The Economics of Mass Shootings: How Investors React

James Karan
Marietta College

While the subject of much research, mass shooting research seldom focuses on the market reaction to firearm manufacturers and related companies. This study explores potential effects on the market returns of four publicly traded firearm manufacturing and related companies following mass shootings from 2014 through September of 2018. Results show that some mass shootings negatively correlated with market returns of such companies, especially over the latter two years. However, given the many mass shootings which showed no significant correlation, future research should evaluate potential pairings with mass shootings that combine to drive such market effects.

Keywords: Mass Shootings, Gun Violence, Stock Returns, Market Returns, Firearm Manufacturer

INTRODUCTION

Gun violence represents a major issue in the United States. Despite a general decline in overall gun homicides, the U.S. experiences many times more firearm homicides than other developed countries (Lopez, 2017). Despite the U.S. possessing just 4.4% of the world's population, Americans own 42% of world-wide, civilian-owned guns. Within the realm of American gun violence, mass shootings make up a small fraction of events. However, the U.S. still suffers an average of one mass shooting per day.

Given the significance of gun violence in the U.S., researchers conduct copious amounts of studies related to the issue. However, most research focuses on criminal justice, mental health, public policy, and political issues. The effects of gun violence on various financial issues remain under-researched. The following represents a study into the effects of mass shootings on the market returns of publicly traded firearms manufacturers and related companies.

LITERATURE REVIEW

Post-Event Regulations

While gun violence, in general, represents a significant issue, mass shootings play an outsized role in potential firearm-related legislation. Despite accounting for about 0.13% of all gun deaths (Luca, Poliquin, & Malhotra, 2016), one study found mass shootings result in around 80 times greater per-death impact than other homicides (Luca, et al., 2016), while another determined mass shootings create 66 times more state-level gun-related legislation than other gun deaths (Irwin, 2016). Both Irwin and the team of Luca, Malhotra, and Poliquin found a 15% increase in the number of firearm bills introduced within a state the year after a mass shooting, with Luca et al. finding the effect positively scales with the number of fatalities.

These tragedies cause some Americans to fear an increase in gun regulations. Historically, calls for changes to gun regulations after mass shootings appear to produce mixed results (Goss, 2015). From 2004 to 2014, all but two states passed legislation regarding firearms restrictions and mental health. However, these changes may differ from expectations. Just 12 states solely tightened restrictions on gun ownership. 26 states both tightened and loosened restrictions, with one state only loosening restrictions. So, while tragic events like mass shootings do factor into political pressure and eventual legislation, the perception of expected tightening regulations may not hold. Actual legislative changes greatly depend on which political party controls the state. States controlled by the Republican party experienced a 75% increase in gun-restriction loosening legislation after a mass shooting, while states controlled by the Democratic party or with highly mixed control saw no statistically meaningful change in gun restrictions (Irwin, 2016; Luca, et al., 2016). Despite the researched reality, perception may be driving people's reactions.

Post-Event Sales

Both through anecdotal reporting and academic research, gun manufacturers and retailers experience a financial boon after a mass shooting in the form of increased gun sales. A review of news articles and media reports portrays Americans rushing to purchase firearms after a tragedy (Sierra, 2015; The Associated Press, 2013; Tucker, 2016). Academic researchers discovered the same (Feldmann, 2012; Price, 2016; Wallace, 2015). Gun sale data is not specifically available, so common proxies are utilized to gauge firearm demand. Price utilized available quarterly revenue data, estimating an average quarterly revenue bump of 6-7% (Price, 2016). While Price did not discover conclusive findings relating background checks to mass shootings, others have (Wallace, 2015). Background checks are commonly utilized as a proxy for demand, such as by Feldmann (Feldmann, 2012). But why do gun sales spike after a mass shooting? The answer appears to be twofold.

The first driver of gun sales post-event is fear of regulation. Multiple researchers identified an expectation of increased regulations to drive firearm consumers to retailers (Depetris-Chauvin, 2015; Feldmann, 2012; Wallace, 2015). Anecdotal evidence from gun retailers also suggests fear of new regulations drives gun sales (Sierra, 2015). As discussed earlier, research regarding legislative responses to mass shootings not only fails to tighten restrictions but, in fact, loosens them. Despite this, the perception of future regulations drives Americans to gun retailers, boosting profits for both retailers and manufacturers.

