Ensuring Event Study Accuracy For Securities Class Actions

By **Ferdose al-Taie, Ryan Leary and David McKnight** (June 26, 2023)

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Despite the decline in recent years, federal securities class actions continue to be an active area of litigation. Coming off a peak of 411 filings in 2017, 2022 saw 197 securities class actions filed.

According to the Stanford Class Action Clearinghouse, 108 securities class actions have been filed so far this year. If filings continue at this rate, 2023 would see an estimated 10% increase in filings compared to 2022.[1] Many cases have class periods that reach back many years.

For example, the May 11 Retail Wholesale Department Store Union Local 338 Retirement Fund v. Beyond Meat Inc. securities class action in the U.S. District Court for the Central District of California alleges a class period that starts on May 5, 2020, and extends through Oct. 13, 2022.[2]

The allegedly misleading statements and disclosures in this case, as well as many other recently filed securities class actions, coincide with periods of significant fluctuations in market volatility.

To assess the magnitude and materiality of company disclosures on security prices, economists commonly apply a family of methodologies known as event studies that rely on establishing a baseline of expected price volatility.

However, it has been shown that substantial increases in market volatility — like that during the period following the global financial crisis of 2008 — can cause event studies to overstate the statistical significance of an immaterial disclosure.[3]

In this article, we use recent market data to show that the event study methodology can lead to both false positives and false negatives. False positives overstate the significance of immaterial events during periods of increasing market volatility, and false negatives overlook the significance of material events when market volatility is decreasing.

We conducted our study over the 2016 to 2020 period using a sample of 20 randomly selected constituents of the S&P 500 index that did not experience a securities fraud lawsuit.[4]

We then describe several methods that could be employed — each depending on the facts and circumstances of individual cases — to increase the accuracy of event studies in periods of changing market volatility.

Volatility During COVID-19 and the Global Financial Crisis

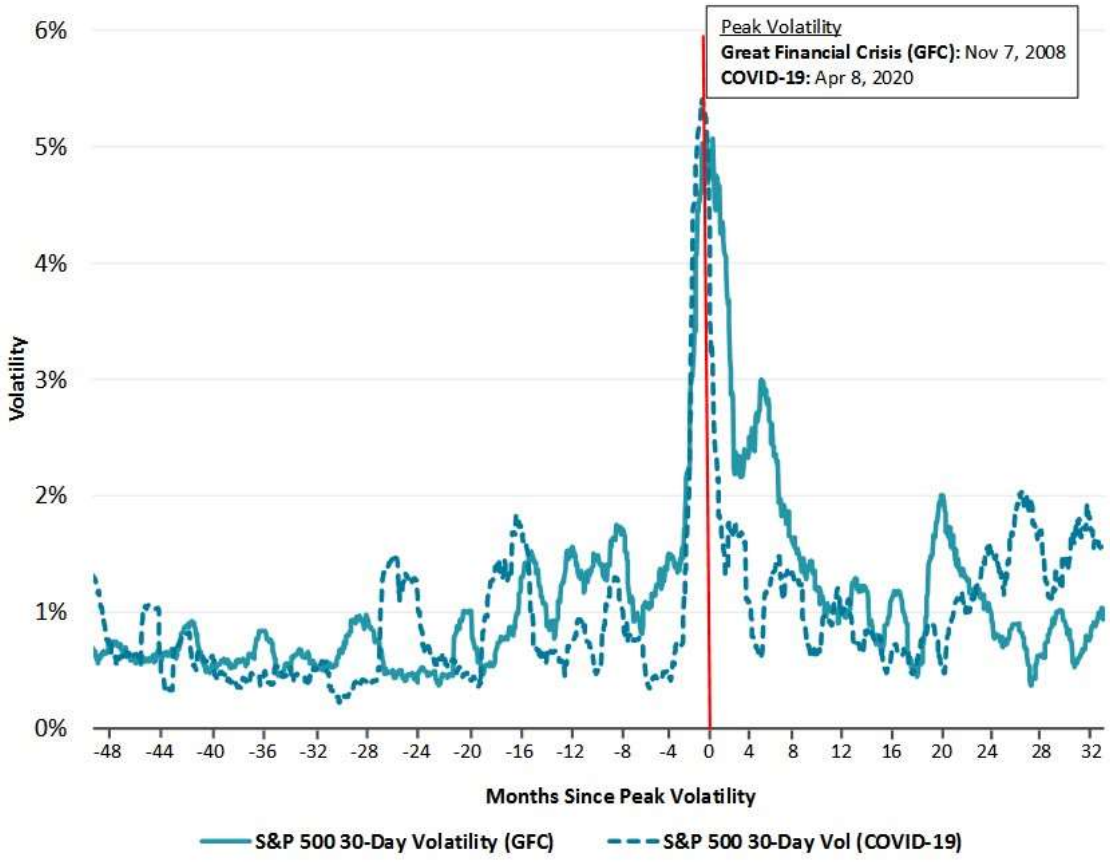
While there were many similarities between the patterns of volatility during the 2008 global financial crisis and the COVID-19 pandemic, several important distinctions exist.

