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The dislocations of terror: Assessments of risk during the Second Intifada

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ABSTRACT

The goal of terrorism is to create havoc and disrupt the normal functioning of society. To understand the impact of terrorism on a country it is useful to consider two types of country experiences with these shocks to the social order—the instance of a very small number of attacks against high profile targets and the case of chronic terror with a great number of attacks, generally against targets that are part of routine daily activities. The present study explores the Israeli experience with chronic terror. Using expenditure information from coffee shops and restaurants we examine how individuals assess their vulnerability to an attack and adjust their behavior. Specifically, we explore whether distance from the site of an attack, and similarity of a contemplated undertaking to the target of a recent attack, influence decision making in a context of chronic terror. We find strong support for a situational similarity effect but only weak evidence for a proximity effect. We examine the implications of these findings for the organization of economic activity.

1. Introduction

Terrorist attacks have had a greater impact on expenditures by western countries and on the psychological well-being of their residents than might be expected solely from a calculation of the lethal effects. Even taking into account the horrific September 11, 2001 strikes at the World Trade Center and at the Pentagon, and the high profile attacks in London and Madrid in the years that followed, there is greater loss of life each year from traffic accidents than from terror attacks. Similarly, natural and industrial disasters have been responsible for many more fatalities than terrorism.

Nonetheless, far greater resources have been expended by the United States and by European countries to safeguard their populations from terrorism than is invested to mitigate the human cost of traffic accidents or workplace hazards. Part of the reason for the acute concern with terrorism stems from a belief that the volume of attacks would surely increase in the absence of heightened vigilance and deterrence (Posner, 2004, p. 171). Yet, the threat of terror attacks generates a level of anxiety and trepidation that is unique to this phenomenon, and a democratic government must respect this fear even when the preventive actions that are instituted have little practical effect or are unwarranted on the basis of a cost/benefit analysis (Sunstein, 2003; Shapiro, 2007, p. 1).

Terrorism is frightening because it implies agency: the maneuvering by a malevolent actor intent on inflicting injury and mayhem. The actor could be clever, devious, adaptive in foiling preventive measures, even prepared to sacrifice his or her life in order to wreak havoc and destruction—features not associated with a traffic accident or a workplace mishap. Indeed, the corrosive impact of terrorism on feelings of security is well-recognized. Thus, Fullerton et al. (2003, p. 6), assessing the

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psychological effects of different types of traumatic events, has ranked terrorism as one of "the most powerful and pervasive generators of psychiatric illness, distress, and disrupted community and social functioning."

1.1. Terror as a rare event versus chronic terrorism

In the United States, our familiarity with terrorism has largely been molded by the massive attacks of September 11, which provoked deep feelings of anxiety and a sense of vulnerability. In a national survey conducted a week after the World Trade Center strike, Schuster et al. (2001) found that 44% of adults reported severe stress symptoms; follow-up studies by Galea et al. (2002) and Holman et al. (2008) reinforced this assessment. Not surprisingly, the large scale attacks in Madrid on March 11, 2004 and in London on July 7, 2005 generated similar manifestations of psychological unease in England and Spain (Vazquez et al., 2006; Rubin et al., 2005), though there is a suggestion that the impact was muted because of the inuring effects of prior bouts with terrorism in these countries.

Distressing as it has been to residents in the United States, the attack at the World Trade Center produced only minor change in individual behavior or in the operational routines of commercial actors, except for enhanced airport security and an intensification of activity by organizations charged with responsibility for public safety. In a recent literature review, Spilerman and Stecklov (2009) concluded that the effects on the national economy were quite modest, with a rapid return to normality in the months following the assault. Few modifications were made by individuals in their daily routines as a result of the attack. Aside from the perfunctory checking of handbags at public events, it is not evident that shopping decisions, leisure activity, or bus or rail travel have been much affected, though the New York City subway rider is now urged by frequent announcements to "say something if you see something."

If the impact of terror on everyday activities has been modest in the United States and in Western Europe, this has not been the case elsewhere. In this regard, it is useful to distinguish between two historical experiences with terrorism: terror as a rare event—a very few attacks, usually directed against iconic targets—and chronic terrorism, in which many attacks have taken place over a long period of time (Spilerman and Stecklov, 2009). In countries that have experienced chronic terror, such as Northern Ireland and Israel, one's sense of vulnerability is not limited to the few times when "risky" behavior is undertaken, such as boarding an airline or visiting a prominent public building. Rather, in those countries, attacks have taken place in a great variety of settings—restaurants, retail stores, movie houses, busses, even on crowded streets.

