The impact of terror attacks on global sectoral capital markets: An empirical study

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Abstract

This article examines the effects of fifteen major terror attacks perpetrated in the U.S. and Europe between 2001 and 2017 on a general global stock market index as well as on industry-specific indices, namely (1) airlines, (2) global hotels, restaurants, and leisure (hospitality), and (3) global utilities. Using an event-study method, we show that attacks tend to result in significant negative abnormal returns on the day of attack which, on occasion, persist for a few days. As expected, adverse market effects appear more pronounced, in terms of magnitude and persistence, for the global airline and hospitality industries than for the global utilities industry. Attacks in Europe since 2015 show no adverse global market effects, with two late exceptions (the London Bridge and Barcelona attacks, both in 2017). This might suggest that just when investors and markets seemed to have learned to cope with attacks, these two latter events caused some concern again. Implications of our findings for short- and long-term global investor strategy are discussed.

Economic costs of acts of terror can be grouped into three categories (Krugman, 2004). First is the direct damage caused on buildings, infrastructure, and on productive lives ended. Second are the budgetary cost of public sector responses to terror, such as increased amounts of monies spent on national defense and homeland security. And third is the cost imposed on the private sector by the way people and firms respond to the fear of future terror attacks. The empirical literature largely focuses on effects suffered within the attacked countries, even if some consideration is given to external effects. For example, Becker and Murphy (2001) document falling investment in the United States due to terror threats as approximately 0.2 percent of GDP, and they suggest that this then likely affects other economies through lower U.S. demand for imports. Blomberg, Hess, and Weerapana (2004) find that terror attacks reduce domestic economic growth to a smaller degree than when compared to the effects of internal conflict, external war, or natural disasters.

Given their prominence in the functioning of the economy, capital markets in the western world are likely to be prime recipients of adverse effects of terror. Campbell, Lo, and Craig (1997) argue that share prices and the evolution of market indices can be a good source of information regarding the economic impact of terror as they reflect both, companies' profit expectations and the likelihood, as seen by investors, of these expectations being fulfilled. Frey, Luechinger, and Stutzer (2004) make a similar point. Profit expectations may be revised downward due to the destruction of physical and intangible capital and also due to demand-reducing consumer fears. Relatedly, market risk premia increase when terror involves greater uncertainty about firms' prospects. Market assessment thus likely dictates subsequent actions of market agents, such as investors and analysts, and will eventually determine the way markets react to any specific event, including the time required for market recovery ("bounce back").

In this article we study the effects of terror attacks on international equity markets. Employing an event-study method, we assess whether fifteen major terror attacks that took place between 2001 and 2017 in the United States and Western Europe carried adverse effects on *global* stock markets. We pay particular attention to sub-indices in (1) the global hotel, restaurant, and leisure industry (hospitality), (2) the global airline industry, and (3) the global utilities industry. We look at global rather than domestic stock markets for two reasons. Following deregulation policies introduced in the late 1990s, capital markets became more globalized than before, with investors now holding internationally diversified portfolios to reduce nonsystematic risk as much as possible. But since that time, terror attacks also became more global in nature, including in OECD countries (IEP, 2016).

We provide answers to the following research questions. First, the "big picture": To what extent did specific attacks affect global stock markets (i.e., the global market index)? And was the effect, if any, permanent or transitory? Second, how did attacks affect specific industries at the global level?

Toward this, we dissect the global market index and examine two industries likely to be adversely affected (the hospitality and airline industries) and one unlikely to be negatively affected (utilities), or affected to a lesser degree. Again, for all three industries, we ask whether the effect, if any, was permanent or transitory. Third, in line with the extant literature, we ask how stock market responses to terror attacks may have changed over time.

Answers to these questions broaden the literature along two dimensions. First, to our knowledge, there has been no research on capital market effects related to relatively recent sets of terror attacks, including those in Western Europe between 2015–2017. Second, even though several papers have addressed the effect of terror attacks at the level of national capital markets, including at industry levels, none has looked at it from the point of view of international stock markets. Our work thus is useful to further update, assess, and measure the economic costs of terror generally and for international investors, specifically, who may be concerned about the negative effects that acts of terror may have on their investment portfolios and strategies.

The remainder of the article is organized as follows. The next section reviews existing literature and sets out the research framework. Following that, the data used is described along with the event-study methodology. The results section follows. The article concludes with a discussion of the main findings.

This article studies the magnitude and persistence of fifteen major terror attacks in the U.S. and Europe between 2001 and 2017 on global equity markets, specifically on the airline, hospitality, and utilities industries globally. As expected, the research finds more pronounced, if transitory, effects on the airline and hospitality industries and less on utilities and an overall diversified global equities index. It also finds that a wave of attacks in Europe since 2015 at first led to few adverse market reactions until two major attacks (in London and Barcelona) in 2017, suggesting that attacks can still rattle the markets. Implications for short- and long-term global investor strategies are discussed.

Literature review

We focus on two layers of literature related to the research theme of this article. The first is broad and considers the general reaction of stock markets to terror attacks; the second is focused and concentrates on the impact of terror attacks on specific industries.

Abadie and Gardeazabal (2003) used an event-study method to assess the firm-level impact of terror attacks in the Basque region of Spain, finding that shares of firms with a significant part of their business in that region showed positive relative performance when conditions of truce prevailed and a negative one when they did not. Chen and Siems (2004) studied the effect of 14 major terror/military attacks on U.S. capital and global markets for the period 1915–2001, paying particular attention to the effect of Iraq's invasion of Kuwait (1990) and to the 9/11 attack (2001). They found that, as compared to global markets, the U.S. capital markets became more resilient over time and recovered sooner. Johnston and Nedelescu (2005) examined market reactions to 9/11 and to the attack in Madrid in March 2004. Their main finding was that financial markets faced major disruptions as well as high levels of uncertainty, especially for the case of the 9/11 attacks in New York.

Nikkinen, *et al*. (2008) also focused on 9/11, examining its effect on 53 stock markets across the world. Their findings show increased volatility as well as short-run negative effects, which were eliminated quickly. Kollias, Papadamou, and Stagiannis (2011) investigated two major terror attacks in Europe—in March 2004 in Madrid and in July 2005 in London—on the stocks of different sectors, finding that whereas the Spanish market experienced significant negative returns across most sectors this was not the case for London.