The second driver of gun sales after a mass shooting is fear for personal and family safety. Prior research discovered crime is predictive of owning a firearm for personal protection (Cao, Cullen, & Link, 1997; Lizotte, Bordua, & White, 1981; McDowall & Loftin, 1983; Young, 1985). Wallace used appraisal theory to suggest mass shootings contribute to a fear of victimization, creating the increased desire for personal protection (Wallace, 2015). Further, a Gallup poll in 2013 determined personal safety as the primary reason Americans own guns (Swift, 2013). These findings combine to explain why Americans rush to buy firearms after a mass shooting event.

The above factors combine to create an environment of potential financial windfall for gun manufacturers after a mass shooting. Not only do legislators not typically tighten gun control, but they often loosen it. Individuals fear a tightening of legislation despite the historical lack of evidence, driving consumers to retailers. Finally, individuals fear of victimization and desire for personal protection increase. With these factors in place, gun manufacturers and retailers experience a surge in sales after a mass shooting. But, have investors jumped on firearm manufacturer stocks after an event? Have stock prices shown investors expect a sales jump or tightening regulations? Or have investors largely ignored mass shootings entirely? This area is under-researched, but a few authors have broached the topic.

Post-Event Stock Price

One of the first article directly observing stock price changes in the wake of a mass shooting was published in 2013. In the wake of the Aurora movie theater and Newtown, Connecticut shootings, Cross and Pruitt analyzed the stock price changes of directly affected companies, unaffected but related companies, and gun manufacturers (Cross & Pruitt, 2013). The authors found that domestic stock prices

of movie theaters dropped significantly, both the targeted theater and others. However, this drop did not carry over to foreign theater chains. This showed signs of a "contagion effect" whereby unaffected companies from the same industry suffered stock price declines.

Firearm manufacturer stock prices displayed mixed effects. Smith and Wesson (now American Outdoor Brands) and Sturm, Ruger & Co. represent two publicly traded firearm manufacturers. After the Aurora shooting, Smith & Wesson stock was unaffected, but Sturm, Ruger & Co. increased in value (Cross & Pruitt, 2013). Contrary to those results, both companies suffered stock devaluation after the Newtown shootings.

One recent article expanded on the Cross & Pruitt concept by looking at the stock price changes of American Outdoor Brands (AOBC) and Sturm, Ruger & Co (RGR) after mass shootings from 2009 to 2013 (Gopal & Greenwood, 2017). Gopal & Greenwood utilized a market movement event study to explore the price changes of AOBC and RGR 2, 5, and 10 days after 93 mass shootings in the timeframe. The authors found significant decreases in stock prices in 2009 and 2010. However, these effects were much less prevalent in 2011 through 2013, suggesting to the authors the market had accepted a "new normal" and priced mass shootings into the stock prices. Alternatively, the negative effects of expected regulation tightening and the positive effects of a sales bump simply canceled each other out once the post-event sale bump had been established. These results, and the significance of the issue warrant continued and enhanced investigation into this topic.

METHODOLOGY

This study extends the study of Gopal and Greenwood by analyzing stock price effects of mass shootings from 2014 through early 2018. While Gopal and Greenwood only examined mass shooting effects on AOBC and RGR, this study broadens the sample to four firearm manufacturing and related companies. AOBC, RGR, Olin Corporation (OLN), and Vista Outdoor (VSTO) comprise the portfolio of companies.

Stock returns should be most dramatically affected by mass shootings receiving the most media attention. Therefore, a stricter definition of mass shooting similar to that utilized by several of the above studies, 5 or more fatalities, was utilized to identify events. 2014 through September of 2018 represents the observed timeframe. Mother Jones provides a free, updated database of mass shootings in America, from which conforming events were drawn. (Follman, Aronsen, & Pan, n.d.).

The Mother Jones data marked mass shooting event dates. To capture potential effects on stock returns of firearm manufacturers, potential effects were measured over one week, two weeks, and one month after the mass shooting. This is a deviation from the 2017 Gopal and Greenwood study, which reviewed 2-, 5-, and 10-day windows, but will give a more thorough examination of potential stock return effects. The one- and two-week windows provide a review of immediate impact, and the one-month window searches for a slightly longer-lasting effect.

