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The Impact of Hospitality Homicides on the Stock Prices of Targeted Firms

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A B S T R A C T

This paper examines the stock price responses of publicly-traded hospitality companies (hotels, restaurants, casinos, cruise ships, and theaters) following 73 non-robbery-motivated homicides. Although significant negative changes in stock prices are observed for the entire sample, dividing the sample by hospitality sector demonstrates that these results are driven almost entirely by the strongly negative reactions observed for restaurants. Interestingly, and in contrast to prior research, "random" killings (i.e., where there was no prior relationship between the company and the killer) result in dramatically more negative stock price reactions than those perpetrated by individuals with either a current or prior employment relationship. Surprisingly, there is only weak evidence in support of the hypothesis that the noted stock price declines and the severity of the incidents (as defined by the number of people killed and/or wounded) are positively correlated.

Keywords: Hospitality; homicides; economic impact; event study

JEL classification: G14; I31; K32; K49

1. Introduction

At 10:05PM PST, on October 1, 2017, gunman Stephen Paddock of Mesquite, Nevada, began firing out of the 32nd floor of the Mandalay Bay hotel toward the 22,000 guests attending the Route 91 Harvest music festival. By the time the carnage ended at 10:15PM, Paddock's military-style assault rifles—modified into fully automatic weapons via the installation so-called "bump stocks"—had directed 1,100 rounds onto the crowded street below, and with Paddock himself entering infamy as the perpetrator of the largest mass shooting in modern American history.

Security is the lifeblood of the hospitality industry. Although often unspoken, it is everywhere present, ranging from the sturdy locks on a hotel door, to the ubiquitous ceiling smoke detector, to the pre-film security trailers warning movie patrons to watch out for "suspicious characters" now playing at theaters all around the country.[1] Clearly, few hospitality guests would ever wish to patronize any facility where the prospect of encountering a security issue loomed large, and whereas threats to personal safety, when they occur, usually take the form of robberies, even more serious incidents such as rape and murder are, unfortunately, not unknown.

In the introduction to his 2012 book, *Hospitality Security: Managing Security in Today's Hotel, Lodging, Entertainment, and Tourism Environment*, hospitality security expert Darrell Clifton notes that hospitality security is predicated upon ". . . the dubious proposition of having to keep our assets as secure as possible, while keeping our property as open and welcoming as we can" (Clifton, 2012, p. xxv). What are the "assets" to which Clifton refers? Guests, employees, and property, with the protection of people— "life over money"—the author's paramount consideration. Clifton continues:

> This conundrum compounds the complexity of our job functions, and it is why we refer to our properties as "soft" targets. While it is hard enough to protect a nuclear power plant from intruders, terrorists, thieves, and spies, it is even more difficult to keep the same persons out of a hotel that is open to the public.[2]

This study uses the well-established "event study" methodology from the fields of finance and economics to quantitatively investigate the stock price impacts of the failure to protect guests and/or employees in the hospitality industry (defined as hotels, restaurants, casinos, cruise ships, and theaters) from the most catastrophic of these potential security threats—homicide—and in so doing sheds important light on the *economic* repercussions of these horrific and widely-publicized events.

By their buying and selling decisions, investors make informed judgments concerning the impact of various market developments upon affected companies. For the case of hospitality homicides, study of the risk-adjusted, net-of-market changes in the stock prices of the affected companies provides an important and unbiased assessment of the economic damage inflicted upon these firms as a result of the tragedies.

Just what *is* the impact of a hospitality homicide on the stock price of a targeted company? Are all hospitality homicides created equal? Or, are there cross-sectional differences in share price responses depending upon identifiable characteristics of the events (e.g., the number of victims, hospitality sector, premium versus discount properties, etc.)? Do homicides committed by employees or former employees, as suggested by prior research on workplace violence, result in more pronounced reductions in shareholder value than events better classified as "random"? Obviously, the answers to these and related questions are likely to prove of significant interest to a number of constituencies, ranging from hospitality executives and shareholders, to risk managers and insurers, to academic researchers in

[1] AMC's clever take on dealing with "angry robots" during a theatrical presentation is just one recent example. https://www.youtube.com/watch?v=9uwlkNG--38

[2] Clifton (2012), p. xxv.

various fields of study. They are the questions to which the remainder of this study is specifically addressed.

2. Homicides in the Hospitality Sector

Although, according to official Justice Department figures, there were 15,696 homicides committed in the United States in 2015, due to the manner in which data from the FBI's Uniform Crime Reporting program (UCR) are compiled and tabulated, the actual frequency of homicides within the hospitality sector is likely impossible to assess.[3] What *is* known with certainty, however, is that by virtue of their unique nature as "soft targets," hospitality venues have been—and, unfortunately, will likely continue to be—vulnerable to violent incidents and even occasionally subject to truly horrific mass-casualty attacks.[4] In fact, it is likely that no group of private sector enterprises has been hit harder by intentional acts of violence than the hospitality sector. While official Bureau of Labor Statistics workplace data track only the deaths of *employees*, businesses in the hospitality sector, by their very nature, must be open and accessible to the general public. Thus, in addition to fatally-wounded employees, customers are also not infrequently killed during hospitality attacks and are often the intended targets. Indeed, two of the most infamous early mass killings took place at restaurants. In 1984, a shooting that occurred at a McDonalds franchise in San Ysidro, California, claimed the lives of 21 people (including children as young as 8 months old) and wounded 19.[5] Seven years later, a shooting at a Luby's cafeteria in Killeen, Texas, left 23 people dead and 20 wounded.[6] More recently, the "Dark Knight Rises" shooting at the Cinemark Century 16 in Aurora, Colorado, on July 20, 2012, left 12 theater patrons dead and another 58 wounded.[7]