More recently, Baumert, Buesa, and Lynch (2013) studied the effect of the Boston marathon bombing in 2013 on financial markets in Frankfurt, London, Madrid, Paris, Milan, New York, and Tokyo, comparing the effects with those of prior prominent attacks. The results show that the markets exhibited statistically significant negative abnormal returns on the day of the Boston attack but that the magnitude of these abnormal returns was lower than when compared to previous events.

Moving now to the second layer of literature, the tourism and airline industries have naturally received special attention due to their vulnerability to terror attacks. For example, Enders, Sandler, and Parise (1992) quantified the value of losses in tourism revenues for European countries and found that continental Europe lost USD16.145 billion due to such attacks for the period 1974–1988. Fleischer and Buccola (2002) examined hotel revenues in Israel, finding that from 1992 to 1998 annualized averages of monthly revenue losses from terror events in its foreign and local tourism markets were approximately USD48.6 and USD0.3 million, respectively.

Raby (2003) investigated sectoral effects more broadly and concludes that the airline, travel, tourism, accommodation, restaurant, postal, and insurance industries are particularly sensitive to increased terror risks. Madanoglu, Olsen, and Kwansa (2010) focused on the market value of hospitality and tourism firms as a result of three attacks, namely bombings in Bali (2002), Istanbul (2003), and Madrid (2004), in each case finding adverse market reactions. Gallego, Rossell, and Fourie

(2016) looked at the effect of terror, crime, and corruption on tourist arrivals for 171 countries for the period 1995–2013 and found that terror and crime exert a negative effect on tourist arrivals, but corruption did not.

As far as the airline industry is concerned, Drakos (2004) examined the effects of 9/11 on a set of airline stocks listed on various international stock markets and documented an increase in volatility following the attack. Additionally, he found that in the six months period prior to the attack, the markets considered airline stocks as defensive (low risk) while in the six months after the attack, they became aggressive stocks (high risk). Carter and Simkins (2004) found statistically significant abnormal price movements in the stocks of U.S and international airline carriers following 9/11. These, however, were not permanent (that is, mitigated in the days following the attack). Relatedly, Ito and Lee (2004) assessed the impact of 9/11 on U.S. airline demand and found that it resulted in both a negative transitory shock, exceeding 30 percent, and an ongoing negative demand shock amounting to approximately 7.4 percent of pre-9/11 demand volume. Brauer and Dunne (2012) studied the effects of large-scale natural and man-made catastrophes, such as epidemics, terror, and war on global air traffic for the world's largest 20 airlines. Their results suggest that global air traffic was not greatly affected by the general level of terror attacks worldwide as global airlines could change routes to fly to substitute tourist destinations. It took an exceptional event, such as 9/11, to cause a measurable impact on air traffic demand and, even then, the effect turned out to be relatively small in magnitude.

Data and methodology

Compiling a list of terror events deemed "significant," and hence likely to affect global markets, is somewhat arbitrary. According to the U.S. government's Incident Review Panel Criteria, a terror incident is considered significant "if it results in loss of life or serious injury of persons, major property damage, and/or is an act or attempted act that could reasonably be expected to create the conditions noted" (USDOS, 2003).

Authors who have addressed questions similar to ours have built their sample of events in a way that facilitates the examination of their research questions. For example, Johnston and Nedelescu (2005) studied two significant events, Chen and Siems (2004) studied 14 such events, and Baumert, Buesa, and Lynch (2013) focused on four significant events. We select fifteen events, providing a "platform" upon which to discuss the effect of terror attacks on international capital markets. In contrast to most other studies, ours uses the large number of 15 events and, even though some prior and non-European attacks are included, focuses on 11 recent attacks occurring in Europe over the period 2015–2017. The reason for our selection is that the research questions we address focus on possible effects at the international capital markets level where there is clearly a high level of integration between the European and U.S. markets. According to Nikkinen, *et al*. (2008), the impact of terror attacks varies across geographic regions, depending on the degree of their integration within the global economy; less integrated regions are less exposed. The events we use, along with some background information, are presented in Table A1 in the Appendix.

The hypotheses tested in this article refer to the effects, if any, that the listed terror attacks may have had on the MSCI World Index and three global sectoral indices, namely, MSCI World Hotel, Restaurant, and Leisure Index, MSCI World Airline Index, and MSCI Utilities Index.[1] The first index is a broad global equity index, representing large and mid-cap stocks across 23 countries. The sectoral indices are comprised of global stocks of firms within these sectors. All data are in daily frequency and were collected from DataStream. The indices were transformed into daily returns using the continuous compounding equation $R_{it} = ln\,(P_{it}/P_{it-1})$, where R_{it} is the daily return of index i, and P_{it} and P_{it-1} are the daily prices of index i at time t and $t–1$.

Methodologically, event studies examine the possible effects of one or more event(s) on the value of assets, such as stocks and bonds, commodities, and exchange rates. The method is based on the efficient-market hypothesis put forward by Fama (1970). It asserts that as new information arrives at the market, investors and analysts immediately and accurately assess its current and—more importantly—future impact. This (re)assessment results in prices changing to reflect the effect of this new information on the value of the future performance of the asset under consideration, in our case the four world market indices. Consequently, price changes can be attributed to specific events resulting from the release of this new information.

The event study method has been widely used to assess the impact of a wide range of events, such as earnings (Ball and Brown, 1968), announcements of mergers and acquisitions (Brown and Warner, 1980), regulatory changes (William, 1981), the effect of macroeconomic announcements on foreign exchange markets (Evans and Lyons, 2008), and actions related to corporate social responsibility (Katsikides, Markoulis, and Papaminas, 2016). Regarding terror attacks, papers with a scope like ours, such as Chen and Siems (2004), Johnston and Nedelescu (2005), Madanoglu, Olsen, and Kwansa (2010), and Baumert, Buesa, and Lynch (2013) all employ the event-study method to study the effect of such attacks on stock markets.

A general framework to carry out meaningful event analysis is provided by MacKinlay (1997) and Kothari and Warner (2007). The first step is to determine the event date. For the purposes of this article, this is defined as the day on which a specific terror attack took place. Following that, the estimation period and the event period need to be defined. According to MacKinlay (1997), the estimation period is the time period used to calculate the estimated return predicted by the market around the "announcement date" of the event. Here, we use a period of 90 trading days before the event date.