Per the Mother Jones database, 19 mass shootings with at least 5 fatalities occurred from the beginning of 2014 through September of 2018 (Follman, et al., n.d.). This study evaluated if a correlation exists between these mass shootings and stock return changes for a portfolio of four publicly traded firearms manufacturers. The returns of AOBC, RGR, OLN, and VTSO act as the dependent variable and were measured against the S&P 500 index less a risk-free rate (20-year treasury bond yield) as an approximation of the market.

A Chow test was performed to evaluate the potential effects of mass shootings on the stock returns of AOBC, RGR, OLN, and VTSO. The purpose of this study is not to determine actual returns, but potential differences in returns before and after a mass shooting by comparing the daily return relationship of an equally weighted firearm manufacturer portfolio (AOBC, RGR, OLN, and VTSO) with the overall market. Thus, potential differences in coefficients between linear regressions before and after mass shootings were evaluated. Specifically, regressions one week before and after, two weeks before and after, and one month before and after were analyzed. The effect of mass shootings on firearm manufacturer stock returns was estimated using the following equation:

$$r_{it} = \alpha + \beta\left(SP500R_t - R_{ft}\right) + u_{it} \quad (1)$$

where r represents return for firm *I* at time *t*. *f* represents the risk-free rate. A represents the constant term, and μ represents the error term.

DATA ANALYSIS AND RESULTS

Potential effects of mass shootings on firearm manufacturer stock returns were reviewed with regard to one-week, two-week, and one-month analysis windows. While such effects did not exist after all 19 mass shootings, or over all time windows, certain events did exhibit abnormalities over various timeframes. Further, mass shootings found to correlate with changes in return behavior specifically correlated to a decline in market return relative to the prior relationship with the S&P500 for events in 2017 and 2018. The opposite was true for pre-2017 mass shootings. Finally, the effects of mass shootings appeared to diminish for some events over time, suggesting an immediate impact followed by an eventual return to normal relationships with the general market.

The one-week window provides a look at the most immediate effects. Of the 19 mass shootings, four were shown to have significantly different coefficients between one-week prior and one-week after the event. The September 23, 2016 Cascade Mall shooting in Burlington, WA and the October 1, 2017 Las Vegas, NV shooting were significant with a $p < .01$. Additionally, the June 17, 2015 shooting at a Charleston, SC church and the February 14, 2018 shooting at Marjory Stoneman Douglass High School in Parkland, FL were significant with a $p < .05$. While not at the level of $p < .05$, the Ft. Lauderdale airport shooting of January 9, 2017 did show a significant effect at $p < .1$ level. The other 14 mass shootings failed to show a significant effect. Findings of significance are detailed below, with full findings in appendix A.

Daily returns for the portfolio of AOBC, RGR, OLN, and VTSO were measured against the general market, proxied by the S&P500 less a risk-free rate. Three of the five events displaying a significant change in relationship, all but Charleston and Ft. Lauderdale, had a decline in returns, with the pre-event market returns exceeding the post-event market returns relative to the general market. Charleston and Ft. Lauderdale showed an increase in returns relative to the market over the one-week window.

TABLE 1
ONE-WEEK EFFECT

VARIABLES	Stoneman	Las Vegas	Mall	Charleston	Airport
Constant – pre-event	-0.851*	-1.569***	0.679***	-0.474***	-1.794
	(0.50)	(0.48)	(0.23)	(0.17)	(1.32)
Constant– post-event	0.393	0.055	-0.554	0.371	0.434
	(0.88)	(0.37)	(0.42)	(0.31)	(0.47)
Market Returns – pre-event	2.134***	7.349***	0.917***	0.708**	3.741
	(0.51)	(1.70)	(0.28)	(0.35)	(4.58)
Market Returns – post-event	-0.168	0.67	2.642***	1.486***	0.781
	(0.72)	(1.19)	(0.43)	(0.51)	(0.84)
Observations	40	40	33	33	38
R-squared	0.158	0.399	0.566	0.478	0.132
F-test	3.461**	5.897***	6.295***	3.596**	2.515*
Prob > F	0.0422	0.00609	0.00536	0.0403	0.0958

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The two-week window continues to explore the immediate effects of mass shootings and if one-week results dissipated. Once again, four of the 19 mass shootings showed a significant difference in coefficients between two-weeks prior and two-weeks after the event. However, these are not the same four events. The 2017 Las Vegas and 2018 Parkland shootings continued to show significant effects at the $p < .01$ and $p < .05$ levels respectively. Additionally, the Ft Lauderdale, FL shooting and the Capital Gazette shooting in Annapolis, MD on June 28, 2018 were significant at the $p < .05$ level. It should be noted that while the Cascade Mall shooting did not exhibit a significant effect in the two-week time frame, the Charleston, SC shooting did with a $p < .1$. Findings of significance are below, with full findings in appendix B.