Though both were characterized by relatively long periods of heightened volatility, the large initial spike in volatility associated with COVID-19 in March 2020 was shorter than the shock during 2008.

Figure 1 below compares the volatility in the S&P 500 index during the 2008 global financial crisis with that during the COVID-19 pandemic. We plot the 30-day rolling volatility for the period that spans 48 months before and 32 months after volatility peaked in each crisis.

Both were marked by significant increases in overall market volatility, with volatility peaking around 5%. However, the period during which volatility peaked above 2% was much shorter during the pandemic than in the global financial crisis. Both crises saw periods of heightened volatility in the years following the respective peaks, with volatility again approaching or exceeding 2%.

Figure 1: 30-DAY S&P 500 VOLATILITY Around the 2008 Crisis and the COVID-19 Pandemic



Flaws in the Traditional Event Study Methodology

In shareholder class actions, experts will often estimate market models over a six-month or one-year period prior to the beginning of the class period, with no adjustments to account for changing volatility. This traditional event study methodology can lead to incorrect inferences during periods of changing volatility.

To determine the effect of fluctuations in market volatility on the accuracy of traditional event studies around the COVID-19 pandemic, we selected a random sample of 20 constituents of the S&P 500 index that traded from Jan. 1, 2016, to Dec. 31, 2022, and have not been named as defendants in a securities class action.

We apply the traditional event study methodology to each company to estimate a market model and calculate the number of days with statistically significant abnormal returns for each six-month period listed in Table 1 below.[5]

In a properly estimated event study for a company without securities class action, 5% of tested days, on average, should have statistically significant abnormal returns if using the standard 5% significance level.[6]

However, if a market model is estimated over a period with lower volatility than the disclosure period, the event study will identify too many statistically significant abnormal returns. Conversely, if the volatility during the disclosure period has declined, the market model will identify too few statistically significant returns.

Table 1 shows the percentage of days that the traditional event study methodology identifies as having a statistically significant abnormal return. The market model for each event study is estimated over the six months immediately preceding the disclosure period. Periods where the number of significant abnormal returns is statistically different from the expected 5% are indicated with asterisks.[7]

Table 1: Statistically Significant Days for 20 Constituents of the S&P 500 Index Using Traditional Event Study Methodology

Disclosure Period	Average Percent of Statistically Significant Dates
7/2016–12/2016	4.4
1/2017–6/2017	4.1
7/2017–12/2017	5.7
1/2018–6/2018	**7.2****
7/2018–12/2018	**7.7****
1/2019–6/2019	**3.4****
7/2019–12/2019	**7.4****
1/2020–6/2020	**31.5****
7/2020–12/2020	**2.6****
1/2021–6/2021	**3.2****
7/2021–12/2021	3.9
1/2022–6/2022	**11.1****
7/2022–12/2022	3.9
Average	**7.4**

The results in Table 1 illustrate the problems with the traditional event study methodology.

