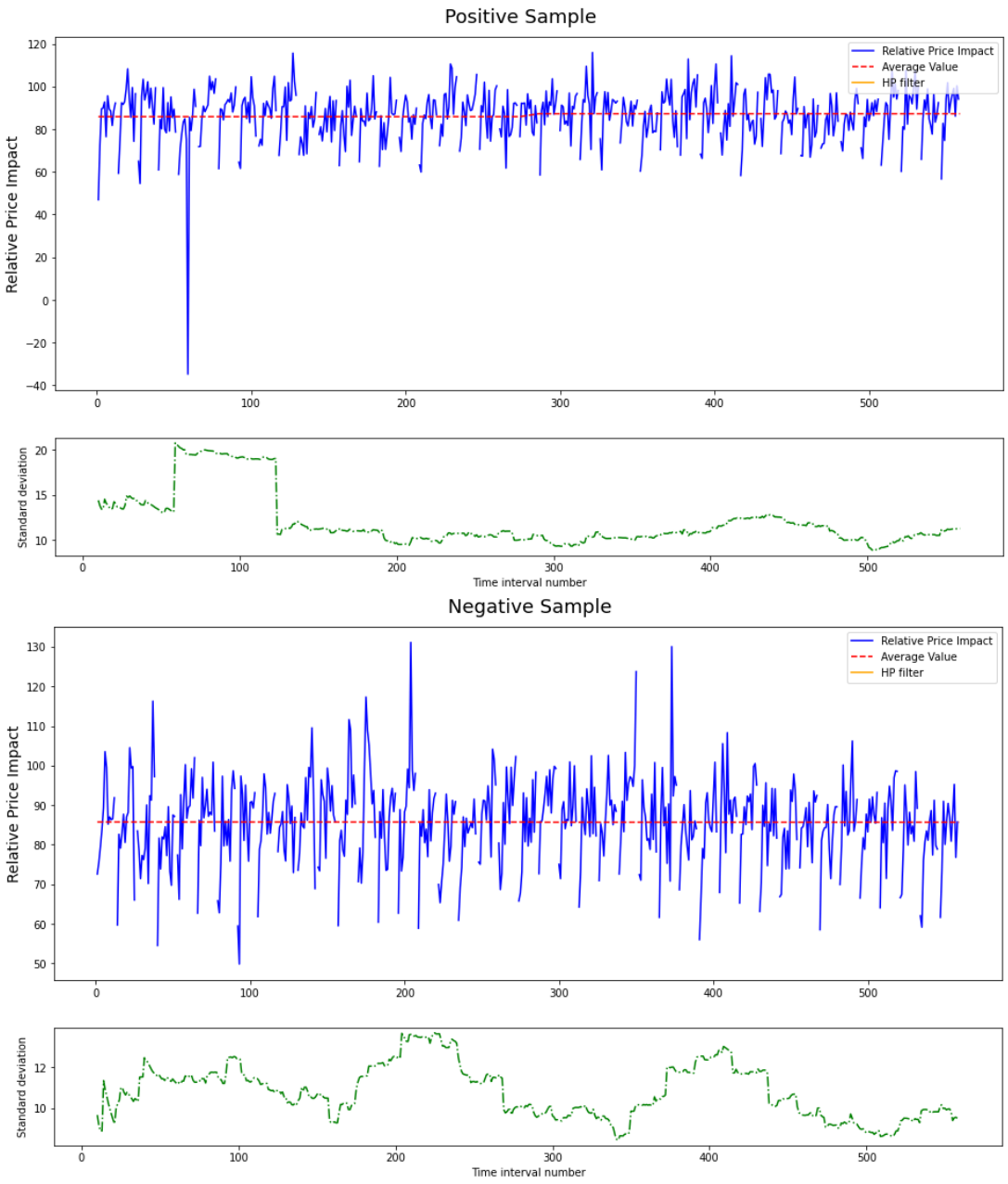

Fig. 13: Positive and Negative Aggregated Relative Price Impact

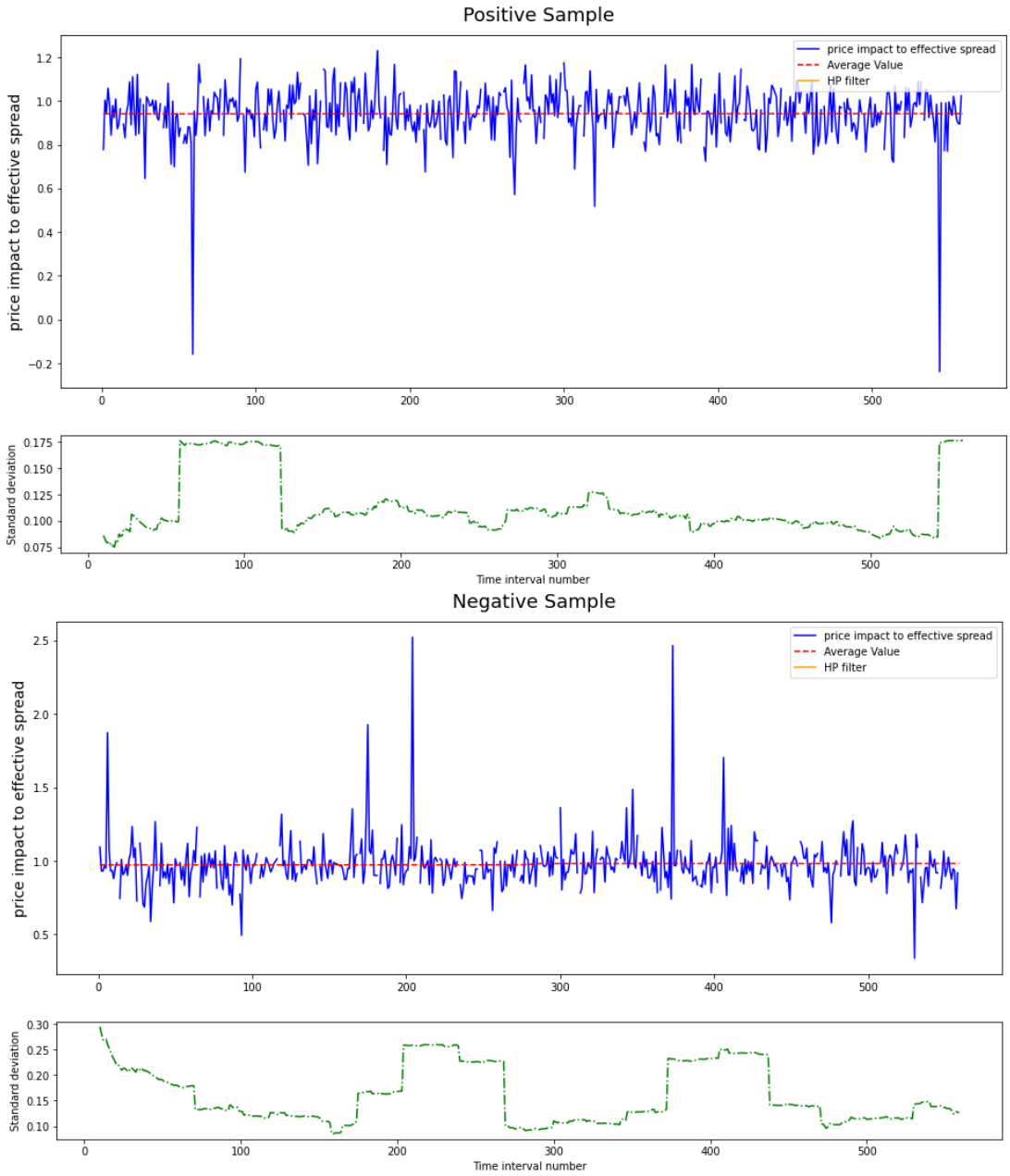

Fig. 14: Positive and Negative Aggregated Price Impact to Effective Spread

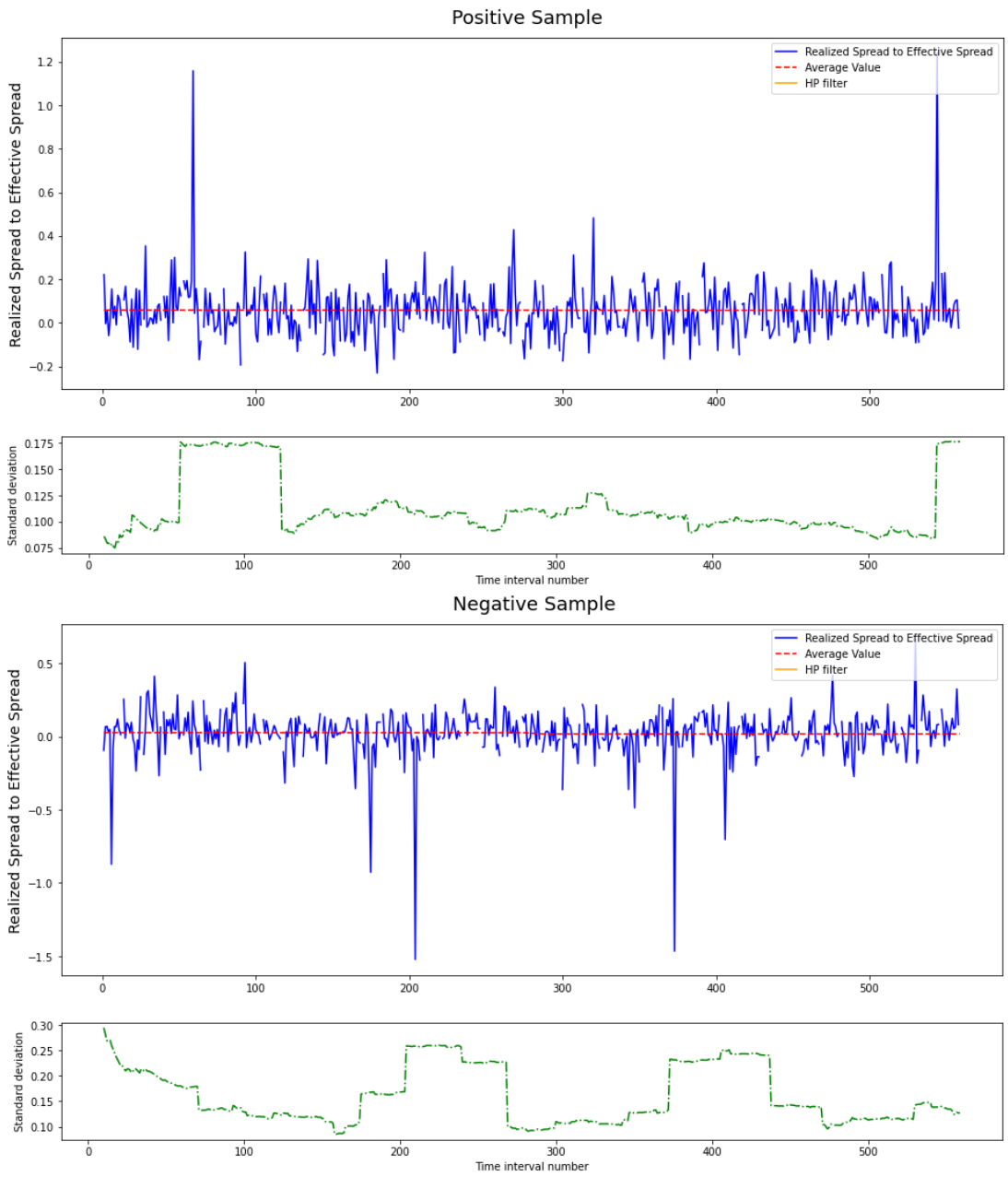

Fig. 15: Positive and Negative Aggregated Realized Spread to Effective Spread

Tables

In Table 1 we elaborate on how we created the sample dataset of events that were used in the event study. Violation Tracker provides parent-subsidiary data for some of the firms.