These two types of exposure to terrorism have very different emotional and behavioral consequences. In the first case there is the perception of a rupture in one's sense of normality and the afflicted society quickly orients itself to repairing the damage and restoring the status quo ante. The impulse shock from the attack generates a "low point" in feelings of security and well being—the moment when it is recognized that the worst has transpired—which is then followed by a period of recovery and a return to normality (Baum and Dougall, 2002, p. 620). This formulation, incidentally, conforms to the stage progression model of a community's rebound from a natural or industrial disaster (e.g. Barton, 1963; Quarantelli and Dynes, 1977), and it is therefore not surprising that several investigations of the behavioral response to the September 11 strike have invoked this temporal imagery (e.g., National Research Council, 2002; Smelser, 2007, chap. 5).

The second type of encounter with terrorism has consequences that intrude more deeply into the fabric of society and are pervasive and longer lasting. Once it is recognized that the attacks constitute not so much an interruption of the customary order as the emergence of a new normality with danger and threat lurking in every activity, however quotidian, individuals tend to modify their daily routines to lessen the vulnerability. They may alter mode of travel from bus to taxi, avoid unguarded restaurants, and shift shopping choices from street stores to establishments in protected malls. Indeed, Borell (2008) found this very sort of adaptation in Beirut to the wave of bombings following the assassination of Rafik Hariri in 1995.

These behavioral modifications carry profound implications for the viability and profitability of commercial establishments, consequences which are borne out in studies of several countries that experienced bouts of terrorism. Thus, following the renewal of attacks into Israel from the Palestinian territories in September 2000, there was a steep fall off in foreign tourism (Fleischer and Buccola, 2002; Morag, 2006), an observation that echoes findings from other countries—e.g., the Basque attacks in Spain in the 1970s and 80s (Enders and Sandler, 1991); violence by radical Islamist groups in Egypt in the 1990s (Aziz, 1995). Further, in Israel, bus ridership was found to decline by some 5% in the week subsequent to an attack, even more deeply in large cities that were frequent targets (Becker and Rubinstein, 2011). In regard to summary effects on the Israeli economy, Eckstein and Tsiddon (2004) estimate that over a 3 year period the attacks were responsible for a 10% reduction in productive output, though the effect was uneven across economic sectors, with firms in the security industry experiencing a notable increase in sales and in market value (Berrebi and Klor, 2005; Handels, 2004).

1.2. Vulnerability and coping strategies under chronic terrorism

From the perspective of understanding the variety of ways that terrorism can impact the social order, the experience of countries that have had to confront chronic terrorism is clearly the more informative case. It is also evident that the effects on commercial actors in these countries, noted above, are driven by the concerns individuals have about their personal safety, and that the modifications made in their daily routines are intended to reduce exposure to an attack. This raises a fundamental issue of how individuals come to assess their personal vulnerability and the sorts of steps they take to reduce at least the anxiety associated with vulnerability, if not the actual risk of becoming a victim. This issue is the subject of the present study.

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The literature on adaptations to chronic terrorism emphasizes two kinds of coping strategies: "problem-focused" coping and "emotion-focused" coping (e.g., Schiff, 2006; Maguen et al., 2008). The first refers to approaches for enhancing security that involve observation and causal reasoning and which attempt to deal directly with the stressor; the second covers methods for reducing the emotional distress prompted by the stressor, such as a fatalistic orientation and magical-religious thinking. Thus, in studies of strategies used by Israeli bus commuters, it was noted that while the majority avoided high risk bus lines, searched under seats for suspicious packages, and tried to locate themselves close to an exit, a minority sought protection with artifices such as self-distraction, denial of the risk, and recitation of psalms (Gidron et al., 1999; Kirschenbaum, 2005; Sosis, 2007). Interestingly, Gidron et al. (1999) conclude that while problem-focused coping has a clear protective value, it is less efficacious than denial or self-distraction in reducing anxiety.