While it performs reasonably well in the pre-2020 period, identifying between 3.4% and 7.7% of days as significant, the traditional event study methodology finds 31.5% of days to have significant abnormal returns in the first half of 2020 — much higher than the expected 5%.[8]

In contrast, volatility fell in the second half of 2020, and the traditional event study methodology finds that only 2.6% of days are statistically significant.

This overestimation followed by an underestimation of the number of statistically significant abnormal returns is a hallmark of a rapid reversal following an initial spike in volatility.

We also observe that when the second half of 2021 — a period of relatively low volatility — is used as an estimation period, 11.1% of days are found to be statistically significant in the first half of 2022, which is a consequence of the increase in volatility about two years after the initial spike associated with the pandemic.[9]

Potential Approaches to Fluctuating Market Volatility

Economists have developed a number of different approaches to address the problems that can arise when market volatility fluctuates, and experts have successfully used these techniques in securities class actions to modify the traditional event study methodology.

Potential alternative approaches are summarized below.

Rolling Estimation Window

Experts can use a rolling estimation window to sequentially reestimate the market model for each day in the disclosure period, using an estimation window that ends just before each disclosure day.

This contrasts with the traditional approach of estimating a single market model over a period that precedes the class period. By estimating the market model over a more recent period, this approach will more accurately reflect the market volatility on the disclosure dates and result in a more reliable statistical test.

Rolling Split Estimation Window

Experts can also estimate a market model using a six-month rolling estimation window that spans three months before and after each date in the disclosure period. Similar to the rolling estimation window, the rolling split window approach uses more recent market information to calculate company-specific volatility.

This method is particularly well suited to instances where there is a continuously increasing or decreasing volatility regime, as the market model estimated using such a window includes the volatility before and after the date of disclosure in its estimation and thus may better reflect the volatility on the disclosure date itself.

Volatility Implied by Option Transactions

Another approach is using the market's expectation of daily volatility to measure statistical significance.[10] Expected stock price volatility is an important component in the value of option contracts whose strike prices are close to the current stock price.

An estimate of volatility based on the price at the money of option contracts is called implied volatility.[11] However, unlike the standard error of a market model, implied volatility measures the expected variability of the entire return of a stock, which includes market-wide fluctuations and not just company-specific abnormal returns.[12]

In this method, one estimates not only the market model — which relates the company's returns to market returns — but also a model that depicts the relationship between the company's volatility and the market's volatility.

While more complicated than the approaches discussed above, using information on implied volatility to inform inferences of statistical significance in event studies can be a powerful tool to control for rapidly changing market volatility.

Volatility Predicted by GARCH Models

In the three previously discussed approaches, volatility on the date of disclosure is estimated based on the company-specific volatility during the class period.

One potential concern with these approaches is that estimates of volatility may be inflated if the disclosures themselves increase volatility during the class period.[13] An alternative approach is to estimate company-specific volatility using a generalized autoregressive conditional heteroskedasticity, or GARCH, model.[14]

A GARCH model is among the most widely employed techniques for predicting company-specific volatility and allows for market volatility to be time-dependent. While GARCH and other methods of predicting company-specific volatility can be estimated on data outside the class period, there can be practical and theoretical challenges to estimating these models.[15]

When applying the four approaches described above, one must ensure that all disclosures, misrepresentations and any other news associated with the alleged fraud are excluded from the estimation period to obtain a clean benchmark.

However, determining which days to exclude to obtain such a clean benchmark requires judgment and can therefore be the subject of expert debate.

Further, when the pattern of company-specific returns is alleged to be affected by the fraud, even on days not directly associated with the release of news, using the company-specific data from the class period may be objectionable.[16][17]

Empirical Illustration

We illustrate how one can correct for the challenges posed by fluctuations in volatility during the COVID-19 pandemic using rolling estimation windows and rolling split estimation windows. While the optimal methodology depends on the facts and circumstances in each case, we use these two approaches because of their relatively straightforward implementation.