The event period is usually defined to be longer than the event date, or period of interest, so as to accommodate the examination of periods around the event and to capture possible effects of insider trading (if any) as well as the longer-term effects of the specific event. In the case of terror attacks, unfortunately they cannot be foreseen and, as such, we begin the analysis on the date of the event. Apart from the event date, we also use event windows of 5, 10, and 15 days thereafter. The reason for employing event windows is to assess how quickly the market absorbed (or failed to absorb) the event news. On the one hand, a possibility exists that on some occasions initial worries might persist (e.g., if not all event perpetrators were apprehended or killed, fears of further attacks may linger), hence keeping the market index down. On the other hand, it is possible that uncertainties might be quickly alleviated through the release of new information (e.g., government taking specific actions so that people feel safe) and thus causing market recovery.

To measure market reaction to the announcement of a terror attack, a normalized or expected return for each of the market indices we use needs to be estimated during the various event windows. This expected return must then be subtracted from the actual market return observed on the day of the event, and on subsequent days, in order to determine whether any abnormal return could be attributed to the event. Thus, $AR_{it} = R_{it} - E(R_{it})$, where the left-hand side term is the abnormal return of market index i at time t, R_{it} is as defined before, and $E(R_{it})$ is the expected return of market index i at time t.

An important issue concerns the estimation of $E(R_{it})$. We follow Chen and Siems (2004) and Baumert, Buease, and Lynch (2013) and compute it as $\frac{1}{90}\sum_{-90}^{-1} R_{it}$. The event date is set as $t = 0$, so that the expected return of market index i is estimated over 90 days, i.e., from $t = -90$ to $t = -1$, the last full trading day prior to the event.

Event day abnormal returns can be used to examine the *immediate* market reaction to an event. *Cumulative* abnormal returns (CAR) over the next few days or weeks can, however, provide a stronger and potentially more useful measure of the market's resilience and, importantly, its ability to "bounce back" from an attack. Therefore, once a time series of abnormal returns has been established, it would be important to test whether CAR are different from zero over the event windows that span after the event day. They can be estimated as $CAR_{t1,t2} = \sum_{t=t1}^{t2} AR_{it}$, where *t1* and *t2* denote the start and end of the event window, respectively. The null and alternative hypotheses then are H_0: CAR = 0 versus H_1: CAR ≠ 0.

We examine each of the fifteen events separately and therefore carry out standard *t*-tests for each event as well as for each event window within the specific event. The relevant *t*-statistic is $CAR_{t1,t2}/\left(\sigma^2_{t1,t2}\right)^{1/2}$, where the sigma term in parentheses equals $L\sigma^2(AR_t)$ and captures the variance of the one-period average abnormal return over the estimation window, and L is the number of days corresponding to each event window. Thus, the CAR will have a higher variance, the longer is L (i.e., the longer the event window).

The question we ask is whether the CAR of each of the four global market indices is statistically significantly different from zero on the day of the event ($t = 0$) and during the three subsequent event windows.

Results

In the main narrative here we present some results visually. Tables A2 to A5, in the Appendix, present the full numeric results, including the *t*-statistics needed to assess the statistical significance of the estimates.

Looking at the "big picture" first—the effect of the fifteen terror events on the MSCI Global Index—we make four observations. First, of the fifteen events only five affected the MSCI Global Index on the day of the event. They are: 9/11 (2001), Madrid (2004), Boston (2013), Orlando (2016), and Barcelona (2017). Second, when this is the case, no event—and that includes 9/11—negatively affected the index for more than 10 days. Effects are wholly transitory and not permanent. Actually, 9/11 and the Boston marathon bombing caused negative CAR up to the 5-day window (although of a very different magnitude, 10.5 percent versus 2.9 percent), and the Madrid train bombing caused a negative CAR in the 10-day window (–3.8 percent). The other two events (Orlando and Barcelona) caused abnormal returns only on the day of the event. Third, the magnitude of CAR diminished over time (see Figure 1). For example, the CAR caused by earlier events, except for the London bombing of 2005, were much higher in comparison to those caused by more recent events (if any). This leads to the fourth observation, which is that the relatively recent wave of terror attacks in Western Europe, which started with the Charlie Hebdo attack in Paris in January 2015 has not

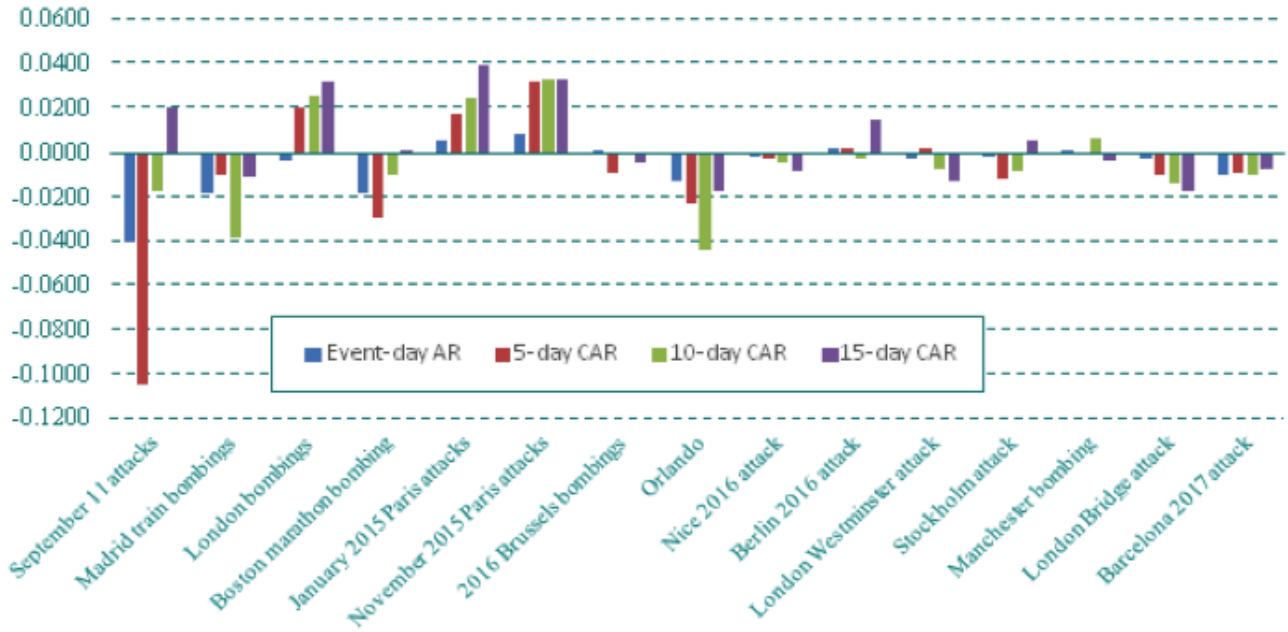


Figure 1: Event-day AR and 5,10, and 15-day event window CARs for MSCI Global Index for all 15 events.

resulted in any negative CAR for the global index, except for the August 2017 attack in Barcelona.