Table 1: Sample Construction

	obs. Dropped	obs. Remaining
Data: All the misconducts from 2017 to 2020	-	86677
Less: Financial misconducts	1802	84875
Merge: Russell3000 constituents dataset (Adding Tickers)	75108	9767
Merge 1: by firm name subsidiary	84680	195
Merge 2: by parent company	78397	6478
Merge 3: by firm name and parent company	84680	3508
Merge: S&P500 historical constituents time series	-	9767
Less: Misconducts from firms (or parents) not in S&P500 at the time of penalty	3558	6209

Table 2: Descriptive Statistics of Penalty

This table presents the frequency of misconducts, average penalty ratio, and total penalty share by agencies, major industry, government level, case category, and offense group.

T2 Panel A: Sample Statistics by Major Industry (with obs. More than 30)

Major Industry Group	Misconduct Frequency (%)	Total Penalty Share (%)	Average Penalty Ratio
Retailing	15.832	16.166	1.021
Financial services	13.770	22.819	1.657
Diversified	10.469	0.262	0.025
Railroads	8.649	0.075	0.009
Oil and gas	5.573	2.421	0.435
Healthcare services	4.542	1.891	0.416

Major Industry Group	Misconduct Frequency (%)	Total Penalty Share (%)	Average Penalty Ratio
Pipelines	4.010	0.023	0.006
Pharmaceuticals	3.930	5.486	1.396
Telecommunications	3.672	5.936	1.616
Utilities and power generation	2.899	1.212	0.418
Miscellaneous manufacturing	2.577	3.910	1.517
Airlines	2.303	1.245	0.541
Food products	2.239	0.698	0.312
Aerospace and military contracting	2.094	0.570	0.272
Freight and logistics	1.949	0.542	0.278
Paper and packaging	1.756	0.066	0.038
Wholesalers	1.353	5.447	4.026
Mining and minerals	1.337	0.003	0.002
Chemicals	1.063	0.487	0.458
Construction and engineering	0.886	0.083	0.093
Building materials	0.870	0.009	0.010
Waste management and environmental services	0.805	0.430	0.533
Motor vehicles	0.773	0.652	0.843
Industrial equipment	0.693	0.022	0.032
Information technology	0.548	22.901	41.821
Metals	0.548	0.097	0.177
Housewares and home furnishings	0.483	0.004	0.008

T2 Panel B: Sample Statistics by Agency (with obs. More than 30)

Agency Group	Misconduct Frequency (%)	Total Penalty Share (%)	Average Penalty Ratio
OSHA	23.290	0.853	0.037
FMCSA	17.338	0.750	0.043
FRA	16.772	1.327	0.079
WHD	9.785	0.289	0.030
EPA	4.383	2.755	0.631
INS	3.671	0.191	0.052
CMS	3.590	0.531	0.149
AG	3.461	15.440	4.480
MSHA	3.299	0.008	0.003
MHC	1.989	0.052	0.026
FAA	1.957	0.281	0.144
NLRB	1.779	0.387	0.218
EEOC	1.197	0.603	0.506
OFCCP	0.922	0.268	0.292
USAO	0.857	10.941	12.818
FIN	0.566	0.033	0.059
EBSA	0.485	0.381	0.789

T2 Panel C: Sample Statistics by Government Level

Government Level Group	Misconduct Frequency (%)	Total Penalty Share (%)	Average Penalty Ratio
Federal	88.61	81.54	0.92
State	10.98	17.30	1.57
Local	0.40	1.16	2.88

T2 Panel D: Sample Statistics by Offense Group (with obs. More than 30)

Offense Group	Misconduct Frequency (%)	Total Penalty Share (%)	Average Penalty Ratio
Safety-related offenses	64.23	4.11	0.06
Employment-related offenses	17.85	8.26	0.46
Consumer-protection-related offenses	9.62	40.30	4.19
Environment-related offenses	5.38	8.11	1.51
Government-contracting-related offenses	1.11	11.92	10.73
Competition-related offenses	0.95	18.23	19.19
Healthcare-related offenses	0.79	9.06	11.48
Miscellaneous offenses	0.08	0.01	0.11

T2 Panel E: Sample Statistics by Primary Offense Group (with obs. More than 30)

Primary Offense Group	Misconduct Frequency (%)	Total Penalty Share (%)	Average Penalty Ratio
Workplace safety or health violation	26.14	0.16	0.01
Motor vehicle safety violation	16.93	0.65	0.04
Railroad safety violation	16.07	0.04	0.00
Wage and hour violation	12.11	3.57	0.29
Insurance violation	6.65	1.52	0.23
Environmental violation	5.38	8.11	1.51
Nursing home violation	3.01	0.07	0.02
Employment discrimination	2.37	1.64	0.69
Consumer protection violation	1.98	11.69	5.90
Aviation safety violation	1.82	0.19	0.10

Primary Offense Group	Misconduct Frequency (%)	Total Penalty Share (%)	Average Penalty Ratio
Labor relations violation	1.77	0.39	0.22
False Claims Act and related	1.10	11.92	10.88
Benefit plan administrator violation	0.72	2.48	3.42
Family and Medical Leave Act	0.50	0.00	0.01

T2 Panel F: Sample Statistics by Secondary Offense Group (with obs. More than 30)

Secondary Offense Group	Misconduct Frequency (%)	Total Penalty Share (%)	Average Penalty Ratio
Fair Labor Standards Act	26.87	2.46	0.25
Overtime violation	16.99	2.22	0.35
Mining violation	13.61	0.32	0.06
Misclassification	6.46	0.22	0.09
Other pay violation	6.33	0.16	0.07
Meal/rest break violation	4.20	0.24	0.15
Off-the-clock work	3.94	0.29	0.20
Service Contract Act	2.60	0.05	0.05
Racial discrimination	2.47	0.51	0.55
Child labor or youth employment violation	2.30	0.38	0.45
Davis-Bacon Act and related	1.82	0.02	0.03
Antiboycott violation	1.34	0.00	0.00

Table 3: Event Study Statistics

This table presents $CAAR$ (%), standard deviation, t-statistic, and p-value for both methodologies discussed in the methodology section. The classic event study results break down to panels

from A1 to E1 and the results for clustered event analysis accounting for overlapping the event windows break down to panels from A2 to E2. The estimation window used in the analysis goes back to 200 days with zero gaps.