Table 2 below reports the number of statistically significant news days that the traditional event study would predict and compares those results to event studies estimated using a rolling or a rolling split estimation window. The market model for each event study is estimated over a six-month rolling or six-month rolling split estimation window. Asterisks indicate where the number of statistically significant dates is statistically different from 5%.

Table 2: Statistically Significant For 20 Constituents of the S&P 500 Index Using Standard and Adjusted Methodologies

	Average Percent of Statistically Significant Dates		
Disclosure Period	Traditional Methodology	Rolling Pre-Event Estimation Window	Rolling Pre- & Post- Event Estimation Window
7/2016–12/2016	4.4	6.2	5.0
1/2017–6/2017	4.1	4.1	4.4
7/2017–12/2017	5.7	5.4	5.1
1/2018–6/2018	**7.2****	5.7	4.9
7/2018–12/2018	**7.7****	**7.0****	5.6
1/2019–6/2019	**3.4****	3.8	4.0
7/2019–12/2019	**7.4****	5.7	5.1
1/2020–6/2020	**31.5****	**13.0****	**6.8****
7/2020–12/2020	**2.6****	**3.6****	5.5
1/2021–6/2021	**3.2****	**3.4****	5.1
7/2021–12/2021	3.9	6.1	4.6
1/2022–6/2022	**11.1****	**6.9****	6.1
7/2022–12/2022	3.9	4.6	4.0
Average	4.4	5.2	4.9

In contrast to the traditional methodology, the rolling estimation window — which sequentially estimates the market model base on the six months of data immediately preceding the disclosure date — reduces the number of significant dates in the first half of 2020 to 13%, a substantial improvement relative to the traditional methodology.

Similarly, the rolling split estimation window, which uses an estimation window spanning three months before and after each disclosure date, further reduces the number of significant days in the first half of 2020 to 6.8%.

As shown in Table 2, during this period of fluctuating volatility, the traditional event study methodology predicts a number of significant abnormal returns different from 5% in eight of the 13 periods analyzed.

In comparison, the rolling estimation window method predicts too many or too few significant abnormal returns five times, and the rolling split estimation window method only once in the first half of 2020.

This result is explained by the fact that the split estimation window uses data closer in time

to the test date than the other two methods. This can lead to improved performance in periods of rapidly changing volatility.[18]

Conclusion

Event study analyses are often crucial components of expert testimony in securities class actions, but — as evidenced by both the COVID-19 pandemic and the global financial crisis of 2008 — periods of rapidly fluctuating market volatility can cause the traditional event study methodology to be inaccurate.[19]

Careful analysis of the changing volatility and selection of the appropriate event study methodology is necessary to ensure that incorrect inferences are not made.

The circumstances of each case will ultimately dictate the appropriate approach, including the best method for calculating the standard errors needed to assess the significance of relevant disclosure days and the best period over which to estimate the market model.

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[1] See Stanford Class Action Clearinghouse, Filing Database, available at https://securities.stanford.edu/charts.html.

[2] See Retail Wholesale Department Store Union Local 338 Retirement Fund v. Beyond Meat, Inc., No. 23-cv-03602 (C.D. Cal. May 11, 2023), Complaint.

[3] Branko Jovanovic and Edward Fox, "Testing For Materiality In Volatile Markets," Law360, 2010.

[4] By limiting our study to firms not experiencing securities class actions lawsuits, we are able to isolate the effect of fluctuating market volatility, without being tainted by changes in firm-specific volatility that could arise from disclosures in securities class actions.

[5] Problems can arise in event studies when the company is itself a large component of the index used as a control in the market model. To avoid this potential issue, we randomly select 20 companies from the S&P 500 Index that are not also constituents of the S&P 100 Index (i.e., not one of the 100 largest companies in the S&P 50 Index). We estimate the market model in each event study using the S&P 100 Index as a control.

[6] More technically, in an event study with a 5% significance level, days with abnormal stock price returns that are larger than what would be expected 95% of the time are identified as significant. This implies that in a properly specified model on average 5% of days will be significant absent an increase (or decrease) in the amount of material company

specific news.