Our findings partly align with existing literature. For example, Chen and Siems (2004) documented significant negative short-term abnormal returns for U.S. and other markets for a number of significant terror events, Nikkinen, *et al*. (2008) found transitory negative effects on several stock markets due to 9/11, and Baumert, Buesa, and Lynch (2013) found adverse abnormal returns for major international markets on the day of the Boston bombings in 2013. Yet our findings also differ in some respects. For instance, not all of the 15 events we examined affect the global stock market index. More specifically, we found that almost all of the attacks since 2015 do not result in negative abnormal global market returns, not even on the day of the attack.

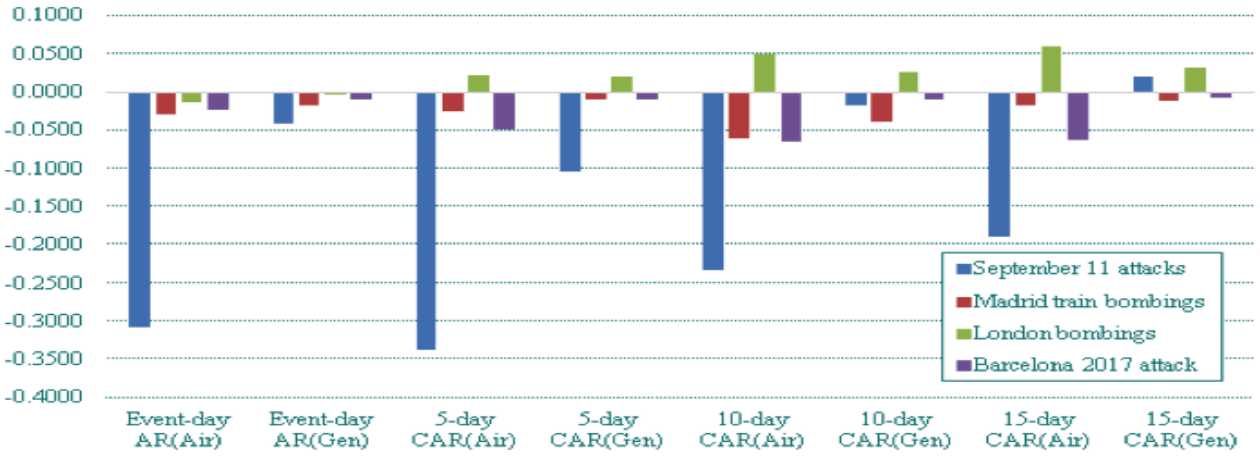
We next turn to the effect of the fifteen terror attacks on our sectoral global MSCI indices. The first industry we focus on is the airline industry. Our findings indicate that only four of the 15 events examined affected the MSCI Global Airline index: The 9/11 (2001), Madrid (2014), London (2005), and Barcelona (2017) attacks. When an adverse effect is noted, its magnitude was larger than that observed for the MSCI Global index (see Figure 2, Panel A).

In terms of persistence, the event that stands out is 9/11, where the CARs are highly statistically significant during all event windows. According to our calculations, CARs relating to the global airline index continued to be negative and statistically significant 37 days after the event. Apart from 9/11, the effect of all other events appears to be rather transitory. For example, the Madrid train bombings of 2004 resulted in negative CARs up to the 10-day event window, while the Barcelona attacks in 2017 produced negative CARs up to the 15-day event window. The London bombings of 2005 also generated negative event day AR, followed by positive CAR up to the 15-day event window. This suggests that, in this case, the market exhibited a rebound after the event.

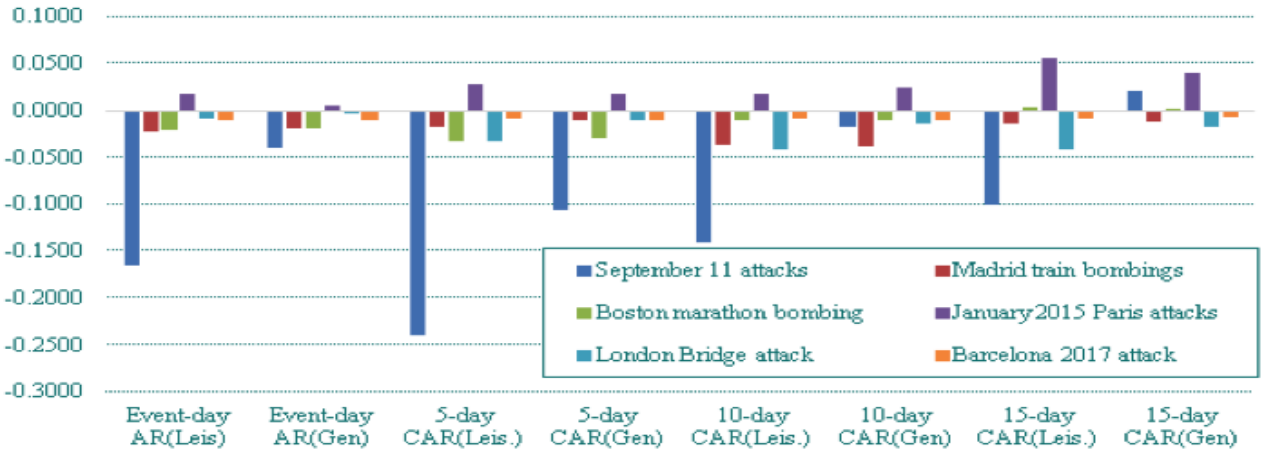
As for the case of the global index, the pre-2015 attacks affected the airline industry index substantially more than when compared to the post-2015 attacks. Along the same lines, the attacks that occurred in Western Europe between 2015 and 2017 have not affected the global airline index, again except for the Barcelona (2017) attack.