When reviewing how the relationship with the market changed, mass shootings in 2017 and 2018 correlated with a decline in firearm manufacturer returns relative to the general market. Mass shootings prior to 2017 correlated with an increase in returns relative to the general market. This matches the one-week results, with the only exception being the Ft. Lauderdale shooting, which took place six days into 2017. Further, the Ft. Lauderdale shooting reversed course from the one-week results, with two-week returns increasing relative to the general market.

TABLE 2
TWO-WEEK EFFECT

VARIABLES	Capital G	Stoneman	Las Vegas	Airport	Charleston
Constant – pre-event	-0.927***	-1.170***	-1.080***	-1.156*	-0.271
	(0.27)	(0.36)	(0.36)	(0.66)	(0.18)
Constant – post-event	-0.179	-0.184	0.575	0.138	0.256
	(0.18)	(0.42)	(0.48)	(0.26)	(0.21)
Market Returns – pre-event	1.482***	1.557***	4.871***	1.054	0.768***
	(0.40)	(0.34)	(1.41)	(1.91)	(0.21)
Market Returns – post-event	0.629*	0.374	-0.04	1.176**	1.562***
	(0.38)	(0.33)	(0.86)	(0.58)	(0.38)
Observations	84	84	80	69	66
R-squared	0.201	0.206	0.131	0.091	0.369
F-test	3.176**	3.94**	6.707***	3.459**	2.887*
Prob > F	0.0471	0.0233	0.00208	0.0374	0.0633

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The one-month window provides the longest-term view of this study, exploring if potential short-term effects dissipate over a longer-term window. Only two of the 19 mass shootings showed a significant effect on firearm manufacturer returns over a one-month window. Both the 2016 Cascade Mall and 2015 Charleston church shootings were found to have a significant effect, at the $p < .01$ level, in the one-month timeframe. It should be noted that while the Parkland and Las Vegas shootings were not significant in the one-month window, the Capital Gazette shooting did exhibit a significant effect at the $p < .1$ level. Findings of significance are below, with full findings in appendix C.

In this final test, the Capital Gazette displayed the typical decline in returns experienced by 2017 and 2018 mass shootings. The Charleston mass shooting continued to correlate with an increase in returns. However, the Cascade Mall mass shooting reversed course and correlated with a decline in returns, having correlated with an increase in returns over the one-week window.

TABLE 3
ONE-MONTH EFFECT

VARIABLES	Capital G	Mall	Charleston
Constant – pre-event	-0.665***	0.399**	-0.377***
	(0.16)	(0.16)	(0.14)
Constant – post-event	-0.174	-0.389**	0.175
	(0.17)	(0.18)	(0.16)
Market Returns – pre-event	1.098***	1.413***	0.498***
	(0.31)	(0.23)	(0.19)
Market Returns – post-event	0.448	1.227***	1.625***
	(0.31)	(0.19)	(0.30)
Observations	172	129	129
R-squared	0.122	0.347	0.281
F-test	2.675*	5.617***	8.346***
Prob > F	0.0718	0.00461	0.0004

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

INTERPRETATION AND DISCUSSION

This study examined the potential effects of mass shootings on the returns of a portfolio of four publicly traded firearms manufacturers and related companies, OLN, VSTO, RGR, and AOBC, from 2014 through September of 2018. This acts as an extension of the work done by Gopal and Greenwood, who examined the mass shooting effects on RGR and AOBC separately from 2009 to 2013. Gopal and Greenwood found a significant effect in the first few years, but with the effect dissipating later (Gopal & Greenwood, 2017). The authors suggest the possibility of mass shootings becoming priced into the market valuations of RGR and AOBC. In part, this study examines such suggestions. Based on the findings presented here, it appears a generalized statement of mass shootings being priced into firearm manufacturers' stock price does not hold true, at least in the relatively short-term (one week to one month).