Obviously, the ultimate ramifications of any hospitality homicide are both profound and multi-faceted. Most significantly, of course, are the lives that are shattered as families lose loved-ones by death or experience permanent and traumatic changes from debilitating injuries. In addition to these physical losses, there is likely to be significant psychological damage resulting from the attacks. Thus, even employees and customers who were not *physically* harmed by these violent episodes may suffer significant mental trauma as a result.[8]

[3] Source: US Department of Justice, Federal Bureau of Investigation official report, *Crime in the United States*, September 26, 2016. https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/home

[4] Incredibly, as the first draft of this section was literally being written—on December 31, 2016—the BBC and other major wire services began reporting an attack on Istanbul's popular Reina night club. Despite enhanced security specifically put in place for the New Year celebrations (which included a 24-hour police presence in the area and "complimentary efforts by the coast guard at sea"), a gunman armed with a rifle and dressed "as Santa" managed to enter the club, kill 39, wound at least 64 others, and evade capture in the early morning darkness. Clearly, the Pulse nightclub shooting in Orlando on June 12, 2016 (49 dead and 53 wounded) and the Bataclan theater assault on November 13, 2015 (where 89 people died out of the 130 killed and another 100 wounded in coordinated attacks) represent even more devastating attacks against "soft" hospitality targets. For more information about the Reina attack, see, e.g., http://www.telegraph.co.uk/news/2016/12/31/istanbul-attack-gunmen-dressed-santa-open-fire-nightclub-turkey/

[5] See https://en.wikipedia.org/wiki/San_Ysidro_McDonald%27s_massacre

[6] See https://en.wikipedia.org/wiki/Luby%27s_shooting

[7] See https://en.wikipedia.org/wiki/2012_Aurora_shooting

[8] Ignoring any possible sympathy for the perpetrator(s), who are quite often killed by law enforcement or commit suicide during their assaults, it is almost certain that his or her surviving family members will also be both stigmatized and ostracized by both guilt and extensive media coverage of the events.

While in no way equating the magnitude of their losses with the families of those killed or injured in hospitality-targeted attacks, there *is* another group of individuals who may be adversely affected by these tragic incidents—namely, the investors of the securities issued by the publicly-traded hospitality sector businesses targeted by the killers. There is reason to believe that these losses may not be trivial, and it is to a review of prior literature in this area that we next turn.

3. Previous results

In work tangentially-related to the present effort, several empirical studies have examined the stock price responses of firms subjected to large and unanticipated non-operating losses. For example, Sprecher and Pertl (1983) document a negative and statistically significant stock price reaction by publicly-traded companies in response to 27 "large losses". While the applicability of their results to the present study is limited (none of the examined data points involved the hospitality industry), the author's finding that the *timing* of the market's reaction to the studied losses is fully supportive of the hypothesis that stock market participants react both quickly and unbiasedly to the informational content of complex and unanticipated events.

Closer in context to the present study are two works documenting the impact of fatal crashes on domestic airline stocks. Specifically, Davidson, Chandy, and Cross (1987) and Nethercutt and Pruitt (1997) report immediate, negative, and statistically significant price changes in response to these tragedies—tragedies which, like hospitality homicides, clearly involve the public, are associated with significant media coverage, and likely involve a significant liability component. Similarly, Lai, McNamara, and Oppenheimer (2002) examine a sample of 155 large corporate non-operating losses, including significant liability claims. As before, the authors identify significant negative stock price reactions following the announcements.

Two published studies have examined the stock price impacts of homicides on targeted companies. In the first, McNamara and Pruitt (2006) analyze a sample of 40 workplace killings that occurred between 1990 and 2004. Interestingly, while the equity response on the event day was, as expected, negative, it was not statistically significant. However, the authors did observe significant negative stock price reactions over the 30-day period *following* the event. When the sample was divided between "random" events (e.g., homicides committed by an individual unaffiliated with the company) and events in which the perpetrator was either a current or former employee (or a member of their family), major differences were observed. Specifically, there was both an immediate and subsequent protracted negative response to employment-related homicides, whereas there was essentially no reaction at all to random killings—the obvious inference being that a company's liability is likely much greater for events in which the killer went through the employment screening process and was subsequently hired.

In a recent study, Cross and Pruitt (2013) examine two horrific mass homicides—the Aurora, Colorado, theater shooting and the Newtown (Sandy Hook), Connecticut, school shooting. As Cinemark, the owner of the theater in Aurora, is a publicly-traded hospitality company, its stock price reactions following that tragedy provide useful insights into the potential impact of a similarly catastrophic tragedy on other hospitality companies. Cinemark's stock prices fell by 6 percent ($Z = -3.12$) on the first two days following the attack, and showed no sign of returning to pre-attack levels over the next month. The present study seeks to extend the obvious limitations of Cross and Pruitt's focus on two mass attacks to a generalized sample of more "typical" hospitality homicides.

4. Some hospitality sector homicide events

Although no two hospitality homicides are identical, two incidents well-known hospitality firms experienced in the past may help to shed light on some of the difficult issues related to these always tragic events.

The random nature of some hospitality sector killings is exemplified by the 2011 shooting at an IHOP restaurant in Carson City, Nevada. When the perpetrator, 32-year-old Eduardo Sencion, arrived at the restaurant, he stepped out of his van and shot and wounded a woman in the parking lot with a Chinese-made Norinco assault rifle. He next entered the IHOP and targeted a group of Nevada National Guardsmen eating at a table, striking five and killing three. An additional eight people were shot during the attack, and one of those—a 67-year-old woman having lunch with her disabled husband—was killed. As so often happens in such tragedies, when the police eventually arrived at the scene (after an eight-minute delay), Sencion turned the gun on himself. Although Mr. Sencion had been diagnosed with paranoid schizophrenia at the age of 18, post-mortem toxicology tests confirmed there were no anti-psychotic drugs in his system at the time of the attack. A police investigation revealed he had no prior relationship with IHOP, the National Guard, or any of the other people shot during the attack, and left no note explaining the motive for his actions.