Existing literature on the effect of terror attacks on the airline industry mostly focuses on airline demand. For example, Ito and Lee (2004) documented a large negative transitory effect followed by a smaller permanent one and Brauer and Dunne (2012) documented that, with the exception of 9/11, global air traffic for the top-20 air carriers was not greatly affected by the general level of terror attacks worldwide. Our results augment these findings from the angle of global stock markets in the spirit of Brauer and Dunne (2012), in the sense that most of the events did not appear to cause significant negative abnormal returns and even when they did, the only one that exhibited permanent characteristics

Panel (A): Event day and 5-,10-, and 15-day event window CARs for MSCI global airline index.



Panel (B): Event day and 5-,10-, and 15-day event window CARs for MSCI hotels, restaurant, and leisure index and MSCI global index



Panel (C): Event day and 5- and 10-day event window CARs for MSCI utilities, airlines and hotels, restaurant, and leisure indices for 9/11 and 2004 Madrid bombings

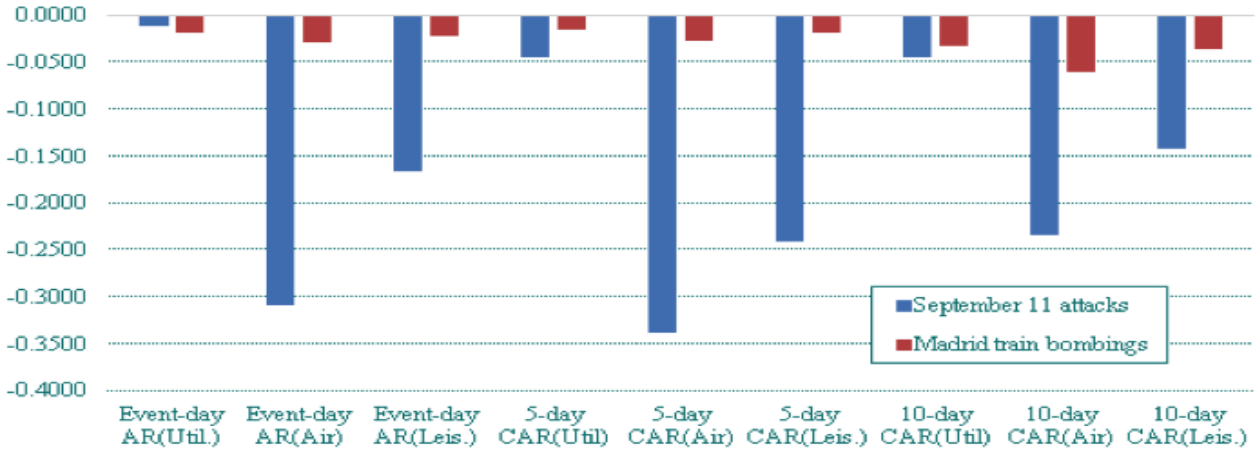


Figure 2: Event day and CARs windows.

was 9/11. We should also note that our results enrich those of Carter and Simkins (2004) who found rather transitory effects on stocks of airline companies as a result of 9/11.

Now turn to the effect of the attacks on the MSCI World Hotel, Restaurants, and Leisure index. Our results indicate that of our fifteen events, five had a negative effect on the industry (9/11, Madrid 2004, Boston 2013, London Bridge 2017, Barcelona 2017) and one, the Charlie Hebdo attack in Paris in 2015, a positive one. Once more, when there was an effect on the industry, it appeared to be larger in magnitude in comparison to the MSCI Global Index (see Figure 2, Panel B).

As far as the persistence of the market effect of the events is concerned, two events stand out, 9/11 and the London Bridge attack, both producing significant negative CAR up to and including the 15-day event window. Apart from these two, the Madrid bombing of 2004 produced negative CAR up to the 10-day event window, the Boston marathon bombing of 2013 up to the 5-day window, and the Barcelona attack produced abnormal returns on the day of the event only. The behavior of the hospitality index after the 2015 Charlie Hebdo attack in Paris also merits a comment since it might be reflecting the "we are not changing our way of life" mood prevalent at the time.

As mentioned, existing work has focused on the effect of terror attacks on tourist arrivals (e.g., Gallego, Rossell, and Fourie, 2016, among others). Once more, our work enriches current findings as it offers evidence that, from an international equity market perspective, only a few attacks result in negative abnormal returns and, of those, only two exhibit persistence.

Regarding global utilities index—low risk equities from the perspective of global investors—our results indicate that only two of the fifteen events caused any effect, namely 9/11 and the 2004 Madrid train bombing, and both were substantially weaker than for the airline and hospitality industries. Figure 2, Panel C graphs the effects for the two relevant events. In terms of persistence, both resulted in modest negative CAR up to the 10-day event window, after which the effect disappeared.

Discussion and conclusion

The analysis provides useful insights regarding the research questions addressed in this article. In terms of the MSCI global index, most of the pre-2015 attacks studied (plus the Barcelona 2017 attack) resulted in but transitory adverse effects on the index, and none beyond the 10-day event window. An investor with a global index buy-and-hold strategy is not likely to suffer financially from terror attacks of the nature studied here.

Sector-specific investors, however, may need to draw more differentiated conclusions as the global airline and hospitality indices reacted differently to terror attacks—in magnitude and in persistence—than did the overall global index. (Utility stocks, as we saw, hardly reacted at all.) Even here, of the fifteen attacks only four adversely affected the airline index and only five the hospitality index. Moreover, it takes an event as dramatic as that of 9/11 to cause some degree of persistency.

For general global investors, a diversified portfolio across industries makes sense, offering some investment protection in the face of terror attacks. Other investors, however, may take positions depending on the apparent effects different attacks exert in terms of magnitude and persistence across global industries. For example, it may make sense to take short positions in industries likely to be negatively affected in the short-term and long positions in those likely to be financially "immune" to terror attacks. An investor might also try to time the market after an attack, waiting for prices first to fall and then recover, knowing that index declines are unlikely to persist. Given that today's markets move much faster than in the past, it would also be interesting to observe intraday price movements (as, e.g., in Baumert, 2009), especially in relation to the post-2015 attacks.

Our results indicate that, for all equity indices examined, pre-2015 terror attacks, such as 9/11 or the Madrid or Boston bombings, generated negative returns. Nonetheless, the effects differed depending on the magnitude of the event and the specific industry considered. For example, 9/11, the biggest attack in magnitude (i.e., many more casualties, higher direct and indirect costs), naturally had a more profound effect on all indices examined. But attack "bigness" *per se* does not always correlate to the effects on the markets. For example, the Paris (November 2015) and Nice (July 2016) attacks caused many more deaths than the Boston marathon attack (2003), yet the global market reaction was distinctly different.