From 2014 through September of 2018, certain mass shootings affected firearm manufacturers' returns while others did not. This suggests mass shootings in general are not baked into stock prices, but something else drives which events affect stock returns, and which do not. However, even among events which correlated with changes in returns, there was variation among the different timings measured. The Capital Gazette shooting showed a delayed reaction, with no significant effect in the one-week window, but with significant effects thereafter. The Cascade Mall shooting showed a significant effect over one-week and one-month, but not two-weeks. Lastly, the Ft. Lauderdale, Parkland, and Las Vegas shootings showed significant effects over one and two-weeks but dissipating over a month. The difference in effect timing, along with the 14 mass shootings which never exhibited an effect, suggest something related to the mass shootings, as opposed to the events themselves, led to the observed effects.

Additionally, while mass shootings predominantly correlated with a decline in returns relative to the general market, there were some variations in these results. The Charleston mass shooting consistently resulted in an increase in returns. The Cascade Mall shooting displayed an increase in returns over one-week, but a decrease over one-month. The Ft. Lauderdale shooting displayed the opposite, a decrease in returns over one-week but an increase in returns over two-weeks. All of these events were among the earliest reviewed and shown to possess a significantly changed relationship with the market, perhaps

indicating the timing of the shooting as relevant to the direction of change. Further, there could be a rubber banding effect, with an overcorrection for earlier changes regarding the Ft. Lauderdale and Cascade Mall events.

Gopal and Greenwood suggested the number of casualties enhances the market return effect on firearm manufacturers (Gopal & Greenwood, 2017). This does not appear to hold true in this study. Some events with significantly higher casualties, like the Pulse nightclub shooting in Orlando, FL and the Texas First Baptist Church shooting in Sutherland Springs, TX, exhibit no significant effect, while others with significantly fewer casualties, such as the Capital Gazette and Cascade Mall shootings do. Along the same lines as casualty numbers is total media coverage, as one would expect the two to be correlated. A more thorough review of post-event media coverage is required, but this does not appear to be related to the effect of mass shootings on firearm manufacturer returns either.

Gopal and Greenwood also contemplated the notion that firearm type used in the mass shooting may cause the observed effect (Gopal & Greenwood, 2017). Once again, this study does not appear to support such a notion. Mass shootings with observed and unobserved significant effects possessed a mixture of firearm types, including but not limited to handguns, shotguns, and assault-style rifles. Another suggestion made within the Gopal study was that location may play a role. This is an interesting idea which this study may partially support. Of the 19 mass shootings evaluated here, seven were in Texas or California. None of these resulted in a return effect. Another four mass shootings took place in Florida. While there was an even split, two resulted in return effects and two did not, there was a locational split within Florida. The two events resulting in a return effect were in south Florida, while the two that did not were in central Florida, specifically Orlando. Upon first review, the remaining locations do not seem to fit a pattern. One mass shooting in Washington exhibited a significant effect, while another did not, and both were located in similar locations within Washington. The remaining three mass shootings with observed significant effects were located in Maryland, Nevada, and South Carolina. The remaining three mass shootings without an observed significant effect were located in Michigan, Oregon, and Tennessee. However, another potential trend may apply to some of these events.

Gopal and Greenwood observed a significant effect of mass shootings on gun manufacturer returns from 2009 to 2010, with much less prevalent effects from 2011 through 2013 (Gopal & Greenwood, 2017). One contribution of this study is examining if the observed trend of dissipating effects continued, or if it was temporary. The early results of this study support the notion that mass shootings were incorporated into stock prices, as only one of nine mass shootings, the Charleston church shooting, exhibited an effect from the start of 2014 through August of 2016. However, of the ten mass shootings from September of 2016 through September of 2018, five displayed significant effects on firearm manufacturer returns. The four mass shootings not in California, Texas, or central Florida exhibiting no significant effect all occurred prior to this time frame, while all observed events exhibiting a significant effect except for the South Carolina shooting took place after this date. This suggests timeframe and location may provide some combined explanation and warrant future study.