T3 Panel A1: Event Study Result for Major Industry (with obs. More than 30)

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
Retailing	983	0.000	0.029	-0.400	0.688	0.005	0.053	2.982	0.003***	0.010	0.075	4.184	0.000***	0.014	0.102	4.257	0.000***
Financial services	848	0.002	0.023	2.324	0.020**	0.004	0.038	3.187	0.001***	0.004	0.052	2.332	0.020**	0.011	0.075	4.221	0.000***
Railroads	508	0.004	0.013	6.334	0.000***	-0.001	0.021	-1.134	0.2571	-0.001	0.032	-0.431	0.666	0.008	0.067	2.631	0.009***
Oil and gas	346	-0.003	0.028	-1.734	0.084*	0.006	0.061	1.961	0.051*	-0.002	0.083	-0.408	0.683	-0.008	0.088	-1.731	0.084*
Healthcare services	282	-0.001	0.025	-0.393	0.694	0.004	0.047	1.497	0.135	0.008	0.058	2.305	0.022**	0.022	0.089	4.224	0.000***
Pipelines	249	-0.010	0.021	-7.223	0.000***	-0.023	0.031	-11.39	0.000***	-0.031	0.033	-14.95	0.000***	0.009	0.063	2.348	0.020**
Pharmaceuticals	244	0.006	0.020	4.626	0.000***	0.005	0.036	2.051	0.041**	0.001	0.043	0.314	0.753	0.016	0.054	4.540	0.000***
Telecommunications	228	-0.003	0.020	-2.369	0.019**	-0.014	0.036	-5.703	0.000***	-0.025	0.043	-8.885	0.000***	-0.054	0.076	-10.69	0.000***
Diversified	508	-0.004	0.021	-4.312	0.000***	-0.011	0.045	-5.400	0.000***	-0.016	0.075	-4.901	0.000***	-0.036	0.101	-7.929	0.000***
Utilities and power generation	180	-0.001	0.022	-0.519	0.603	-0.001	0.074	-0.235	0.814	0.011	0.056	2.663	0.008***	0.018	0.074	3.312	0.001***
Miscellaneous manufacturing	160	-0.001	0.022	-0.417	0.676	-0.004	0.039	-1.216	0.225	-0.001	0.057	-0.126	0.899	-0.050	0.094	-6.752	0.000***
Airlines	143	-0.002	0.030	-0.729	0.466	-0.020	0.065	-3.713	0.000***	-0.033	0.104	-3.767	0.000***	-0.034	0.117	-3.484	0.001***
Food products	139	-0.004	0.028	-1.666	0.098*	-0.004	0.059	-0.793	0.428	-0.005	0.072	-0.809	0.419	-0.013	0.094	-1.572	0.118
Aerospace and military contracting	90	-0.001	0.028	-0.368	0.713	0.002	0.068	0.282	0.778	-0.003	-0.136	-0.195	0.845	0.004	0.114	0.315	0.753
Freight and logistics	121	-0.001	0.025	-0.405	0.686	-0.007	0.050	-1.584	0.115	-0.012	0.067	-2.034	0.044**	-0.008	0.093	-0.974	0.331
Paper and packaging	109	0.001	0.025	0.332	0.739	0.002	0.039	0.644	0.520	0.002	0.057	0.450	0.653	-0.012	0.077	-1.624	0.107
Wholesalers	84	-0.003	0.022	-1.410	0.162	0.005	0.045	1.020	0.310	-0.018	0.058	-2.757	0.007***	-0.045	0.113	-3.642	0.000***
Mining and minerals	83	-0.007	0.048	-1.383	0.170	-0.010	0.086	-1.008	0.316	-0.015	0.139	-1.010	0.315	0.006	0.175	0.316	0.752
Chemicals	63	-0.003	0.031	-0.660	0.511	-0.004	0.070	-0.444	0.658	-0.010	0.122	-0.635	0.527	0.011	0.103	0.835	0.406
Construction and engineering	55	0.002	0.027	0.681	0.498	-0.001	0.050	-0.212	0.832	-0.001	0.128	-0.085	0.932	-0.006	0.136	-0.353	0.725
Building materials	54	0.004	0.025	1.120	0.267	0.004	0.059	0.525	0.601	0.002	0.066	0.269	0.788	0.008	0.078	0.774	0.442
Waste management and environmental services	50	-0.007	0.035	-1.363	0.178	-0.014	0.049	-2.081	0.043**	-0.017	0.068	-1.775	0.082*	-0.045	0.117	-2.730	0.009***
Motor vehicles	48	-0.006	0.025	-1.665	0.102	0.015	0.036	2.898	0.006***	0.019	0.046	2.795	0.007***	-0.045	0.073	-4.242	0.000***
Industrial equipment	43	-0.005	0.017	-1.945	0.058*	-0.007	0.038	-1.153	0.255	-0.011	0.050	-1.476	0.147	-0.006	0.076	-0.505	0.615
Metals	34	0.003	0.024	0.819	0.418	-0.001	0.048	-0.134	0.893	-0.012	0.054	-1.340	0.189	-0.031	0.047	-3.810	0.001***
Information technology	34	-0.012	0.047	-1.465	0.152	-0.017	0.092	-1.101	0.278	-0.038	0.193	-1.146	0.259	-0.011	0.142	-0.468	0.642
Housewares and home furnishings	30	0.013	0.038	1.865	0.072*	0.015	0.067	1.251	0.220	0.022	0.068	1.776	0.086*	0.037	0.101	2.031	0.051*
Avg. abs.	**-**	**0.004**	**0.027**	**-**	**-**	**0.008**	**0.052**	**-**	**-**	**0.012**	**0.075**	**-**	**-**	**0.021**	**0.094**	**-**	**-**

T3 Panel A2: Event Study Result for Major Industry (with obs. More than 30)