Not all hospitality homicides occur in what are typically considered "public areas" of the targeted facilities nor are committed by individuals who could be readily identified as suspicious or dangerous. For example, a private party meeting room of a Sheraton Hotel was the site of a mass shooting in Brookfield, Wisconsin, by a 44-year-old "buttoned-down churchgoer known for sharing his homegrown vegetables with his neighbors." [9] A local church affiliated with the Living Church of God had rented a meeting room at the hotel for its weekly Saturday services for several years without prior incident. On the morning of March 12, 2005, however, Terry Michael Ratzmann arrived for worship, but left the hotel during the service, only to return about twenty minutes later carrying a Beretta 9mm handgun. Upon reentering the meeting room, Ratzmann fired 22 rounds into the gathered worshippers, killing the minister, the minister's teenage son, and four other congregants before turning the gun on himself. Four other people, including the minister's wife, were seriously injured but survived the attack. Among the people who knew him, Ratzmann was described an "average Joe," and although he left no note, was known to suffer from depression and on the verge of losing his job as a computer technician.

The above two examples (and literally dozens more besides) aptly illustrate "Clifton's conundrum" discussed in the introduction, and suggest that striking an appropriate balance between creating "open and welcoming" and "secure" hospitality spaces will always be difficult and may, in some circumstances literally be impossible. However, given that the net benefits of creating such spaces essentially represent a conscious trade-off between the *certain* losses resulting from higher security costs (e.g., armed guards, inspections, metal detectors, surveillance cameras, etc.) and the *potential* losses due from both unfavorable litigation and the inevitable adverse publicity in the unlikely event of a serious crisis, as well as those due to lower future revenues resulting from the design of less welcoming properties, an empirical analysis of the average financial losses experienced by hospitality firms previously targeted by homicidal attacks will provide reasoned estimates of the financial damage inflicted on hospitality firms as a result of just such "worst case" events. It is to this analysis that we now turn.

[9] For more details on this tragic incident, see http://www.nbcnews.com/id/7167861/ns/us_news-crime_and_courts/t/relatives-struggle-answers-after-shooting/#.WGreu1MrIwF.

5. Empirical methodology

The methodology employed in this research has enjoyed extremely wide acceptance in the fields of finance and economics. Commonly referred to as the "market model," the methodology involves the estimation of a time-series of daily *changes* in stock prices (known as "stock returns" in the literature) to measure the economic effects of specific events (in this case, hospitality homicides) upon publicly-traded companies, *net of overall market movements and adjusted for the individual risk levels of each analyzed firm*.

A regression between the stock returns of each hospitality company with a homicidal event and the daily price changes of an index of the overall market, the parameters of which were estimated over the time period beginning 160 days prior to and ending 11 days prior to each fatal hospitality attack, was employed to extrapolate *expected* stock returns in the absence of the event over a 21-day "event window" beginning 10 days prior and ending 10 days after each homicide. The stock price effects of each homicide were then obtained by subtracting the returns actually observed for each company from those predicted by the model.

After these differences, or "abnormal returns" as they are known in the literature, were calculated for each of the firms in the sample, they were aligned in "event time" with the date of each homicide serving as the day 0 reference point. Thus, the *mean abnormal return* (MAR_t) for event day t (t = -10. . . +10) is merely the average of the abnormal returns for the sample of hospitality companies for any day t over which the effects of the homicides were observed. The *mean cumulative abnormal return* ($MCAR_{t1,t2}$) for event days t_1 to t_2 was calculated by summing the daily mean abnormal returns observed over the two event days of interest. Both short-run (event days t = 0 and 1) and longer-term (event days t = 2 to t = 5 and t = 2 to t = 10) effects were examined. Although first employed by Fama, Fisher, Jensen, and Roll (1969) in a study of the stock price effects of stock splits, Monte Carlo simulation studies of the market-model methodology by Brown and Warner (1985) and others have repeatedly demonstrated the adequacy of the procedures for accurately determining the stock price effects of various corporate events, including, as noted above, the impact of fatal shootings on the stock prices of targeted companies. All stock price calculations were performed using EVENTUS software licensed and maintained by Cowen Research, and accessed using the University of Pennsylvania's Wharton Research Data Services (WRDS) empirical research data platform. While the details of the actual statistical procedures employed in the calculation of the abnormal returns and associated tests are beyond the scope of this article, they are available from the authors upon request.

6. Data

Unfortunately, although the Bureau of Labor Statistics (BLS) compiles data on workplace fatalities (including those committed in the hospitality sector), this information is of limited usefulness in the present context since BLS data count only *employee* deaths—and *not* the deaths of customers or other bystanders. Thus, even catastrophic incidents on hospitality sector properties that do not result in the deaths of employees (such as the IHOP and Sheraton Hotel attacks discussed above) never enter into official BLS tabulations. Similarly, whereas the FBI's annual report, *Crime in the United States*, contains a wealth of *aggregated* data on homicides in the United States (including detailed breakdowns of murders by the sex, race, ethnicity, and ages of both victims and perpetrators), the detailed, *case-specific* information needed to perform an empirical analysis of the impact of homicides on hospitality sector stock prices is not available through published FBI documents. Accordingly, to generate the hospitality-specific sample analyzed in this study, a series of exhaustive internet searches was conducted.

Among the myriad combinations utilized were search terms such as "hotel+fatal", "restaurant+shooting", etc., as well as a review of all workplace killings reported in the *Wall Street Journal Index*.