Two additional areas deserve exploration with regards to possible effects on firearm manufacturer returns. Late September of 2016 represents the delineation between a period of little effect to a period of more significant effect. Given the proximity to the 2016 presidential election, administration policies, investor attitudes, and the general attitude of the country may play a role. Depetris-Chauvin explored an Obama effect, investigating how the fear of gun regulations enhanced gun sales (Depetris-Chauvin, 2015). This Obama effect may have provided a positive return boost to counter the negative drag from a fear of future regulations following a mass shooting. This fits the timeline of findings from Gopal and Greenwood. Their study found effects early in the Obama administration, but fading after the second year of Obama's first term. Further, this study finds a similar lack of effect through the remainder of Obama's two terms. Future researchers could explore the possibility of a Trump effect. With Trump and the Republican party generally against firearm regulations and in full legislative power, did firearm manufacturers lose the positive boost of increased gun sales after a mass shooting spurred on by the fear of future regulation among the general population? Without this boost, the negative forces dragging down returns in the short run no longer have a counterweight.

Finally, one more area of future exploration relates to the media. Media coverage on the surface does not appear to contribute to any mass shooting effect on stock returns with regards to total media coverage. However, the type of media coverage and the entailing discussion topics could contribute. Is there a difference between the media predominantly discussing terrorism or workplace disgruntlement, such as in the San Bernardino and Florida awning manufacturer shootings respectively, and various forms of gun control legislation, such as after the Parkland and Las Vegas shootings? The former events did not result in significant effects, while the later saw significant effects. The media focus could contribute to the observed effects.

CONCLUSION

Mass shootings in the United States draw significant media and research coverage. Such events elicited fears of regulation tightening and restrictions on gun ownership, and lured consumers to increase firearm purchases. Gopal and Greenwood found mass shootings to affect the stock prices of RGR and AOBC significantly in 2009 and 2010, with the effect trailing off from 2011 through 2013. This led the authors to predict the possibility mass shootings became priced into the stock prices of firearm manufacturers. This study found only one mass shooting from 2014 through August of 2016 to significantly affect the market returns of four publicly traded firearm manufacturers, in line with Gopal and Greenwood's presumptions. However, mass shootings starting in September of 2016 began exhibiting significant market effects much more frequently than in the prior six years. Searching for other factors which, along with mass shootings, contribute to market return effects on firearm companies represents a robust area of future research. Perhaps an Obama effect mitigated the drop in returns now observed under a new administration. Perhaps a change in media coverage is a factor. Regardless of what factors contribute to the effect, this study shows that mass shootings have affected market prices more frequently over the past few years.

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APPENDIX A

Full One Week Effect Results
1/1/2014 – 1/6/2017

VARIABLES	Airport	Mall	Dallas	Orlando	Kalamazoo	San Bernardino	Umpqua	Chattanooga	Charleston	Marysville	Isla
Constant – pre event	-1.794	0.679***	-0.02	-0.518	0.247	0.335	-0.146	-0.533	-0.474***	-2.541*	-0.398
	(1.32)	(0.23)	(0.43)	(0.55)	(0.69)	(0.46)	(0.47)	(0.32)	(0.17)	(1.31)	(0.35)
Constant – post event	0.434	-0.554	-0.299	-0.578	1.082*	-0.312	0.338	-0.672**	0.371	0.108	-1.096***
	(0.47)	(0.42)	(0.29)	(0.74)	(0.62)	(0.32)	(0.53)	(0.31)	(0.31)	(0.77)	(0.37)
Market Returns – pre event	3.741	0.917***	1.597**	-3.125	1.523*	0.539*	0.746*	-0.222	0.708**	1.079	1.108
	(4.58)	(0.28)	(0.61)	(2.58)	(0.82)	(0.27)	(0.43)	(0.66)	(0.35)	(1.47)	(1.23)
Market Returns – post event	0.781	2.642***	1.649***	-0.695	0.871	0.017	1.327***	1.296***	1.486***	0.572	1.529**
	(0.84)	(0.43)	(0.34)	(1.70)	(0.62)	(0.52)	(0.45)	(0.43)	(0.51)	(0.48)	(0.67)
Observations	38	33	30	30	27	30	33	33	33	22	20
R-squared	0.132	0.566	0.476	0.118	0.379	0.083	0.403	0.242	0.478	0.197	0.396
F-test	2.515*	6.295***	0.153	0.347	0.497	1.802	0.715	1.867	3.596**	1.592	1.012
Prob > F	0.0958	0.00536	0.859	0.71	0.615	0.185	0.497	0.173	0.0403	0.231	0.386