Now, while the above strategies have been formulated in the literature as person-specific adaptations, the behavioral response to an attack might also vary through time, reflecting, among other things, changes in the actions of the terrorists. A consideration of time-varying behavioral adjustments would appear to have little relevance in the case of emotion-focused coping since this adaptation looks inward and takes minimal account of the unfolding of events external to a person's psyche. Problem-focused coping, in contrast, does involve an appraisal of risk, and this assessment, along with modifications in behavior prompted by the assessment, could well evolve in response to the developing pattern of attacks. Thus, if certain bus lines or particular shopping centers come to be seen as frequent targets, the calculating individual might alter his or her choices to avoid those routes and locales.

The adjustments that are in fact made are likely to be complex, as individuals update their assessments of vulnerability, making use of a variety of details about the prior attacks. There is also a related issue of the dynamics of the response, how it evolves in the days immediately following an attack and whether there is a tendency toward "habituation"—an inuring effect from having lived with terrorism for many years. These sorts of considerations underlie an assessment of the diverse consequences of chronic terrorism for the social organization of a country, and they provide the themes that are examined in this paper.

2. Setting and analytic formulation

Israel has been the target of terrorist violence since its founding in 1948. The attacks have come in waves, with peaks in 1955, 1968, and 2002, reflecting high points in the tension between Israel and its Arab neighbors or between Israel and the Palestinian residents of Gaza and the West Bank. Overall, according to Kirschenbaum (2006, p. 7), there have been some 2700 terror incidents since 1948.

The attacks examined in this paper occurred during 2000–2005, after several years of relative calm. Termed the Second Intifada, the post-2000 violence defines a period in which the Israeli occupation and the Palestinian resistance reached its most violent confrontation to date. We include in the study the 104 terror attacks with at least one fatality[1] that took place within the 1967 borders of Israel; collectively these incidents accounted for 575 deaths. These incidents were coded by the authors from the data base of the Institute for Counter Terrorism,[2] supplemented by listings in the Israel Foreign Ministry's chronology of terrorist attacks.[3] Each of the attacks can be characterized along a range of parameters such as location, intended target, number of injuries, and number of fatalities. During the time period under consideration the mean number of deaths per incident was 5, and there were 37 attacks with a single fatality.[4] The most sanguinary assault occurred in 2002 during the Jewish festival of Passover, in which 30 people were killed at a holiday dinner party in a hotel.

While most of the attacks were bombings, typically suicide bombings, there was substantial variation in both target type and location of the incidents. There were 34 attacks on busses, 13 at retail establishments, 13 on cafes and restaurants, 27 against outdoor targets, and 17 at a variety of other targets. With respect to location, 35 attacks occurred in Jerusalem, 25 in Tel Aviv or in the central region of Israel, 30 in Haifa or in the northern region, and 14 elsewhere in the country. It is this variation in target type and location that permits us to examine the issues of concern in the study, namely how individuals assess risk and vulnerability in a context of chronic terrorism. For example, in decisions of whether or not to dine outside the home, we seek to understand whether individuals are more sensitive to the occurrence of a recent attack at a restaurant than to one on a bus—even though there is no evidence that the target of a prior attack carries information about the likely target of the next assault.[5] Similarly, since the attacks took place throughout the country, we can inquire whether proximity to the site

[1] Incidents without a fatality are omitted both for definitional reasons (they meld into the categories of disrupted and prevented attacks for which information is sketchy) and because in a context of chronic terrorism they tended to receive little newspaper coverage and were not very visible to the public.

[2] ICT, Interdisciplinary Center, Herziliya, Israel. www.ict.org.il/.

[3] www.mfa.gov.il/MFA/Terrorism-+Obstacle+to+Peace/Palestinian+terror+since+2000/.

[4] There were a total of 111 attacks in the period but seven were multiples, occurring on the same day as another attack. For simplification, since "day" is the analytic unit in this study, days with multiple attacks were coded according to the characteristics of the more sanguinary incident in the assumption that it would have received the greater newspaper coverage.

[5] A test of the information content can be made by comparing the probability of a next attack on a particular type of target conditional on the prior attack having been against the same target type, versus the unconditional probability of an attack on the target type. For example, the unconditional probability of an attack on a bus during the time period of the study was (34/104) = .33, whereas the probability of a bus attack, given that the immediately prior attack occurred on a bus, was (12/34) = .35. These two probabilities are not statistically different. Thus, knowing that the prior attack was on a bus is not informative about the likelihood that a bus will be the target of the next attack. Analogous calculations for the other target types also fail to show an association between prior and current targets.