Given the methodology's requirements for daily stock price data included on the University of Chicago's Center for Research in Security Prices (CRSP) database, the sample was limited to killings that occurred only at publicly-traded hospitality companies, and further restricted to the years between 2001 and 2015 (inclusive) in an effort to enhance its relevance to the current business and regulatory environment. Killings in which theft or robbery was the primary motive were eliminated from further consideration for several reasons.

First, robberies are obviously motivated almost exclusively by monetary gain, whereas the hospitality killings included in this sample are motivated by anger, revenge, mental frailty, or some other *non-financial* cause. Second, robberies are typically directed at well-demarcated locations where location-specific loss-control mechanisms (e.g., restricted access) are more easily employed. Indeed, so many robbery-motivated killings occur at certain types of business establishments that society has become almost desensitized to their occurrence and, as such, these incidents typically generate little media coverage and even less attention on the part of the general public. Conversely, casual empiricism suggests hospitality killings *not* motivated by financial gain are likely to be interpreted much more negatively—and granted significantly greater and more focused attention—by the media, investors, and society at large. Also omitted from analysis were homicides that occurred in proximity to a hospitality property, but that did not directly involve either the customers or the employees of that property. For example, a fatal gun fight between rival gangs on a street adjacent to a fast-food restaurant would not be included in the sample, whereas it would be included if the same fight were held *inside* the restaurant. Following these and a few technical adjustments, the final sample was winnowed to 73 hospitality-related homicides committed over the years from 2001 to 2015.[10] Table 1 presents selected summary statistics for the studied events.

Table 1 Hospitality sector homicide sample summary statistics: 2001-2015

Location:														
Hotels/motels										28				
Restaurants										38				
Casinos, theaters, and cruise ships										7				
										73				
Calendar year (20XX):														
01	01	02	03	04	05	06	07	08	09	10	11	12	13	15
1	1	2	3	3	2	4	2	8	7	6	6	10	11	7
Company:														
McDonald's:								17						
Holiday Inn:								6						
Wyndham International:								5						
Marriott:								4						
Sheraton:								4						
Jack in the Box:								3						
Kentucky Fried Chicken:								3						
Chili's:								2						
Denny's:								2						
Hilton:								2						
Pizza Hut:								2						
Sonic:								2						
Wendy's:								2						
Other (21 companies):								1						

[10] In a few instances, companies with otherwise valid hospitality-related homicides were necessarily omitted from the analysis due to insufficient stock price data in the CRSP database. Despite these omissions, the final sample of 73 firms is quite large for a study of this type. For example, McNamara and Pruitt's (2006) analysis of the stock price impacts of workplace homicides was restricted to just 40 events.

As shown in Table 1, of the 73 events included in the sample, 28 were located in hotels or motels, 38 in restaurants, and 7 in casinos, cruise ships, or theaters. Whereas every year from 2000 to 2014 registered at least one homicidal event, there appears to have been an increase in the number of these tragedies over time, with the first eight years in the sample period totaling only 18 events, compared to 55 over the following seven years. Whether this dramatic increase in frequency is due to an actual increase in the number of hospitality homicides, a change in media practices with respect to the reporting of such incidents, or both, remains unclear. In total, the 73 studied events resulted in the deaths of 106 individuals, with an additional 117 people wounded in the attacks. These figures do not include the deaths of the 15 attackers who died either as a result of suicide or at the hands of law enforcement personnel. Interestingly, there appear to have been no instances of armed hospitality security personnel engaging and killing the attackers.

Not surprisingly given that they are both large and publicly-traded, all of the companies included in the sample are household names, with McDonald's (17 incidents) and Holiday Inn (6 incidents) experiencing the greatest number of attacks. However, the way most publicly-traded firms in the hotel/motel sector are organized leads to an interesting possibility. Indeed, large lodging companies frequently develop property brands that span a wide range of hospitality segments. For example, while Hilton Worldwide Holdings owns super premium properties such as the Waldorf Astoria, it also owns middle-market motels such as Hampton and Homewood Suites. Similarly, Marriott International properties range from the high luxury Ritz-Carlton to the mid-market Fairfield Inn. An open question—and one addressed in the following sections—is whether tragedies occurring at lower-tier properties impact the shareholders of the parent companies to the same degree as do similar homicides occurring at premium hotels.[11]

Finally, although an ever-present issue in studies of more "typical" corporate events such as mergers and new product announcements (where rumors and other pre-announcement leakages are the norm), the identification of the exact date of hospitality homicides, as is the case with other unexpected tragedies such as airline crashes, could not be more precise. This unusual level of announcement date specificity lends considerable accuracy to the calculation of the economic costs of the hospitality homicides discussed below. Indeed, in cases where there is no apparent economic impact from the events, one may be extremely confident in assuming that the noted lack of equity responses is, indeed, due to the general economic insignificance of the events, just as equal confidence may be lent to those cases where statistical significance is actually observed.

7. Empirical results

7.1 Abnormal returns tests

Table 2 presents a summary of the mean cumulative abnormal returns ($MCAR_{t1,t2}$) and their associated test statistics (Z) for differing samples of hospitality firms subjected to homicidal attacks, as well as the number of firms in each sample, the number of sample firms registering positive abnormal returns, and the associated binomial proportionality test statistic (Z), for three different intervals around the time of each hospitality homicide. Under the null hypothesis of no stock price effect from the attacks, neither the registered $MCAR_{t1,t2}$ levels nor the binomial proportionality test statistic of the simple fraction of firms experiencing positive abnormal returns should be significantly different from zero.

[11] Perhaps not surprisingly, the majority of hostelry homicides occur in mid- and lower-tier establishments.