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
Retailing	984	0.000	0.000	-0.438	0.661	0.005	0.001	3.894	0.000***	0.010	0.001	6.046	0.000***	0.014	0.002	6.147	0.000***
Financial services	849	0.002	0.000	1.863	0.062*	0.004	0.001	2.537	0.011**	0.004	0.002	1.855	0.063*	0.011	0.003	3.531	0.000***
Railroads	509	0.004	0.006	0.558	0.576	-0.001	0.007	-0.143	0.886	-0.078	0.007	-0.077	0.938	0.008	0.008	0.956	0.339
Oil and gas	347	-0.002	0.001	-2.065	0.039**	0.006	0.001	3.667	0.000***	-0.002	0.002	-0.82	0.412	-0.008	0.002	-2.819	0.005***
Healthcare services	283	0.000	0.002	-0.283	0.777	0.004	0.002	1.686	0.098*	0.008	0.002	2.937	0.003***	0.022	0.003	6.651	0.000***
Pipelines	250	-0.009	0.004	-1.967	0.050*	-0.022	0.006	-3.420	0.000***	-0.031	0.007	-4.327	0.000***	0.009	0.007	1.228	0.220
Pharmaceuticals	245	0.006	0.001	3.493	0.000***	0.005	0.002	1.947	0.052*	0.001	0.002	0.292	0.77	0.016	0.003	4.409	0.000***
Telecommunications	229	-0.003	0.002	-1.371	0.171	-0.013	0.003	-4.193	0.000***	-0.025	0.003	-7.013	0.000***	-0.054	0.003	-13.864	0.000***
Diversified	509	-0.004	0.002	-1.819	0.069*	-0.011	0.002	-4.705	0.000***	-0.016	0.002	-6.576	0.000***	-0.035	0.002	-13.103	0.000***
Utilities and power generation	181	-0.001	0.001	-0.737	0.461	-0.001	0.001	-0.745	0.456	0.011	0.002	5.132	0.000***	0.018	0.002	6.994	0.000***
Miscellaneous manufacturing	161	-0.001	0.002	-0.321	0.747	-0.004	0.002	-1.290	0.198	0.000	0.003	-0.185	0.853	-0.050	0.003	-15.681	0.000***
Airlines	144	-0.002	0.003	-0.612	0.54	-0.020	0.004	-4.920	0.000***	-0.033	0.004	-7.078	0.000***	-0.034	0.005	-6.065	0.000***
Food products	140	-0.004	0.001	-3.108	0.002***	-0.004	0.001	-2.670	0.008***	-0.005	0.001	-2.878	0.004***	-0.012	0.002	-5.822	0.000***
Aerospace and military contracting	91	-0.001	0.001	-0.666	0.507	0.002	0.001	1.043	0.299	-0.003	0.002	-1.261	0.021	0.004	0.002	1.510	0.134
Freight and logistics	122	-0.001	0.001	-0.648	0.517	-0.007	0.001	-3.876	0.000***	-0.012	0.002	-5.490	0.000***	-0.008	0.002	-2.828	0.005***
Paper and packaging	110	0.080	0.001	0.526	0.599	0.002	0.002	1.119	0.265	0.002	0.002	0.924	0.357	-0.012	0.003	-3.446	0.000***
Wholesalers	85	-0.003	0.002	-1.25	0.214	0.005	0.002	1.660	0.1	-0.017	0.003	-5.313	0.000***	-0.044	0.003	-11.759	0.000***
Mining and minerals	84	-0.007	0.004	-1.628	0.107	-0.009	0.005	-1.758	0.082*	-0.015	0.006	-2.479	0.015**	0.006	0.007	0.834	0.406
Chemicals	64	-0.002	0.002	-0.966	0.337	-0.004	0.002	-1.323	0.19	-0.010	0.003	-3.031	0.003***	0.011	0.003	2.961	0.004***
Construction and engineering	56	0.002	0.002	0.99	0.326	-0.001	0.002	-0.521	0.604	-0.001	0.003	-0.477	0.634	-0.006	0.003	-1.79	0.078*
Building materials	55	0.004	0.003	1.152	0.254	0.004	0.004	0.940	0.351	0.002	0.005	0.463	0.644	0.088	0.006	1.318	0.192
Waste management and environmental services	51	-0.007	0.002	-3.217	0.002***	-0.014	0.002	-5.773	0.000***	-0.017	0.002	-5.985	0.000***	-0.044	0.003	-13.066	0.000***
Motor vehicles	49	-0.006	0.007	-0.853	0.397	0.015	0.008	1.803	0.077*	0.018	0.008	2.180	0.034**	-0.044	0.008	-5.23	0.000***
Industrial equipment	44	-0.005	0.001	-2.734	0.009***	-0.006	0.001	-3.351	0.001***	-0.011	0.002	-5.107	0.000***	-0.006	0.002	-2.254	0.029**
Metals	35	0.003	0.003	1.057	0.297	-0.001	0.003	-0.280	0.78	-0.012	0.004	-2.517	0.016**	-0.030	0.006	-4.898	0.000***
Information technology	35	-0.011	0.002	-4.498	0.000***	-0.017	0.002	-6.404	0.000***	-0.037	0.002	-13.168	0.000***	-0.011	0.003	-3.527	0.001***
Housewares and home furnishings	31	0.013	0.003	4.052	0.000***	0.015	0.003	4.485	0.000***	0.021	0.003	5.898	0.000***	0.036	0.004	8.887	0.000***
Avg. abs.	**-**	**0.007**	**0.002**	**-**	**-**	**0.007**	**0.003**	**-**	**-**	**0.015**	**0.003**	**-**	**-**	**0.024**	**0.004**	**-**	**-**

T3 Panel B1: Event Study Result for Agency (with obs. More than 30)