[7] We use a binomial distribution to calculate the probability of a given number of significant days assuming the true success rate is 5%. We also employ a Bonferroni adjustment to correct for the fact that we are conducting the test 13 times for 13 different periods. This calculation indicates that we expect between 3.77% and 6.31% of dates tested to have a significant abnormal return.

[8] While 5% is the average or expected outcome if the market model is accurate, some variation from 5% is also expected.

[9] An additional potential concern with the traditional market model, especially in a class action lawsuit, is that the coefficient (which captures the variation of a firm's returns relative to the market) may also be affected by the disclosures. This means that the estimated model will inaccurately predict the abnormal returns themselves and not just the significance level of those returns.

[10] See Branko Jovanovic and Edward Fox, "Testing For Materiality In Volatile Markets," Law360, 2010.

[11] Since implied volatility may rise on the day of an alleged disclosure, reflecting a rise in uncertainty regarding the company's prospects, implied volatility from the day before the event date will not be tainted by the disclosure.

[12] The company-specific portion of a stock's return is the part of the return that cannot be explained by market (or industry) factors.

[13] We demonstrated one such method in our prior work. See Branko Jovanovic and Edward Fox, "Testing For Materiality In Volatile Markets," Law360, 2010.

[14] Albert Corhay, and A. Tourani Rad, "Conditional Heteroskedasticity Adjusted Market Model and an Event Study," Quarterly Journal of Economics and Finance 36, no. 4 (1996): 529–38.

[15] See for instance John Y. Campbell, Lettau Martin, Malkiel Burton, Xu Yexiao, "Replication data for: Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk," The Journal of Finance 46(2001)1-43; Wagner, Niklas F., "Time-Varying Moments, Idiosyncratic Risk, and an Application to Hot-Issue IPO Aftermarket Returns," Research in International Business and Finance 18(2004)59-72; and Xu, Yexiao and Malkiel, Burton G. G., "Investigating the Behavior of Idiosyncratic Volatility," Journal of Business 76(2003)613-44. Chok, Jay Inghwee and Sun, Qian, "Determinants of Idiosyncratic Volatility for Biotech IPO Firms," USC Marshall School of Business Research Paper; Financial Management, 2007; H. Peter Boswijk, Roy van der Weide, "Method of moments estimation of GO-GARCH models," Journal of Econometrics 163(2011)118-126.

[16] Imagine, for example, that a company announces on Monday that its previous SEC filings are no longer reliable and is uncertain when it will file amended forms. If the amended forms are filed on Friday, it is relatively clear that Monday and Friday should be excluded from the estimation window. However, any news about the company released Tuesday through Thursday would presumably take on heightened importance to investors relative to if the company's books had been reliable. Therefore, the uncertainty regarding the company's financials may affect the volatility of its stock even on days where no news

directly related to the SEC forms were issued.

[17] Suppose a company announces on Monday that it will make an important disclosure the following Friday but does not specify if this disclosure is positive or negative. As a consequence of this announcement, the implied volatility increases, reflecting the uncertainty regarding the nature of the announced disclosure. This increase in implied volatility may lead to a finding that the disclosure was not statistically significant, even though the announcement was material.

[18] To see this, consider an event study run on disclosure days at the peak of volatility in mid-April 2020. The market model estimated using a rolling split estimation window will include the entire roughly 6-month period of substantially increased volatility and the model's estimated company-specific volatility will peak just as realized volatility peaks in mid-April 2020. In other words, company-specific volatility will be relatively similar in the estimation and disclosure periods. In contrast, the rolling estimation window will include only half of the period of increased volatility in its estimation window and will include several months of relatively low volatility from late 2019 and early 2020. Consequently, this methodology is likely to find relatively more significant abnormal returns.

[19] While the best method for adjusting traditional event studies for fluctuations in market volatility will depend on the facts and circumstances of a case and can include techniques beyond those discussed in this article, even relatively simple econometric techniques can yield far more accurate results than traditional methods.