Table 2 Cumulative abnormal returns and associated test statistics for various samples around the time of hospitality homicides

Mean cumulative abnormal returns ($MCAR_{t1,t2}$) and their associated test statistics (Z), the number of firms (N), the number of firms registering positive abnormal returns over that interval (N+), and the associated binomial proportionality test statistic (Z) around the time of homicides for select hospitality samples.

Event interval	Mean cumulative abnormal return ($MCAR_{t1,t2}$)	Test statistic (Z)	N	N+	Test statistic (Z)
Panel A: Full sample of 73 hospitality homicides					
-10 to -1	0.62%	1.29	73	41	1.31
0 and 1	-0.68%	-2.02*	73	27	-1.97*
2 to 10	-0.31%	-1.36	73	31	-1.04
Panel B: Sample of 28 hotel/motel homicides					
-10 to -1	0.81%	0.85	28	17	1.32
0 and 1	0.01%	0.11	28	12	-0.57
2 to 10	-0.33%	-0.65	28	11	-0.95
Panel C: Sample of 7 cruise ship, theater, and casino homicides					
-10 to -1	-0.74%	0.62	7	4	0.51
0 and 1	-1.24%	-1.48	7	3	-0.25
2 to 10	-1.28%	0.13	7	3	-0.25
Panel D: Sample of 38 restaurant homicides					
-10 to -1	0.73%	0.79	38	20	0.46
0 and 1	-1.10%	-2.26*	38	12	-2.14*
2 to 10	-0.11%	-0.26	38	17	-0.52
Panel E: Sample of 29 “affiliated” hospitality homicides					
-10 to -1	1.01%	0.64	29	14	0.28
0 and 1	0.48%	1.25	29	16	0.65
2 to 10	0.01%	-0.17	29	13	-0.47
Panel F: Sample of 44 “random” hospitality homicides					
-10 to -1	0.36%	1.14	44	26	1.46
0 and 1	-1.45%	-3.61**	44	11	-3.07**
2 to 10	-0.46%	-0.92	44	18	-0.96

*Significant at the 5 percent level, two-tailed test.
**Significant at the 1 percent level, two-tailed test.

The three test intervals analyzed in the study—a pre-event window extending from ten days before to one day prior to the attacks, a two-day announcement window comprised of event days 0 and 1, and a nine-day post-event window—are standards in the event-study literature and encompass, in total, the stock price trends of the sample firms over a single calendar month (21 trading days). The ten-day pre-event interval is normally included to capture the stock price effects of any “pre-event leakage” prior to the actual event. As noted above, since, by definition, all of the events in the homicide sample must have been completely unanticipated, inclusion of the pre-event window in this case serves primarily to serve as a contrast to later event-period changes in stock prices (if any).

A two-day event window (event days 0 and +1) is included as standard practice in virtually all event studies to account for the possibility that the first information about any particular event (in this case, a hospitality homicide) could have been disseminated either before or after the close of trading on the date of the attacks. The chosen window therefore insures stock market participants had at least one, and possibly as many as two trading days to fully react to the informational content of the events. A nine-day post-event window (event days 2 to 10) is analyzed to capture any delayed or protracted stock price changes following the studied homicides.

Panel A of Table 2 presents the result of the tests for the full sample of 73 hospitality homicides over the 2001 to 2015 time period. As expected, there is no evidence of any changes in stock prices prior to the homicides, however, the statistically significant decline (of just under 0.7 percent; Z = -2.02) provides clear evidence that, overall, the studied 73 homicides were interpreted by financial market participants as negative informational events. Indeed, the decline is virtually identical in both magnitude and direction to the reactions previously observed by Pruitt and Peterson (1986) over the same two-day event window in a study of product recall announcements on share prices—developments well-known to be highly problematic.

While some readers may be tempted to question the economic significance of a risk- and market-adjusted -0.68 percent decline in stock prices over a two-day interval, it is important to note that this decline is equivalent to an annualized *excess* return of over 130 percent per year, or more than an order of magnitude greater than the average stock's expected gain on an annualized basis. The fact that 63 percent of the firms in the sample experienced unexpected share price declines (Z = -1.97) further emphasizes the market's assessment of the economic importance of these tragedies. That is, not only did share prices significantly decline on average, but the noted declines were also broad-based rather than isolated to a few specific cases. The lack of a significant price changes over the post-event interval (event days 2 to 10) underscores the extremely rapid pace of the stock market's price revaluations following these complex, informationally rich events.

Panels B, C, and D of Table 2 present the results of tests of samples of hotel/motel, "other" hospitality, and restaurant homicides considered in isolation. Interestingly, while no statistically significant reactions stock price reactions were observed in the hotel/motel and cruise ship, casino, and theater homicide samples (Panels B and C), striking results are observed for restaurants (Panel D). Indeed, not only is the average two-day decline in share values for the restaurant sample more dramatic than that observed for the overall sample (declining by 1.1 percent compared with a decline of 0.68 percent for the full sample of 73 homicides), but almost 70 percent of the restaurant firms (68.4 percent) experienced adjusted share price declines in response to the attacks (versus just 63 percent for the sample as a whole). Viewed as a whole, the economic damage inflicted by the studied restaurant homicides is virtually identical to that previously observed by companies subjected to a major consumer boycott (see, e.g., Pruitt and Friedman, 1986), and underscores the severity of these events to targeted firms.

The question naturally arises: Why *are* homicides directed toward restaurants interpreted by financial market participants as so much more economically damaging than those targeting hotels, motels, theaters, cruise ships, and casinos? The most obvious possibility, of course, is that the restaurant homicides included in the sample were relatively "worse" in terms of the number of people killed and/or wounded in the attacks, but in fact, the opposite is true. Indeed, whereas the mean number of people killed in the restaurant attacks was 1.18, for the non-restaurant sample it was 1.74. Further, the disparity is even greater in the case of the number of people wounded, where the average was 0.61 in the case of restaurants, but 2.69 for the hotel/motel, theater, cruise ships, and casino attacks.