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
OSHA	1435	-0.001	0.026	-1.320	0.186	-0.001	0.050	-0.761	0.446	-0.002	0.071	-0.982	0.325	0.005	0.098	2.055	0.040**
FMCSA	1072	0.001	0.024	1.537	0.124	0.001	0.046	0.588	0.556	0.001	0.068	0.278	0.780	-0.004	0.094	-1.293	0.196
FRA	869	0.001	0.015	1.282	0.200	-0.004	0.028	-4.193	0.000***	-0.004	0.039	-2.662	0.008***	-0.001	0.067	-0.404	0.686
WHD	603	-0.003	0.023	-2.730	0.007***	0.008	0.043	4.725	0.000***	0.004	0.062	1.608	0.108	-0.008	0.091	-2.140	0.033**
EPA	269	-0.002	0.023	-1.684	0.093*	-0.002	0.051	-0.526	0.598	-0.004	0.067	-0.970	0.332	-0.010	0.093	-1.704	0.089*
CMS	222	0.002	0.017	1.712	0.088*	-0.001	0.034	-0.300	0.763	-0.001	0.045	-0.475	0.634	-0.005	0.073	-1.020	0.308
INS	225	-0.001	0.033	-0.397	0.691	0.003	0.049	1.001	0.317	0.004	0.062	0.934	0.350	0.004	0.090	0.659	0.510
AG	214	-0.003	0.024	-2.055	0.041**	-0.005	0.053	-1.352	0.177	-0.002	0.084	-0.375	0.707	0.003	0.092	0.505	0.613
MSHA	204	-0.003	0.037	-1.122	0.263	-0.008	0.073	-1.650	0.100	-0.014	0.116	-1.678	0.094	-0.005	0.131	-0.509	0.610
MHC	123	-0.002	0.025	-0.767	0.444	0.002	0.050	0.535	0.592	0.006	0.059	1.074	0.284	0.002	0.101	0.273	0.784
FAA	121	-0.003	0.025	-1.366	0.174	-0.013	0.056	-2.479	0.015**	-0.028	0.115	-2.686	0.008***	-0.038	0.099	-4.234	0.000***
NLRB	81	0.001	0.026	0.285	0.775	0.000	0.087	-0.012	0.990	0.001	0.133	0.035	0.972	0.018	0.102	1.580	0.117
EEOC	72	-0.006	0.032	-1.566	0.121	-0.024	0.115	-1.745	0.085*	-0.037	0.094	-3.284	0.002***	-0.020	0.085	-2.018	0.047**
OFCCP	56	0.003	0.044	0.574	0.568	-0.010	0.042	-1.820	0.074	-0.012	0.056	-1.563	0.123	-0.022	0.115	-1.402	0.166
USAO	52	-0.006	0.036	-1.195	0.237	-0.003	0.073	-0.335	0.738	-0.010	0.155	-0.479	0.633	-0.009	0.138	-0.483	0.630
FIN	34	0.003	0.033	0.601	0.551	0.002	0.050	0.278	0.782	-0.003	0.073	-0.264	0.793	0.004	0.134	0.158	0.875
EBSA	30	0.011	0.027	2.234	0.033**	0.000	0.043	-0.017	0.985	0.029	0.062	2.528	0.017**	0.030	0.058	2.879	0.007***
Avg. abs.	**-**	**0.003**	**0.028**	**-**	**-**	**0.005**	**0.055**	**-**	**-**	**0.009**	**0.080**	**-**	**-**	**0.011**	**0.098**	**-**	**-**

T3 Panel B2: Event Study Result for Agency (with obs. More than 30)

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
OSHA	1436	-0.001	0.001	-1.358	0.175	-0.001	0.001	-1.008	0.314	-0.002	0.001	-1.496	0.135	0.005	0.002	3.337	0.001***
FMCSA	1073	0.001	0.001	1.422	0.155	0.001	0.001	0.634	0.526	0.001	0.002	0.340	0.734	-0.004	0.002	-1.622	0.105
FRA	870	0.001	0.004	0.161	0.872	-0.004	0.005	-0.860	0.390	-0.004	0.005	-0.705	0.481	-0.001	0.005	-0.180	0.857
WHD	604	-0.003	0.001	-1.832	0.067*	0.008	0.002	4.047	0.000***	0.004	0.002	1.690	0.092*	-0.008	0.003	-2.733	0.006***
EPA	270	-0.002	0.001	-2.516	0.012**	-0.002	0.001	-1.439	0.151	-0.004	0.001	-2.985	0.003***	-0.010	0.002	-5.810	0.000***
CMS	223	0.002	0.001	1.563	0.120	-0.001	0.002	-0.394	0.694	-0.001	0.002	-0.699	0.485	-0.005	0.002	-1.989	0.048**
INS	226	-0.001	0.001	-0.840	0.402	0.003	0.001	2.749	0.006***	0.004	0.001	2.832	0.005***	0.004	0.002	2.412	0.017**
AG	215	-0.003	0.001	-2.940	0.004***	-0.005	0.001	-3.641	0.000***	-0.002	0.002	-1.414	0.159	0.003	0.002	1.719	0.087*
MSHA	205	-0.003	0.002	-1.505	0.134	-0.008	0.002	-3.545	0.000***	-0.014	0.003	-4.727	0.000***	-0.005	0.004	-1.295	0.197
MHC	124	-0.002	0.002	-0.965	0.336	0.002	0.002	1.170	0.244	0.006	0.002	2.392	0.018**	0.002	0.003	0.867	0.388
FAA	122	-0.003	0.002	-1.704	0.091*	-0.013	0.003	-5.028	0.000***	-0.028	0.003	-9.139	0.000***	-0.038	0.004	-9.521	0.000***
NLRB	82	0.001	0.002	0.507	0.613	0.000	0.002	-0.057	0.955	0.000	0.002	0.208	0.836	0.018	0.003	6.308	0.000***
EEOC	73	-0.006	0.002	-2.892	0.005***	-0.023	0.002	-10.20	0.000***	-0.036	0.002	-14.59	0.000***	-0.020	0.003	-6.996	0.000***
OFCCP	57	0.003	0.002	1.464	0.149	-0.010	0.002	-4.165	0.000***	-0.011	0.003	-4.535	0.000***	-0.021	0.003	-7.855	0.000***
USAO	53	-0.006	0.002	-2.726	0.009***	-0.003	0.002	-1.486	0.143	-0.010	0.002	-4.311	0.000***	-0.009	0.002	-3.681	0.001***
FIN	35	0.003	0.002	1.440	0.159	0.002	0.002	0.968	0.34	-0.003	0.002	-1.307	0.200	0.004	0.003	1.366	0.181
EBSA	31	0.011	0.005	2.304	0.028**	0.000	0.006	-0.024	0.981	0.028	0.006	4.658	0.000***	0.029	0.006	4.834	0.000***
Avg. abs.	**-**	**0.003**	**0.002**	**-**	**-**	**0.005**	**0.002**	**-**	**-**	**0.009**	**0.002**	**-**	**-**	**0.011**	**0.003**	**-**	**-**