Why do markets react differently? One possible explanation is that, over time, international investors have learned to more quickly assess the "true" economic and financial consequences of terror attacks. They know that markets do tend to "bounce back" relatively quickly, and this holds even for attacks as big as 9/11. A second possible explanation is related to a theory advanced by Abadie and Gardeazabal (2003) and Eldor and Melnick (2004) who argue that market effects depend on investor perceptions regarding the persistence of the terrorist phenomenon *per se* and not on single attacks by themselves, whatever their magnitude may be. Our findings suggest that international investors may view single attacks as "one-off" events (at least up to the Manchester bombing) and not likely to recur. This is perhaps the reason that the vast majority of the wave of attacks on Western Europe between 2015–2017 did not seem to cause any significant negative market effects. On a cautionary note, however, note

that our findings show that the attack in Barcelona in 2017 had a negative effect on the MSCI global index, as well as on the airline and hospitality indices, and that the London Bridge attack negatively affected the hospitality index which, moreover, was relatively persistent. In the wake of an increasing string of attacks, it is also possible that market participants may be reevaluating their reaction to such events. All in all, the relation of financial markets to terror attacks is certainly an interesting field for future research even as we hope, of course, that the number of attacks will decline in time.

Notes

The authors thank two anonymous reviewers and the editors of the journal for their helpful and constructive comments.

1. MSCI (Morgan Stanley Capital International) is a provider of financial markets information. It compiles influential indices tracked by fund managers worldwide. These cover thousands of stocks under various categories and are used as benchmarks to measure the performance of investment portfolios.

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TableA1: Terror events and background information

Event no.	*Country*	*Event name or location/s*	*Event date dd/mm/yy*	*Period of interest dd/mm/yy*	*Perpetrator group*	*Casualties (deaths)*
1	USA	43353	37203	08/05/01–05/10/01	Al-Qaida	7,365 (2,997)
2	Spain	Madrid train bombing	11 Mar 2004	06/11/03–31/03/04	Abu Hafs al Masri Brigades	>1,800 (191)
3	UK	London "7/7" bombing	7 Jul 2005	03/03/05–27/07/05	Al-Qaida	784 (56)
4	USA	Boston marathon	15 Apr 2013	10/12/12–03/05/13	[Individual/s]	264 (3)
5	France	Charlie Hebdo, Paris	7 Jan 2015	03/09/14–27/01/15	Al-Qaida	23 (12)
6	France	Stade de France, Paris	13 Nov 2015	13/07/14–04/12/15	ISIS	423 (137)
7	Belgium	Brussels airport and metro station bombing	22 Mar 2016	17/11/15–11/04/16	ISIS	270 (35)
8	USA	Orlando night club shooting	12 Jun 2016	08/02/16–01/07/16	Jihadi-inspired	107 (49)
9	France	Nice truck attack	14 Jul 2016	11/03/16–04/08/16	ISIS (claimed)	433 (87)
10	Germany	Berlin Christmas market truck attack	19 Dec 2016	15/08/16–06/01/17	ISIS	48 (13)
11	UK	Westminster car attack	22 Mar 2017	16/11/16–11/04/17	[Individual/s]	50 (6)
12	Sweden	Stockholm truck attack	7 Apr 2017	02/12/16–27/4/17	ISIS-inspired	20 (5)
13	UK	Manchester concert bombing	42877	17/01/17–12/06/17	[Individual/s]	512 (23)
14	UK	London Bridge vehicle ramming and stabbing	3 Jun 2017	30/01/17–23/06/17	ISIS	56 (8)
15	Spain	Barcelona van attack	17 Aug 2017	13/04/17–06/09/17	ISIS (claimed)	>100 (16+8)

Sources: Data for the first seven events taken from Global Terrorism Database. For the other events, data collected from various media sources.

Table A2: Event day AR and Event window CAR for the MSCI Global Index

Country	*Event*	*Event day AR*	*5-day CAR*	*10-day CAR*	*15-day CAR*
USA	September 11 attacks	-0.0402	-0.1050	-0.0175	0.0203
	SE	0.0078	0.0174	0.0245	0.0301
	t-statistic	-5.1816***	-6.0524***	-0.7121	0.6769
Spain	Madrid train bombings	-0.0182	-0.0103	-0.0381	-0.0113
	SE	0.0053	0.0119	0.0168	0.0206
	t-statistic	-3.4138***	-0.8620	-2.2654**	-0.5474
UK	London bombings	-0.0039	0.0198	0.0253	0.0326
	SE	0.0049	0.0110	0.0155	0.0190
	t-statistic	-0.8016	1.8004*	1.6302	1.7119
USA	Boston marathon bombing	-0.0187	-0.0293	-0.0100	0.0013
	SE	0.0055	0.0124	0.0175	0.0215
	t-statistic	-3.3751***	-2.3603**	-0.5709	0.0619
France	Jan. 2015 Paris attacks	0.0053	0.0173	0.0246	0.0396
	SE	0.0068	0.0152	0.0216	0.0264
	t-statistic	0.7831	1.1368	1.1398	1.4997
France	Nov. 2015 Paris attacks	0.0085	0.0318	0.0332	0.0329
	SE	0.0102	0.0227	0.0321	0.0393
	t-statistic	0.8374	1.4022	1.0358	0.8372
Belgium	2016 Brussels bombings	0.0001	-0.0090	-0.0002	-0.0047
	SE	0.0097	0.0217	0.0306	0.0375
	t-statistic	0.0102	-0.4163	-0.0063	-0.1240
USA	Orlando	-0.0128	-0.0228	-0.0443	-0.0178
	SE	0.0074	0.0165	0.0233	0.0285
	t-statistic	-1.7418*	-1.3840	-1.9054	-0.6235
France	Nice 2016 attack	-0.0023	-0.0023	-0.0046	-0.0081
	SE	0.0094	0.0210	0.0297	0.0364
	t-statistic	-0.2421	-0.1093	-0.1545	-0.2227
Germany	Berlin 2016 attack	0.0022	0.0019	-0.0032	0.0143
	SE	0.0053	0.0119	0.0168	0.0206
	t-statistic	0.4136	0.1611	-0.1899	0.6915
UK	London Westminster attack	-0.0029	0.0022	-0.0071	-0.0128
	SE	0.0038	0.0086	0.0121	0.0149
	t-statistic	-0.7663	0.2573	-0.5840	-0.8592
Sweden	Stockholm attack	-0.0015	-0.0116	-0.0086	0.0056
	SE	0.0037	0.0083	0.0117	0.0144
	t-statistic	-0.3966	-1.4011	-0.7319	0.3893
UK	Manchester bombing	0.0002	-0.0001	0.0067	-0.0037
	SE	0.0041	0.0091	0.0128	0.0157
	t-statistic	0.0500	-0.0108	0.5204	-0.2381
UK	London Bridge attack	-0.0026	-0.0104	-0.0140	-0.0170
	SE	0.0040	0.0089	0.0126	0.0154
	t-statistic	-0.6514	-1.1670	-1.1188	-1.1083
Spain	Barcelona 2017 attack	-0.0098	-0.0094	-0.0098	-0.0071
	SE	0.0043	0.0095	0.0135	0.0165
	t-statistic	-2.2945**	-0.9833	-0.7312	-0.4334