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDIX A

Full One Week Effect Results
1/7/2017 – 9/12/2018

VARIABLES	TTTruck	CapitalG	SantaFe	Stoneman	Rancho	Baptist	LasVegas	Florida
Constant – pre event	1.061	-0.693*	0.929***	-0.851*	0.466	-0.853	-1.569***	0.735
	(0.56)	(0.37)	(0.30)	(0.50)	(0.50)	(0.72)	(0.48)	(0.60)
Constant – post event	0.598**	-0.652*	0.268	0.393	-0.821	-0.689	0.055	-0.163
	(0.20)	(0.35)	(0.23)	(0.88)	(0.75)	(0.42)	(0.37)	(0.30)
Market Returns- pre event	-2.175**	0.733	0.897	2.134***	0.308	15.374	7.349***	1.2
	(0.85)	(0.61)	(0.61)	(0.51)	(0.61)	(12.50)	(1.70)	(3.14)
Market Returns – post event	0.3	0.169	1.182***	-0.168	15.326	0.352	0.67	3.106***
	(0.84)	(0.40)	(0.43)	(0.72)	(12.08)	(1.20)	(1.19)	(0.78)
Observations	11	40	44	40	44	40	40	40
R-squared	0.576	0.158	0.305	0.158	0.222	0.232	0.399	0.261
F-test	2.142	0.305	1.557	3.461**	1.166	0.796	5.897***	2.937*
Prob > F	0.188	0.739	0.223	0.0422	0.322	0.459	0.00609	0.0658

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDIX B

Full Two Week Effect Results
1/1/2014 – 1/6/2017

VARIABLES	Airport	Mall	Dallas	Orlando	Kalamazoo	SanBernardino	Umpqua	Chattanooga	Charleston	Marysville	Isla
Constant – pre event	-1.156*	0.103	-0.001	0.208	0.604	0.006	-0.248	-0.002	-0.271	-1.636**	-0.224
	(0.66)	(0.25)	(0.18)	(0.40)	(0.41)	(0.39)	(0.35)	(0.26)	(0.18)	(0.72)	(0.37)
Constant – post event	0.138	-0.474**	0.084	-0.375	0.482	0.238	-0.229	-0.312	0.256	0.324	-0.616**
	(0.26)	(0.24)	(0.34)	(0.47)	(0.38)	(0.23)	(0.33)	(0.22)	(0.21)	(0.56)	(0.25)
Market Returns – pre event	1.054	1.159***	1.559***	0.912**	0.853*	0.611**	0.837**	0.829**	0.768***	0.586	0.941
	(1.91)	(0.32)	(0.45)	(0.41)	(0.45)	(0.29)	(0.33)	(0.40)	(0.21)	(1.21)	(0.82)
Market Returns – post event	1.176**	1.224***	1.337***	0.006	0.715**	0.44	1.312***	0.248	1.562***	0.717	1.198***
	(0.58)	(0.21)	(0.28)	(1.44)	(0.31)	(0.35)	(0.32)	(0.26)	(0.38)	(0.48)	(0.36)
Observations	69	66	63	57	60	63	66	63	66	44	42
R-squared	0.091	0.417	0.569	0.127	0.256	0.105	0.36	0.108	0.369	0.151	0.315
F-test	3.459**	1.516	0.0966	0.681	0.0698	0.165	0.547	1.135	2.887*	2.538*	0.474
Prob > F	0.0374	0.228	0.908	0.511	0.933	0.848	0.581	0.328	0.0633	0.0916	0.626