While clearly confined to the realm of conjecture (and, thus, untestable in the present context), we believe the explanation for this differential response may lie within the constructs of the social psychological concept of "proximity." The proximity principle explains the tendency for individuals to form deeper interpersonal relationships with people or things that are proximate, or "closer," in some relevant sense (be that physical, demographical, psychological, and/or emotional) than those that are more distant.[12] Since a far larger percentage of the American populace has day-to-day dealings with restaurants—and, especially, the fast- and quick-service restaurants which represent the preponderance of the present sample—than with either hotels, motels, casinos, cruise ships, or theaters, attacks perpetrated against restaurants (say a McDonald's or a Taco Bell—at least one of which is almost certainly "just down the street") are more likely to be perceived as much more psychologically proximate (e.g., "that could have been *us!*") to their day-to-day lives than are attacks targeting non-restaurant hospitality sector businesses.[13] As such, the stock market's relative punishment of restaurants vis-à-vis other hospitality sector businesses around the time of the 73 studied homicides would seem to fit this narrative perfectly.

Panels E and F of Table 2 present the results of the abnormal return tests on hospitality homicides bifurcated by whether the attacker was "affiliated" or "random." For the purposes of this study, an attack was defined as *affiliated* if the attacker was either an employee or former employee of the targeted facility and/or an acquaintance or family member of the primary victims of the attack. An attack was classified as *random* if there was no apparent prior relationship between the attacker and the targeted facility and victims.

In their paper on the impact of workplace homicides, McNamara and Pruitt (2006) document strikingly more negative stock price reactions to attacks perpetrated by individuals previously affiliated with the targeted company. Couching their results within the framework of legal liability, the authors hypothesize that workplace killers with prior employment relationships may serve as "canaries in the coal mine" and, as such, affiliated workplace homicides were likely interpreted by stock market participants as the final, catastrophic symptom of diseased management-workforce relations. Random killings, on the other hand, were seen as just that—random events that, while clearly tragic in effect, imparted no underlying signal of broader corporate failings.

Interestingly, and completely counter to the earlier findings of McNamara and Pruitt, the results presented in Panels E and F of Table 2 clearly document dramatically more negative stock market reactions to random hospitality homicides than to those perpetrated by affiliated killers (which demonstrate no significant price response). In what are clearly the strongest results observed in this study, the market-adjusted stock price decline over the two-day event window (event days 0 and 1) for the random homicide sample (Panel F) was 1.45 percent (Z = -3.61), with three-quarters of the sample firms registering price declines (Z = -3.07). These results suggest that a random homicide is literally twice as economically damaging to a targeted firm as a product recall, and almost twenty percent more damaging than a consumer boycott.

[12] The proximity principle—and the related principle of propinquity (the state of feeling close to someone or something)—is one of the eight "laws" of Gestalt theory and was first applied in an interpersonal context by Festinger (1950) and Newcomb (1960) to explain the fact that people who encounter each other more frequently tend to develop stronger, deeper relationships.

[13] Over half of all Americans eat at a restaurant *at least once per week.* See, e.g., https://www.statista.com/topics/1957/eating-out-behavior-in-the-us/. According to the latest figures, there are almost 630,000 restaurants in the United States (one for every 500 people), compared to fewer than 50,000 hotels, motels, inns, resorts, and bed and breakfasts.

Again, although conjectural, psychological theory may help to explain these results. In the post-9/11 world of increased security concerns, events need not be particularly likely to occur in order to capture one's attention and elicit significant anxiety. Indeed, who among us has not cast a discerning eye at his or her fellow passengers standing in line at a gate to board a commercial aircraft, or heard a balloon pop in a restaurant or lobby and wondered—for a least a split second—if a gun had just been fired? Both of these events are evidence of a psychological phenomenon known as the "availability heuristic." First described by Tversky and Kahneman (1973) and experimentally confirmed by Carroll (1978) and many others, the availability heuristic is a mental shortcut allowing for the rapid processing of complex information in an uncertain environment. Unfortunately, the availability heuristic also often leads people to *over*estimate the risks of frightening, uncommon events (such as being the victim of a random homicide) while simultaneously *under*estimating the risks of much more common threats (such influenza and heart disease). That most individuals would tend to consider a random hospitality attack more likely than one targeted at themselves ("Who would want to kill me?") is entirely rational, and thus the investor perceptions that random hospitality attacks are more likely to possess a greater "fear quotient" and depressive stock price impact is likely rational, as well.

7.2 Cross-sectional regression tests

In order to further clarify the relationship between stock price changes and hospitality homicides, a series of five multiple regressions was performed. In these regressions, the market-adjusted abnormal return observed for each of the 73 hospitality firms registered over event days 0 and 1 (the event window) served as the dependent variable, while specified firm and event-specific attributes served as the independent variables. The independent variables included in the models are discussed in turn below.

The dummy variable RESTAURANT (restaurant location = 1; otherwise = 0) was included to isolate the relative contribution of the restaurant location of a homicide when controlling for the other factors included in the model. Since the restaurant sample analyzed above registered negative and statistically significant abnormal return for homicides located in restaurants, a priori, the expected sign of the variable RESTAURANT is negative.

Similar to the case of RESTAURANT, the dummy variable RANDOM (random homicide = 1; affiliated homicide = 0) was included to capture the influence of a random homicide (regardless of location). While the random homicide sample generated the most negative abnormal returns in the tests discussed above, including the variable RANDOM isolates the influence of a random shooting by controlling for the influence of the other independent variables. Again, ceteris paribus, given the mean abnormal returns results discussed above, the expectation would be that RANDOM should enter the equation with a negative coefficient.