Note 1: ***: significance at the 1%; **: significance at the 5% level; *: significance at the 10% level.
Note 2: Table presents *t*-tests for the event day and event windows of 5, 10, and 15 days. (H0: CAR=0; H1: CAR≠0); estimates of the standard error of AR and CAR and *p*-values in italics.

Table A3: Event day AR and Event window CAR for the MSCI Global Airline Index

Country	*Event*	*Event day AR*	*5-day CAR*	*10-day CAR*	*15-day CAR*
USA	September 11 attacks	-0.3083	-0.3375	-0.2335	-0.1895
	SE	0.0096	0.0215	0.0304	0.0372
	t-statistic	-32.0789***	-15.7058***	-7.6828***	-5.0908***
Spain	Madrid train bombings	-0.0292	-0.0258	-0.0605	-0.0166
	SE	0.0114	0.0255	0.0361	0.0442
	t-statistic	-2.5581***	-1.0108	-1.6759*	-0.3762
UK	London bombings	-0.0135	0.0219	0.0494	0.0598
	SE	0.0064	0.0143	0.0203	0.0248
	t-statistic	-2.1044**	1.5282	2.4390**	2.4090**
USA	Boston marathon bombing	-0.0122	0.0003	0.0373	0.0612
	SE	0.0080	0.0180	0.0254	0.0311
	t-statistic	-1.5156	0.0172	1.4696	1.9655*
France	Jan. 2015 Paris attacks	-0.0018	-0.0013	0.0050	0.0427
	SE	0.0134	0.0299	0.0423	0.0518
	t-statistic	-0.1382	-0.0432	0.1176	0.8235
France	Nov. 2015 Paris attacks	-0.0190	-0.0128	-0.0488	-0.0402
	SE	0.0117	0.0262	0.0370	0.0454
	t-statistic	-1.6183	-0.4888	-1.3171	-0.8869
Belgium	2016 Brussels bombings	-0.0118	-0.0282	-0.0349	-0.0494
	SE	0.0127	0.0283	0.0401	0.0491
	t-statistic	-0.9281	-0.9937	-0.8708	-1.0062
USA	Orlando	-0.0054	-0.0050	-0.0357	-0.0266
	SE	0.0082	0.0183	0.0259	0.0317
	t-statistic	-0.6568	-0.2741	-1.3780	-0.8375
France	Nice 2016 attack	-0.0056	-0.0455	-0.0313	-0.0620
	SE	0.0192	0.0428	0.0606	0.0742
	t-statistic	-0.2933	-1.0630	-0.5164	-0.8364
Germany	Berlin 2016 attack	-0.0046	-0.0062	-0.0152	-0.0042
	SE	0.0061	0.0136	0.0192	0.0236
	t-statistic	-0.7598	-0.4566	-0.7917	-0.1786
UK	London Westminster attack	-0.0033	0.0182	-0.0046	0.0106
	SE	0.0089	0.0199	0.0282	0.0345
	t-statistic	-0.3654	0.9159	-0.1635	0.3078
Sweden	Stockholm attack	-0.0020	-0.0014	0.0220	0.0263
	SE	0.0088	0.0197	0.0279	0.0342
	t-statistic	-0.2230	-0.0713	0.7887	0.7687
UK	Manchester bombing	0.0013	0.0190	0.0297	0.0178
	SE	0.0092	0.0205	0.0290	0.0355
	t-statistic	0.1396	0.9268	1.0223	0.5012
UK	London Bridge attack	-0.0027	-0.0079	-0.0141	-0.0143
	SE	0.0091	0.0203	0.0288	0.0352
	t-statistic	-0.3002	-0.3865	-0.4890	-0.4069
Spain	Barcelona 2017 attack	-0.0236	-0.0494	-0.0656	-0.0634
	SE	0.0087	0.0194	0.0275	0.0337
	t-statistic	-2.7105***	-2.5380**	-2.3852**	-1.8823*

Note 1: ***: significance at the 1%; **: significance at the 5% level; *: significance at the 10% level.
Note 2: Table presents *t*-tests for the event day and event windows of 5, 10, and 15 days. (H0: CAR=0; H1: CAR≠0); estimates of the standard error of AR and CAR and *p*-values in italics.

Table A4: Event day AR and Event window CAR for the MSCI Global Hotels, Restaurants, and Leisure Index