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of a recent incident affects feelings of personal vulnerability as expressed in various behavioral choices, even though the location of a prior attack provides no information about the likely site of the next attack.[6]

2.1. Analytic formulation

We explore how risk and vulnerability are assessed in a context of chronic terrorism from the way that individuals adjust their daily routines following a terror event. Two sources of information are used in the study. Our primary analysis is based on a unique data set to which we were accorded access—establishment-level data from the Aroma coffee house chain, covering three shops in the Jerusalem area. Our outcome variable is cash register receipts of daily sales at each coffee house from late 2000 to the end of 2005. The Aroma chain opened its first establishment in Jerusalem in 1994 and has since spread across Israel, as well as to other countries. Unlike many coffee shops in the United States, the Aroma chain serves a variety of foods, especially sandwiches and salads, and provides a popular alternative to restaurants for quick meals. In examining coffee house sales, our presumption is that a terror event might depress patronization at exposed settings, such as restaurants, coffee shops, retail stores and busses, though the effect might vary with distance from the attack site and by type of target that was impacted, among other factors. Thus, we use sales at these establishments as an indicator of how consumer behavior is impacted by terror attacks.

The sales data are particularly suitable for this study in that they were obtained from the internal accounting system of the Aroma chain, with similar record keeping protocols used by all the coffee houses. Each of the three Jerusalem shops is positioned geographically in a distinct social environment and provides a different perspective on the reaction to terror. One, located on Hillel Street, is considered the first modern coffee shop in Jerusalem and is a familiar institution in the city. It is situated within the central business district and frequented by both workers and tourists. The second, in the German Colony section of the city, is popular for socializing in the evening and on weekends. It is distant from the central business district and less visited during working hours. The third shop is located in Mevasseret, a secular suburban town just outside the Jerusalem city limits. Unlike the other coffee houses, the Mevasseret establishment is situated within a guarded mall.

We supplement the Aroma analysis with a second data set on household expenditures in coffee houses and restaurants in Israel. These data are from the Household Expenditure Survey, which is conducted annually by the Israel Central Bureau of Statistics and cover the years 2000–2005. A routine component of the Expenditure Survey involves a diary that is filled out for 15 consecutive days by a rotating panel of households. Respondents were asked to report all expenditures during this interval using a detailed list of categories. The diary panels permit a second reading on behavioral change in the period following an attack. While the Aroma data provide an accurate representation of the time series in daily sales receipts, they have the limitation of conveying behavioral adaptations as observed in a few establishments in one Israeli city. In contrast, the Expenditure Survey data are representative of the national population though the information is based on self reports that vary in completeness. Despite this (and other limitations of the Survey, detailed later), we utilize the diary data to assess the robustness of the Aroma findings; in particular, to ascertain whether the main results can be replicated at the population level, as well as to pose additional questions about location effects.

Our basic analytic specification of the effect of a terror attack on coffee house sales S_t on day t is given by the time series regression,

$$\log(S_t) = \boldsymbol{\beta}_0 + \boldsymbol{\beta}\boldsymbol{X}_t + \sum_{k=0}^{5}\gamma_k terror_{t-k} + e_t \tag{1}$$

where the vector $\boldsymbol{X}_t$ contains dummy variables for year, month, day of week, and whether day t is a holiday, while $\boldsymbol{\beta}$ in this semi-log formulation is a coefficient vector of approximate percentage changes in sales given a unit change in $x_t \in \boldsymbol{X}_t$ from its reference category.[7] Within the summation, the term $terror_{t-k}$ takes the value "1" if there was an attack with fatalities on day $t-k$, and is "0" otherwise, while the γ_k coefficient captures the impact on day t sales from an attack k days in the past.

Think, then, of a terror attack as an exogenous shock applied to the social system. The preceding formulation permits an examination of the time pattern of the response, beginning on the day of the attack and continuing over the subsequent 5 days. These terror effects are the focus of our interest and are identified with respect to the predicted value of $\log(S_t)$ on the days outside the intervals encapsulating an attack.

3. Temporal pattern of the response at the aroma coffee shops

We begin with a set of baseline models in Table 1 which omit the terms for terror attacks. The intent of the baseline regressions is to convey the extent to which sales at the three Jerusalem coffee shops—Hillel, German Colony, and Mevasseret—are accounted for by the temporal structure of the sales data before variables that tap the effects of the terror attacks

[6] In particular, the unconditional probability of an attack in Jerusalem was (35/104) = .34, while the probability of an attack in Jerusalem, given an immediately prior attack in the same city, was (13/35) = .37. These values are not statistically distinguishable.