The variable LGMKVAL represents the log of the market value of equity of the sample firms and is included to assess the effects of differences in corporate scale on the hospitality homicide returns. While the log of the market value of firm equity is commonly employed in the literature to reduce the impact of nonlinearities in the data set, the direction of the correlation between share prices and firm value cannot be determined a priori.[14]

[14] For any given level of *fixed* value reduction associated with hospitality homicides (due either to lower sales, higher costs, and/or liability losses), the abnormal returns around the time of a hospitality homicide should be positively correlated LGMKVAL, as the fixed value reduction would be spread over a larger equity base. However, if larger corporate scale is positively correlated with increases in post-homicide costs (for whatever reason), the coefficient of LGMKVAL would be expected to be negative. Stated somewhat differently, a positive coefficient for LGMKVAL would imply that larger companies suffer less in face of a homicidal attack than smaller ones.

The variable NUMKILLED is the total number of people both killed and wounded in the attacks. Obviously, a priori reasoning would suggest the coefficient for this variable should be negative, with increasing attack severity expected to be correlated with reductions in hospitality company stock prices.

The dummy variable RACIAL (racially-motivated homicide = 1; 0 = otherwise) was added to ascertain if homicides with apparent racial motivations on the part of the perpetrators (as reported in media stories of the incidents) differ in stock price impact from non-racially-motivated attacks. Similarly, the dummy variable FIGHT (killing as a result of a fight = 1; 0 = otherwise) captures the influence of hospitality homicides that escalated from a fight. No a priori reasoning suggests a specific correlation between these variables and changes in stock prices as a result of such homicides.

The final dummy variable, HIGHQUALITY (premium hotel brand = 1; 0 = otherwise), was included in an effort to ascertain whether the hospitality homicides located at premium hostelry properties (e.g., Hilton and Marriott) result in greater stock price declines than those located a mid- or lower-tier motels (e.g., Hampton or Super8). Under the reasonable hypothesis that potential guests view premium properties as safer and more secure, the correlation of this variable with the stock price changes associated with hospitality homicides is expected to be negative.

Table 3 presents the results of five multiple regressions between the abnormal returns registered by the sample hospitality firms at the time of the 73 hospitality homicides analyzed in the study (the dependent variable) and various iterations of the seven independent variables discussed above. In each case, the F-tests of the regressions (indicative of the statistical validity of the models) are significant far below conventional statistical levels. Similarly, all of the R-squared goodness-of-fit metrics are quite large for regressions employing firm-specific abnormal returns as the dependent variables.

Table 3 Cross-sectional abnormal return regressions

Cumulative abnormal returns for period (0 to +1) are the dependent variable. Independent variables include: restaurant which is an indicator variable equal to one if the event took place at a restaurant and zero otherwise, random which is an indicator variable equal to one if the event was random and zero otherwise, log market value which is the natural log of the market value of the firm, # killed or hurt which is the number of non-shooting persons killed or hurt, racial which is an indicator equal to one if the event was racially motivated and zero otherwise, fight which is an indicator equal to one if a fight preceded the event and zero otherwise, and high quality which is an indicator equal to one if the event took place at a high quality hotel and zero otherwise.

	(1)	(2)	(3)	(4)	(5)
RESTAURANT	-0.008	-0.010	-0.008	-0.009	-0.005
	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)
RANDOM	-0.018**	-0.016*	-0.017*	-0.019**	-0.019**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
LGMKVAL	0.003	0.003	0.004*	0.003	0.004*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
NUMKILLED		-0.001			
		(0.000)			
RACIAL			-0.014		
			(0.012)		
FIGHT				0.011	
				(0.006)	
HIGHQUALITY					-0.012
					(0.010)
CONSTANT	-0.046	-0.044	-0.048	-0.048	-0.050
	(0.028)	(0.027)	(0.028)	(0.027)	(0.028)
Observations	73	73	73	73	73
R-squared	0.168	0.208	0.184	0.205	0.185
F-Test	4.66**	4.48**	3.84**	4.39**	3.85**

Standard errors in parentheses
* p<0.05
** p<0.01

Regression equation (1) represents the base case model for the studied hospitality homicide events. Interestingly, in this regression, while the variable RESTAURANT enters with the expected negative sign (based upon the Table 2 results), it is insignificant at conventional statistical levels, whereas the variable RANDOM is both negative and statistically significant at the one percent level ($t = 3.00$). The coefficient of RANDOM (-0.018) indicates that random hospitality homicides are associated with about a 1.8 percent greater decrease in share prices than non-random attacks. Again, while insignificant, the coefficient for RESTAURANT suggests that restaurants with hospitality homicides register stock price declines about one percent greater than non-restaurants (e.g., hotels, casinos, theaters, and cruise ships).

Combined, the RESTAURANT and RANDOM variable results suggest that a significant driver of the negative restaurant results presented in Panel D of Table 2 may have been a disproportionately larger fraction of random killings within the restaurant sample. This is, indeed, the case, as 27 of the 38 restaurant attacks were classified as random (71.1 percent of the sample events) versus only 13 of the 28 hotel killings (46.4 percent). Given the discussion about Table 2 above that suggests that random attacks are likely to be more feared by hospitality customers than targeted killings, and that restaurants—and particularly *fast-food* restaurants (where 24 of the 28 random killings occurred)—are surely more psychologically proximate to the average consumer than hotels or motels, the stock market's particularly negative assessment of the economic damage inflicted by random hospitality homicides at restaurants certainly appears reasonable. The fact the variable LGMKVAL enters with a positive coefficient (although not statistically significant) suggests that larger firms experience smaller stock price reductions in following hospitality homicides than do than smaller firms.