Country	*Event*	*Event day AR*	*5-day CAR*	*10-day CAR*	*15-day CAR*
USA	September 11 attacks	-0.165340	-0.240642	-0.141443	-0.101086
	SE	0.007844	0.017540	0.024805	0.030380
	t-statistic	-21.078631***	-13.719860***	-5.702242***	-3.327434***
Spain	Madrid train bombings	-0.021602	-0.017879	-0.036001	-0.014273
	SE	0.006459	0.014442	0.020424	0.025014
	t-statistic	-3.344722***	-1.237994	-1.762716*	-0.570588
UK	London bombings	-0.005848	0.021748	0.030513	0.022527
	SE	0.006332	0.014159	0.020024	0.024525
	t-statistic	-0.923552	1.535962	1.523789	0.918547
USA	Boston marathon bombing	-0.021093	-0.033071	-0.009397	0.004257
	SE	0.005949	0.013303	0.018813	0.023042
	t-statistic	-3.545507***	-2.485964**	-0.499474	0.184757
France	Jan. 2015 Paris attacks	0.018378	0.028429	0.017407	0.056698
	SE	0.007593	0.016979	0.024011	0.029408
	t-statistic	2.420315***	1.674400*	0.724937	1.927986**
France	Nov. 2015 Paris attacks	-0.001955	0.018827	0.020133	0.032155
	SE	0.011571	0.025873	0.036590	0.044814
	t-statistic	-0.168981	0.727681	0.550215	0.717518
Belgium	2016 Brussels bombings	-0.005460	-0.012351	0.007665	0.001657
	SE	0.011199	0.025042	0.035415	0.043375
	t-statistic	-0.487531	-0.493206	0.216441	0.038191
USA	Orlando	-0.005383	-0.005024	-0.035718	-0.026586
	SE	0.008196	0.018328	0.025919	0.031745
	t-statistic	-0.656790	-0.274106	-1.378030	-0.837504
France	Nice 2016 attack	-0.007409	0.006806	0.006954	-0.007995
	SE	0.010086	0.022553	0.031895	0.039063
	t-statistic	-0.734611	0.301761	0.218042	-0.204672
Germany	Berlin 2016 attack	-0.004621	-0.006211	-0.015227	-0.004208
	SE	0.006082	0.013601	0.019235	0.023557
	t-statistic	-0.759763	-0.456629	-0.791665	-0.178648
UK	London Westminster attack	0.000964	0.017266	0.012635	0.011805
	SE	0.004462	0.009976	0.014109	0.017280
	t-statistic	0.215964	1.730727*	0.895510	0.683196
Sweden	Stockholm attack	-0.003588	-0.003592	0.010015	0.037200
	SE	0.004329	0.009679	0.013688	0.016764
	t-statistic	-0.829026	-0.371148	0.731654	2.219009**
UK	Manchester bombing	-0.002710	0.006566	0.019756	-0.013927
	SE	0.004297	0.009608	0.013588	0.016641
	t-statistic	-0.630670	0.683426	1.453951	-0.836912
UK	London Bridge attack	-0.007929	-0.032767	-0.036420	-0.041727
	SE	0.004376	0.009785	0.013837	0.016947
	t-statistic	-1.812073*	-3.348858***	-2.631972**	-2.462174**
Spain	Barcelona 2017 attack	-0.009669	-0.008574	-0.008628	-0.008538
	SE	0.005789	0.012944	0.018305	0.022419
	t-statistic	-1.670337*	-0.662366	-0.471315	-0.380830

Note 1: ***: significance at the 1%; **: significance at the 5% level; *: significance at the 10% level.
Note 2: Table presents *t*-tests for the event day and event windows of 5, 10, and 15 days. (H0: CAR=0; H1: CAR≠0); estimates of the standard error of AR and CAR and *p*-values in italics.

Table A5: Event day AR and Event window CAR for the MSCI Global Utilities Index

Country	*Event*	*Event day AR*	*5-day CAR*	*10-day CAR*	*15-day CAR*
USA	September 11 attacks	-0.010903	-0.044444	-0.043904	0.008101
	SE	0.006894	0.015415	0.021800	0.026699
	t-statistic	-1.581535	-2.883246***	-2.013985**	0.303429
Spain	Madrid train bombings	-0.018298	-0.014475	-0.032453	-0.016221
	SE	0.005108	0.011423	0.016154	0.019785
	t-statistic	-3.581896***	-1.267248	-2.008921**	-0.819874
UK	London bombings	-0.003208	0.014720	0.004837	0.011175
	SE	0.005391	0.012054	0.017047	0.020879
	t-statistic	-0.595080	1.221169	0.283744	0.535216
USA	Boston marathon bombing	-0.004828	-0.011341	-0.003765	0.001451
	SE	0.005794	0.012956	0.018323	0.022441
	t-statistic	-0.833285	-0.875334	-0.205480	0.064669
France	Jan. 2015 Paris attacks	0.003070	0.009295	0.030325	0.047180
	SE	0.007430	0.016615	0.023496	0.028777
	t-statistic	0.413186	0.559454	1.290613	1.639493
France	Nov. 2015 Paris attacks	0.010465	0.023101	0.011387	0.008734
	SE	0.009190	0.020549	0.029061	0.035592
	t-statistic	1.138774	1.124169	0.391830	0.245385
Belgium	2016 Brussels bombings	-0.004624	-0.003378	0.006057	-0.006637
	SE	0.008221	0.018382	0.025996	0.031839
	t-statistic	-0.562488	-0.183787	0.232995	-0.208469
USA	Orlando	-0.008175	-0.008611	-0.030863	0.019142
	SE	0.007040	0.015741	0.022262	0.027265
	t-statistic	-1.161204	-0.547034	-1.386380	0.702086
France	Nice 2016 attack	0.000358	0.000617	-0.006877	-0.018645
	SE	0.007804	0.017450	0.024678	0.030224
	t-statistic	0.045933	0.035359	-0.278687	-0.616894
Germany	Berlin 2016 attack	0.005843	0.010371	0.015893	0.022689
	SE	0.009318	0.020835	0.029465	0.036088
	t-statistic	0.627092	0.497762	0.539389	0.628721
UK	London Westminster attack	0.001342	0.003999	-0.006186	-0.008999
	SE	0.006629	0.014822	0.020961	0.025672
	t-statistic	0.202443	0.269780	-0.295120	-0.350551
Sweden	Stockholm attack	-0.004026	-0.005290	-0.019900	-0.015154
	SE	0.005572	0.012460	0.017621	0.021581
	t-statistic	-0.722556	-0.424557	-1.129350	-0.702205
UK	Manchester bombing	0.003370	0.005228	0.010948	-0.003878
	SE	0.005098	0.011399	0.016120	0.019743
	t-statistic	0.661091	0.458609	0.679132	-0.196414
UK	London Bridge attack	-0.004248	-0.014436	-0.010612	-0.031095
	SE	0.004926	0.011014	0.015577	0.019077
	t-statistic	-0.862415	-1.310685	-0.681305	-1.629959
Spain	Barcelona 2017 attack	-0.003161	0.000240	-0.002341	-0.004681
	SE	0.004561	0.010198	0.014422	0.017663
	t-statistic	-0.693137	0.023539	-0.162354	-0.265026

Note 1: ***: significance at the 1%; **: significance at the 5% level; *: significance at the 10% level.
Note 2: Table presents *t*-tests for the event day and event windows of 5, 10, and 15 days. (H0: CAR=0; H1: CAR≠0); estimates of the standard error of AR and CAR and *p*-values in italics.