[7] We emphasize "approximate" percentage change because in a semi-log regression the true proportional change is $\exp(b\Delta x - 1)$, which is non-linear. This value is estimated with the linear relationship $b\Delta x$ (Thornton and Innes, 1989).

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Table 1
Baseline model of daily coffee house sales in Jerusalem in 2000–2005, by coffee shop (GLS estimates, standard errors in parentheses).[a]

	Hillel		German Colony		Mevasseret	
	Coef.	(se)	Coef.	(se)	Coef.	(se)
Year 2000	0.170**	(0.034)	0.160**	(0.052)	–[b]	–
Year 2001	0.234**	(0.034)	0.218**	(0.052)	0.038	(0.027)
Year 2002	0.022	(0.034)	−0.032	(0.052)	0.042	(0.027)
Year 2003	−0.028	(0.034)	−0.093	(0.052)	−0.121**	(0.026)
Year 2004	0.028	(0.027)	−0.154*	(0.056)	−0.089**	(0.026)
February	−0.024	(0.020)	0.023	(0.030)	0.018	(0.030)
March	−0.037	(0.019)	−0.032	(0.030)	−0.011	(0.030)
April	−0.015	(0.019)	0.011	(0.033)	−0.044	(0.030)
May	0.005	(0.019)	0.045	(0.032)	−0.092**	(0.029)
June	0.067**	(0.019)	0.093**	(0.032)	−0.004	(0.032)
July	0.118**	(0.019)	0.156**	(0.032)	0.041	(0.031)
August	0.117**	(0.019)	0.100**	(0.032)	0.046	(0.031)
September	0.081**	(0.019)	0.010	(0.033)	−0.054	(0.032)
October	0.053**	(0.019)	−0.043	(0.032)	−0.030	(0.031)
November	0.042*	(0.019)	−0.043	(0.032)	−0.032	(0.032)
December	−0.006	(0.019)	−0.068*	(0.032)	0.040	(0.031)
Monday	−0.107**	(0.013)	−0.143**	(0.029)	−0.145**	(0.024)
Tuesday	−0.083**	(0.014)	−0.178**	(0.027)	−0.078**	(0.024)
Wednesday	−0.087**	(0.014)	−0.079**	(0.027)	−0.124**	(0.024)
Thursday	−0.087**	(0.014)	−0.170**	(0.027)	−0.091**	(0.024)
Friday	−0.085**	(0.014)	0.052	(0.027)	−0.200**	(0.024)
Saturday	0.175**	(0.013)	−0.184**	(0.029)	−1.047**	(0.028)
Holiday	−0.319**	(0.028)	−0.352**	(0.058)	−0.500**	(0.054)
R-squared	0.471		0.330		0.576	
No. days	1857		1578		1477	
DW-OLS	1.886		2.150		1.835	
DW-GLS	2.010		1.936		1.812	

[a] Dependent variable is ln(sales). Reference terms for the categories are: 2005 for year, January for month, and Sunday for day of week. Constant term suppressed to protect confidentiality in total sales.
[b] The coffee house in Mevasseret opened in 2001.
* $p < 0.05$.
** $p < 0.01$.

are introduced. The baseline terms, though not shown in the later tables in order to conserve space, are included as controls in all subsequent regressions.

Non-stationarity and serial correlation are concerns with time series data. Non-stationarity poses a danger of spurious effects—apparently significant regression estimates from unrelated data (Kennedy, 2003, pp. 349–54). A Dickey–Fuller test for stationarity (unit root test) was therefore performed with each of the expenditure time series. The null hypothesis of non-stationarity was rejected in each case, with test statistics $Z = -30.6$ for Hillel, $Z = -35.3$ for German Colony, and $Z = -35.8$ for Mevasseret. In all three cases rejection is at the significance level $p < 0.001$.