Regressions (2) through (5) add selected explanatory variables to the base case regression (1). While the individual regressions differ on exactly which explanatory variables are included—adding and replacing the variables NUMKILLED, RACIAL, FIGHT, and HIGHQUALITY—in each case the overall explanatory power of the models remain essentially unchanged, and none of the added variables are significant at conventional statistical levels, although both NUMKILLED and HIGHQUALITY enter with the expected sign. LGMKVAL, the log of the market value of equity of the sample firms, is significant at the five percent level in regressions (3) and (5), at the ten percent level in equations (1), (2), and (4), suggesting that larger firms are less damaged by the typical hospital homicide than their smaller counterparts. Overall the results of the conducted multiple regressions clarify the Table 2 findings and demonstrate that it is the *random nature* of hospitality assaults rather than their specific target that is most responsible for the stock price reductions following the attacks, but that random attacks targeting a restaurant are perceived by stock market investors as the most damaging of all.

7.3 Total economic losses due to hospitality homicides

In an effort to estimate the net dollar value of the equity damage inflicted by hospitality homicides on the target firms, the mean market value of the equity of the sample firms was multiplied by the observed reductions in stock prices over event days $t = 0$ and 1. Firm market values were calculated by multiplying the share prices as of event day $t = -11$ by the total number of shares outstanding (both values being obtained from the CRSP database). Calculations for several different samples—the overall sample, restaurants, and hospitality attacks classified as random—are presented in Table 4.

As shown in the table, the decline in market values for the hospitality companies ranges between $125 million and $320 million, depending upon the sample analyzed. Although somewhat overstated due to the fact that the employed market-value calculation explicitly assumes that *every* share (as opposed to only *marginal* shares) of each company could be bought or sold at the price quoted prior the events, these results strongly suggest that the studied hospitality homicides did, indeed, result in both statistically *and economically* significant losses for hospitality shareholders—losses *almost ten times*

the magnitude of those registered in response to consumer boycotts (Pruitt and Friedman, 1986) over the same event horizon (event days $t = 0$ and 1).

Table 4 Market value reductions resulting from various samples of hospitality homicides

Sample	Mean cumulative abnormal return (t = 0 and 1)	Mean company market value	Mean hospitality homicide value reduction
Full sample	-0.68%*	$18,331,279,410	($124,652,700)
Restaurant sample	-1.10%**	$28,987,577,730	($318,863,300)
Random attack sample	-1.45%**	$20,591,620,690	($298,578,500)

*Significant at the 5 percent level, two-tailed test.
**Significant at the 1 percent level, two-tailed test.

8. Conclusions

This study has presented an analysis of the stock price impacts of 73 hospitality homicides over the years from 2001 to 2015. Using the well-established "event study" methodology—which adjusts for changes in the overall stock market and risk levels of each individual hospitality firm—the study documents both statistically and economically significant reductions in stock prices for some, but not all, hospitality sector companies around the time of the fatal attacks. Specifically, whereas no evidence is presented in the study that attacks targeting hotels, motels, cruise ships, theaters, or casinos result in reductions in stock prices for the parent companies, restaurants experience share price losses similar to those previously observed in response to product recall announcements.

Further bifurcation of the sample into "random" homicides (where there was no prior relationship between the killer and the murdered individuals or the targeted establishment) or "affiliated" homicides (homicides where there was a prior relationship) demonstrate striking evidence that stock market participants respond much more negatively to random attacks. Indeed, the stock price reductions following random attacks are virtually identical to those previously associated with major consumer boycotts.

Multiple regressions of the firm-specific stock price declines and select homicide-specific variables further clarify the importance of the random nature of the homicides as the main driver in the observed results. Given that mean equity reductions observed in this analysis to the studied homicides ranged between $125 million and $319 million—depending upon the specific sample studied—it is clear that the impact of the events extends far beyond those directly affected by the tragedies.[15]

As noted in the introduction, since hospitality sector businesses are inherently "soft" targets, striking an appropriate balance between the security measures necessary to minimize the likelihood of an attack—in conjunction with the losses likely to accrue to the enterprise should one occur—and the losses in revenue virtually certain to arise from designing and building more secure, but far less inviting ("fortress") properties will prove difficult. In an article in The New York Times (Hsu 2017) Mac Segal—a security consultant for executive protection company AS Solution—discusses the steps hotel chains may eventually be forced to make in the wake of the Las Vegas Mandalay Bay tragedy. Noting

[15] It must be emphasized that, despite the magnitude of the economic carnage associated with the 73 studied homicides, there can be no equivalence between the mere monetary losses experienced by hospitality sector shareholders and the human tragedies experienced by the families and friends of those killed, injured, and/or psychologically scarred by the senseless attacks.

that hospitality properties in the US and Europe have been "much slower on the uptake" regarding the chances of violence than properties located in the Middle East and Africa, security "at most hotels instead focuses on limiting theft, corralling unruly drunks and ferreting out people wandering the halls without a room."

In the same article, Jim Stover, a senior vice president of the real estate and hospitality practice at insurance broker Arthur J. Gallagher & Co., states that explosives scanners and X-ray machines—standard equipment at airport terminals—will continue to be scarce in hospitality properties because of the enormous premium many customers place on their privacy. And whereas upscale hotels often spend upwards of half a million dollars on closed-circuit camera systems, the human element is typically minimized due to its vastly higher ongoing operating costs and inherent intrusiveness. Unfortunately, as noted by Mac Segal, "no camera has ever stopped a gunman," and so the search for the proper balance between security, privacy, and economics continues. The present study, by providing managers and shareholders with reasoned estimates of the likely economic costs of a homicide to differing hospitality sector businesses, offers at least a reasonable point of demarcation from which to begin these important discussions.

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