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDIX B

Full Two Week Effect Results
1/7/2017 – 9/12/2018

VARIABLES	TTTruck	CapitalG	SantaFe	Stoneman	Rancho	Baptist	LasVegas	Florida
Constant – pre event	0.35	-0.927***	0.541*	-1.170***	0.404	-0.749	-1.080***	0.281
	(0.58)	(0.27)	(0.32)	(0.36)	(0.36)	(0.83)	(0.36)	(0.32)
Constant – post event	4.328	-0.179	0.01	-0.184	-1.262*	-0.502*	0.575	-0.446*
	(3.87)	(0.18)	(0.28)	(0.42)	(0.70)	(0.27)	(0.48)	(0.24)
Market Returns – pre event	-0.399	1.482***	0.225	1.557***	0.332	2.373	4.871***	0.517
	(1.05)	(0.40)	(0.49)	(0.34)	(0.55)	(2.10)	(1.41)	(0.59)
Market Returns – post	6.127	0.629*	1.366***	0.374	5.992	0.583	-0.04	1.948**
	(6.09)	(0.38)	(0.50)	(0.33)	(5.24)	(0.53)	(0.86)	(0.85)
Observations	21	84	84	84	84	80	80	80
R-squared	0.155	0.201	0.15	0.206	0.126	0.054	0.131	0.074
F-test	0.643	3.176**	1.497	3.94**	2.859*	0.668	6.707***	1.948
Prob > F	0.538	0.0471	0.23	0.0233	0.0632	0.515	0.00208	0.15

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDIX C

Full One Month Effect Results
1/1/2014 – 1/6/2017

VARIABLES	Airport	Mall	Dallas	Orlando	Kalamazoo	SanBernardino	Umpqua	Chattanooga	Charleston	Marysville	Isla
Constant – pre event	-0.586	0.399**	-0.132	0.251	0.159	0.014	-0.184	0.028	-0.377***	-0.594	-0.132
	(0.43)	(0.16)	(0.31)	(0.28)	(0.31)	(0.25)	(0.23)	(0.24)	(0.14)	(0.40)	(0.15)
Constant – post event	-0.028	-0.389**	0.032	-0.134	0.303	-0.098	-0.307	-0.214	0.175	0.167	-0.216
	(0.17)	(0.18)	(0.29)	(0.24)	(0.36)	(0.32)	(0.24)	(0.14)	(0.16)	(0.31)	(0.23)
Market Returns – pre event	1.495*	1.413***	0.461	1.241***	1.333***	0.788***	1.015***	0.821**	0.498***	-0.05	0.726**
	(0.77)	(0.23)	(0.67)	(0.26)	(0.42)	(0.21)	(0.27)	(0.34)	(0.19)	(1.08)	(0.35)
Market Returns – post event	0.616*	1.227***	1.123***	1.352***	1.147***	1.255***	0.869***	0.583***	1.625***	0.915***	1.531***
	(0.33)	(0.19)	(0.28)	(0.43)	(0.30)	(0.41)	(0.20)	(0.18)	(0.30)	(0.29)	(0.31)
Observations	145	129	132	126	129	126	132	132	129	88	86
R-squared	0.05	0.347	0.11	0.306	0.251	0.147	0.267	0.098	0.281	0.123	0.228
F-test	0.859	5.617***	0.431	0.549	0.0983	0.514	0.178	0.661	8.346***	1.92	1.487
Prob > F	0.426	0.00461	0.651	0.579	0.906	0.599	0.837	0.518	0.0004	0.153	0.232

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDIX C

Full One Month Effect Results
1/7/2017 – 9/12/2018

VARIABLES	TTTruck	CapitalG	SantaFe	Stoneman	Rancho	Baptist	LasVegas	Florida
Constant – pre event	0.356	-0.665***	0.208	-0.34	0.058	-0.367	-0.339*	-0.171
	(0.52)	(0.16)	(0.21)	(0.27)	(0.25)	(0.53)	(0.20)	(0.25)
Constant – post event	0.921	-0.174	-0.087	-0.181	-0.72	-0.474**	0.074	0.316
	(0.81)	(0.17)	(0.22)	(0.25)	(0.50)	(0.19)	(0.42)	(0.26)
Market Returns – pre event	-0.39	1.098***	0.282	1.103***	0.082	1.552	1.829***	0.669
	(1.00)	(0.31)	(0.43)	(0.33)	(0.52)	(1.11)	(0.55)	(0.44)
Market Returns – post event	0.852**	0.448	1.028***	0.369	2.688	1.093**	1.027	1.044***
	(0.42)	(0.31)	(0.25)	(0.31)	(1.78)	(0.45)	(0.78)	(0.40)
Observations	60	172	172	172	172	172	172	168
R-squared	0.04	0.122	0.072	0.1	0.05	0.04	0.04	0.062
F-test	1.399	2.675*	1.324	1.344	1.102	0.504	0.525	1.332
Prob > F	0.255	0.0718	0.269	0.264	0.334	0.605	0.592	0.267

Observations = daily market return observations for AOBC, RGR, OLN, & VTSO
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1