Serial correlation of the error terms has the potential to bias the standard errors, leading to erroneous conclusions. To minimize the possibility of serial correlation we include a large number of controls to account for the temporal structure in the data; they cover year, month, day of the week, and holiday status. Even with these controls the OLS estimates exhibited serial correlation as judged by the Durban–Watson d. For Hillel, $d = 1.89$, just below the lower bound threshold of $d_L = 1.90$, revealing marginally positive autocorrelation at the 0.05 level; for German Colony $d = 2.15$, exceeding the upper bound statistic $4 - d_L = 2.11$, and indicating mild negative correlation of the error terms, while for Mevasseret $d = 1.84$ versus $d_L = 1.89$, suggesting positive autocorrelation. While these effects barely reach significance, we report in Table 1 GLS estimates, which attempt to correct for the correlated errors.[8] Note from the last row of the table that the Durban–Watson statistic for Hillel is raised to 2.01, exceeding the rejection threshold for positive correlation, while for German Colony, the reduced $d = 1.94$ removes the suggestion of negative correlation. In contrast, the d statistic for Mevasseret is 1.81 so the GLS transformation does not eliminate the evidence for correlated errors in this time series.

Even though the OLS estimates for Mevasseret exhibit less serial correlation than the GLS estimates, the difference is negligible so in the interest of consistency we report GLS results for all three coffee shops. It should also be noted that because the serial correlation is very modest in each regression, the GLS and OLS results are virtually identical. An alternate approach to ridding the residuals of autocorrelation would be to introduce a lagged dependent variable as a regressor, in the assump-

[8] A first-order autoregressive process is assumed for the error term in Eq. (1), $e_t = \rho e_{t-1} + u_t$, where the u_t are independently and identically distributed as $N(0, \sigma^2)$.

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tion that the model's dynamics have been misspecified (Kennedy, 2003, pp. 148–56). Models of this sort were also tried; but the substantive findings were no different from the GLS results that are presented in the paper.

The number of observations for each coffee shop is driven by data availability, which primarily reflects the date at which the shop was opened. Thus, Hillel, the first to begin service, provides 1857 observation days whereas Mevasseret, the last to open, has the shortest series with 1477 days. The R^2 values for the three coffee houses are fairly large, emphasizing the high degree of temporal determination of the time series in sales receipts. The explanatory power is lowest for German Colony, probably a consequence of its distant location from the business center of Jerusalem, making it dependent on leisure-oriented coffee consumption and therefore more sensitive to exogenous perturbations in demand, such as might arise from variations in weather conditions.

The results in Table 1 convey the basic temporal pattern of coffee house patronization as well as the differences between the three establishments. The terms for calendar month depict the seasonal pattern in coffee shop sales; with the exception of Mevasseret they show peak sales during summertime relative to January, which is the reference month. This sales pattern is to be expected since the winter months in Jerusalem are cold and rainy, which would suppress leisure-related patronization. The Mevasseret shop fails to follow this seasonal pattern probably due to its location in a covered mall. Finally, the day of week terms are strong and generally negative for Saturday (relative to Sunday, the reference term) and holidays, reflecting a lower tendency to patronize coffee houses on Jewish religious days. The exception of Hillel on Saturday reflects the closure of most competing coffee shops in its vicinity on the Sabbath. In totality, the month and day effects, and their variation across the three sites, make clear that the coffee house establishment data conform well to our understanding of the Israeli social context.

3.1. Short-term dynamics of the response

Using the formulation of Eq. (1) we examine in Table 2 the effects of terror attacks on daily sales in each of the coffee shops. Dummy terms are introduced for days since an attack in order to model the response dynamics. As noted, each equation also includes the Table 1 regressors as controls; thus, the secular trend and cyclic variations in the sales pattern have been netted out. The results show some evidence for the impact of the terror attacks. Though few coefficients are significant, Hillel and German Colony exhibit depressed coffee house sales in each of the 5 days following an attack; in contrast, the effect in Mevasseret is positive for much of the time interval. At peak impact there is a sales decline of 3.4% at Hillel and 7.2% at German Colony. For reasons we detail later, Mevasseret is quite different, with a significant 5.8% sales increase on the fifth day following an attack. All these results, however, are based on the totality of attacks—massive events with many fatalities as well as small attacks with few casualties. Yet, in a country that has experienced terrorism as an on-going existential condition, smaller incidents often receive little newspaper coverage and, possibly, have less impact on behavioral decisions.