T3 Panel C1: Event Study Result for Government Level Group

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
Federal	4020	0.000	0.266	-0.883	0.377	-0.001	0.054	-1.684	0.092*	-0.002	0.078	-1.748	0.080*	-0.003	0.099	-2.138	0.033**
State	654	-0.002	0.028	-1.434	0.151	0.000	0.050	-0.132	0.894	0.000	0.065	-0.122	0.902	0.003	0.095	0.900	0.368
Local	25	0.000	0.028	-0.014	0.988	0.000	0.043	0.041	0.966	0.002	0.068	0.110	0.913	0.016	0.091	0.879	0.387
Avg. abs.	**-**	**0.001**	**0.107**	**-**	**-**	**0.001**	**0.049**	**-**	**-**	**0.001**	**0.071**	**-**	**-**	**0.008**	**0.095**	**-**	**-**

T3 Panel C2: Event Study Result for Government Level Group

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
Federal	5287	0.000	0.001	-0.774	0.439	0.001	0.001	-1.077	0.282	-0.002	0.001	-2.07	0.039**	-0.002	0.002	-1.505	0.132
State	678	-0.001	0.001	-1.894	0.059*	0.000	0.001	0.355	0.723	0.000	0.001	-0.32	0.749	0.003	0.001	2.269	0.024**
Local	26	0.000	0.003	0.068	0.946	0.001	0.003	0.315	0.756	0.002	0.003	0.479	0.636	0.016	0.003	5.001	0.000***
Avg. abs.	**-**	**0.001**	**0.001**	**-**	**-**	**0.001**	**0.002**	**-**	**-**	**0.001**	**0.002**	**-**	**-**	**0.007**	**0.002**	**-**	**-**

T3 Panel D1: Event Study Result for Offense Group (with obs. More than 30)

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
Safety-related offenses	3813	0.000	0.024	0.078	0.937	-0.002	0.046	-2.570	0.010**	-0.003	0.068	-2.666	0.008***	-0.001	0.092	-0.622	0.533
Employment-related offenses	1073	-0.002	0.026	-2.304	0.021**	0.002	0.057	0.892	0.372	-0.001	0.077	-0.376	0.706	-0.006	0.092	-1.999	0.046**
Consumer-protection-related offenses	591	-0.001	0.030	-0.716	0.474	0.003	0.050	1.271	0.203	0.002	0.064	0.639	0.522	0.005	0.096	1.220	0.222
Environment-related offenses	332	-0.002	0.023	-1.698	0.090*	-0.001	0.050	-0.376	0.706	-0.004	0.067	-1.036	0.300	-0.008	0.093	-1.547	0.122
Government-contracting-related offenses	68	-0.003	0.033	-0.648	0.518	-0.006	0.069	-0.660	0.511	-0.011	0.144	-0.625	0.533	-0.012	0.139	-0.694	0.489
Competition-related offenses	57	-0.003	0.034	-0.629	0.531	-0.006	0.064	-0.692	0.491	-0.004	0.064	-0.429	0.669	0.000	0.091	0.021	0.982
Healthcare-related offenses	49	0.000	0.021	-0.158	0.874	0.001	0.046	0.207	0.836	0.009	0.043	1.386	0.171	0.010	0.069	0.957	0.343
Avg. abs.	**-**	**0.002**	**0.027**	**-**	**-**	**0.003**	**0.055**	**-**	**-**	**0.005**	**0.075**	**-**	**-**	**0.006**	**0.096**	**-**	**-**

T3 Panel D2: Event Study Result for Offense Group (with obs. More than 30)

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
Safety-related offenses	3814	0.000	0.001	0.036	0.971	-0.002	0.001	-1.684	0.092*	-0.003	0.001	-2.143	0.032**	-0.001	0.002	-0.533	0.594
Employment-related offenses	1074	-0.002	0.001	-2.118	0.034**	0.002	0.001	1.221	0.222	-0.001	0.002	-0.566	0.572	-0.006	0.002	-2.928	0.003***
Consumer-protection-related offenses	592	-0.001	0.001	-1.243	0.214	0.003	0.001	2.755	0.006***	0.002	0.001	1.468	0.143	0.005	0.001	3.276	0.001***
Environment-related offenses	333	-0.002	0.001	-2.517	0.012**	-0.001	0.001	-0.975	0.33	-0.004	0.001	-3.015	0.002***	-0.008	0.002	-4.973	0.000***
Government-contracting-related offenses	69	-0.003	0.002	-1.278	0.205	-0.005	0.002	-2.591	0.012**	-0.011	0.002	-4.993	0.000***	-0.012	0.002	-5.009	0.000***
Competition-related offenses	58	-0.003	0.002	-1.246	0.218	-0.006	0.002	-2.463	0.017**	-0.004	0.002	-1.485	0.143	0.000	0.003	0.098	0.921
Healthcare-related offenses	20	0.000	0.002	-0.217	0.829	0.001	0.002	0.569	0.572	0.008	0.003	3.298	0.001***	0.009	0.003	3.376	0.001***
Avg. abs.	**-**	**0.002**	**0.001**	**-**	**-**	**0.003**	**0.002**	**-**	**-**	**0.005**	**0.002**	**-**	**-**	**0.006**	**0.002**	**-**	**-**

T3 Panel E1: Event Study Result for Primary Offense Group (with obs. More than 30)

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
Workplace safety or health violation	1619	-0.001	0.028	-1.508	0.131	0.002	0.053	-1.207	0.227	-0.003	0.077	-1.442	0.149	0.005	0.102	1.832	0.067*
Motor vehicle safety violation	1051	0.001	0.024	1.671	0.095*	0.001	0.046	0.530	0.596	0.000	0.068	0.220	0.825	-0.003	0.094	-1.194	0.232
Wage and hour violation	751	-0.002	0.022	-2.937	0.003***	0.004	0.054	2.131	0.033**	0.001	0.069	0.550	0.582	-0.008	0.091	-2.507	0.012**
Railroad safety violation	830	0.001	0.015	1.149	0.251	-0.005	0.027	-4.818	0.000***	-0.004	0.038	-3.044	0.002***	-0.002	0.067	-0.810	0.417
Insurance violation	409	-0.001	0.030	-0.887	0.375	0.003	0.050	1.277	0.202	0.003	0.063	1.119	0.263	0.004	0.100	0.895	0.371
Environmental violation	332	-0.002	0.023	-1.698	0.090*	-0.001	0.050	-0.376	0.706	-0.004	0.067	-1.036	0.300	-0.008	0.093	-1.547	0.122
Nursing home violation	187	0.002	0.015	1.578	0.116	-0.002	0.032	-0.789	0.430	-0.006	0.042	-1.798	0.074*	-0.012	0.069	-2.401	0.017**
Employment discrimination	144	-0.001	0.033	-0.221	0.824	-0.011	0.056	-2.267	0.025**	-0.022	0.073	-3.632	0.000***	-0.012	0.097	-1.501	0.135
Consumer protection violation	122	0.001	0.034	0.292	0.770	0.004	0.050	0.832	0.406	0.005	0.066	0.848	0.397	0.016	0.077	2.345	0.021**
Aviation safety violation	113	-0.003	0.026	-1.250	0.213	-0.014	0.057	-2.504	0.014**	-0.030	0.118	-2.681	0.008***	-0.040	0.100	-4.275	0.000***
Labor relations violation	81	0.001	0.026	0.285	0.775	0.000	0.087	-0.012	0.990	0.001	0.133	0.035	0.972	0.018	0.102	1.580	0.117
False Claims Act and related	67	-0.003	0.033	-0.615	0.540	-0.005	0.070	-0.619	0.537	-0.012	0.145	-0.655	0.514	-0.013	0.140	-0.761	0.448
Benefit plan administrator violation	43	0.011	0.026	2.800	0.008***	0.007	0.043	1.042	0.303	0.034	0.063	3.510	0.001***	0.022	0.080	1.767	0.084*
Family and Medical Leave Act	31	-0.011	0.049	-1.289	0.207	0.000	0.049	-0.040	0.967	-0.005	0.054	-0.478	0.636	0.006	0.083	0.391	0.698
Avg. abs.	**-**	**0.003**	**0.028**	**-**	**-**	**0.004**	**0.052**	**-**	**-**	**0.009**	**0.077**	**-**	**-**	**0.012**	**0.092**	**-**	**-**

T3 Panel E2: Event Study Result for Primary Offense Group (with obs. More than 30)

		the event window [-1, 1]				the event window [-5, 5]				the event window [-10, 10]				the event window [-20, 20]			
Offense Group	Obs.	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value	CAAR	SD	t-stat	p-value
Workplace safety or health violation	1620	-0.001	0.000	-1.553	0.120	-0.002	0.000	-1.606	0.108	-0.003	0.001	-2.244	0.024**	0.005	0.001	2.881	0.004***
Motor vehicle safety violation	1052	0.001	0.000	1.535	0.125	0.001	0.001	0.565	0.572	0.000	0.001	0.267	0.789	-0.003	0.002	-1.484	0.138
Wage and hour violation	752	-0.002	0.001	-2.165	0.030**	0.004	0.001	2.586	0.009***	0.001	0.001	0.710	0.477	-0.008	0.002	-3.476	0.000***
Railroad safety violation	831	0.001	0.004	0.136	0.891	-0.004	0.005	-0.909	0.363	-0.004	0.005	-0.760	0.447	-0.002	0.005	-0.346	0.729
Insurance violation	410	0.000	0.000	-1.505	0.133	0.003	0.001	2.868	0.004***	0.003	0.001	2.596	0.009***	0.004	0.001	2.648	.008***
Environmental violation	333	0.000	0.000	-2.516	0.012**	-0.001	0.001	-0.975	0.330	-0.004	0.001	-3.014	0.002***	-0.008	0.001	-4.973	0.000***
Nursing home violation	188	0.000	0.001	1.247	0.213	-0.002	0.002	-0.902	0.368	-0.005	0.002	-2.266	0.024**	-0.012	0.002	-4.104	0.000***
Employment discrimination	145	-0.001	0.001	-0.414	0.678	-0.010	0.002	-6.397	0.000***	-0.022	0.001	-12.11	0.000***	-0.012	0.002	-5.742	0.000***
Consumer protection violation	123	0.001	0.001	0.660	0.510	0.004	0.002	2.454	0.015**	0.005	0.001	3.074	0.002***	0.016	0.001	8.545	0.000***
Aviation safety violation	114	0.000	0.001	-1.558	0.121	-0.013	0.002	-5.125	0.000***	-0.029	0.003	-9.299	0.000***	-0.040	0.004	-9.689	0.000***
Labor relations violation	82	0.001	0.001	0.507	0.613	0.000	0.002	-0.057	0.954	0.000	0.002	0.207	0.835	0.018	0.002	6.308	0.000***
False Claims Act and related	68	0.000	0.002	-1.213	0.229	-0.005	0.002	-2.426	0.017**	-0.011	0.002	-5.233	0.000***	-0.013	0.002	-5.487	0.000***
Benefit plan administrator violation	44	0.011	0.003	3.159	0.002***	0.007	0.004	1.662	0.104	0.033	0.004	7.734	0.000***	0.021	0.004	4.715	0.000***
Family and Medical Leave Act	32	-0.011	0.002	-3.853	0.000***	0.000	0.003	-0.117	0.908	-0.004	0.003	-1.462	0.153	0.006	0.003	1.754	0.089*
Avg. abs.	**-**	**0.001**	**0.001**	**-**	**-**	**0.003**	**0.002**	**-**	**-**	**0.002**	**0.002**	**-**	**-**	**0.004**	**0.002**	**-**	**-**