The possibility that degree of havoc matters is explored in Table 3, in which the attacks have been categorized according to number of fatalities. Two findings emerge. First, there appears to be a threshold in fatalities before a terror attack has behavioral consequences, at least with respect to the patronage of coffee shops. The threshold effect is evident for Hillel and German Colony, and is seen in both a count of the number of days with significant terms and in the magnitude of the coefficients. Regarding the latter, in Hillel, the peak sales reductions due to mid-size and large attacks are 9.3% and 9.1%, respectively. In German Colony, the corresponding figures are appreciably larger, 18.6% and 32.0%, most likely a reflection of the leisure time orientation of this shop and its consequent greater sensitivity to discretionary behavior.

The second finding that emerges is the failure to find a significant impact on sales in the Mevasseret shop for any level of attack intensity. The coefficients for this coffee house never reach significance and the effects are often positive. A likely reason for the difference of Mevasseret from the other establishments is its location in a guarded mall with few entry portals

Table 2
Effect of terror attacks on Jerusalem coffee house sales in 2000–2005, by days since attack and coffee shop (GLS estimates, standard errors in parentheses).[a]

	Hillel		German Colony		Mevasseret	
	Coef.	(se)	Coef.	(se)	Coef.	(se)
Day of attack	−0.016	(0.017)	−0.030	(0.031)	0.014	(0.028)
1 Day After	−0.034*	(0.017)	−0.027	(0.031)	0.002	(0.028)
2 Days After	−0.017	(0.017)	−0.072*	(0.030)	−0.041	(0.029)
3 Days After	−0.023	(0.018)	−0.061*	(0.030)	0.013	(0.029)
4 Days After	−0.015	(0.017)	−0.037	(0.031)	0.016	(0.028)
5 Days After	−0.008	(0.017)	−0.004	(0.031)	0.058*	(0.028)
R-squared	0.472		0.350		0.578	
No. days	1852		1573		1418	
DW-OLS	1.891		2.168		1.838	
DW-GLS	2.008		1.938		1.810	

[a] Dependent variable is ln(sales). The variables from Table 1 are included as controls in each regression.
* $p < 0.05$.
** $p < 0.01$.

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Table 3
Effect of terror attacks on Jerusalem coffee house sales in 2000–2005, by fatality level, days since attack, and coffee shop (GLS estimates, standard errors in parentheses).[a]

Fatality level[b]		Hillel		German Colony		Mevasseret	
		Coef.	(se)	Coef.	(se)	Coef.	(se)
Small attack (1–4 fatalities)	Day of Attack	−0.011	(0.021)	−0.027	(0.039)	0.023	(0.036)
	1 Day After Attack	−0.009	(0.021)	0.030	(0.039)	0.004	(0.035)
	2 Days After	0.007	(0.021)	0.015	(0.039)	−0.018	(0.037)
	3 Days After	−0.001	(0.021)	−0.046	(0.039)	0.031	(0.036)
	4 Days After	0.007	(0.021)	0.011	(0.039)	−0.005	(0.036)
	5 Days After	0.018	(0.021)	−0.020	(0.038)	0.048	(0.037)
Mid-size attack (5–9 fatalities)	Day of Attack	0.047	(0.037)	−0.088	(0.067)	−0.009	(0.058)
	1 Day After Attack	−0.073*	(0.037)	−0.133	(0.069)	−0.008	(0.060)
	2 Days After	−0.058	(0.037)	−0.077	(0.069)	−0.079	(0.065)
	3 Days After	−0.025	(0.037)	0.010	(0.067)	0.047	(0.067)
	4 Days After	−0.093*	(0.037)	−0.186**	(0.067)	0.066	(0.062)
	5 Days After	−0.025	(0.037)	0.021	(0.067)	0.044	(0.060)
Large attack (10 or more fatalities)	Day of Attack	−0.087*	0.035)	0.014	(0.065)	0.023	(0.061)
	1 Day After Attack	−0.091**	(0.035)	−0.111	(0.066)	0.025	(0.061)
	2 Days After	−0.052	(0.036)	−0.320**	(0.066)	−0.067	(0.061)
	3 Days After	−0.084*	(0.035)	−0.146*	(0.065)	−0.076	(0.063)
	4 Days After	0.005	(0.035)	−0.062	(0.065)	0.025	(0.063)
	5 Days After	−0.050	(0.035)	0.041	(0.065)	0.093	(0.060)
R-squared		0.481		0.376		0.578	
No. days		1852		1573		1418	
DW-OLS		1.901		2.186		1.843	
DW-GLS		2.005		1.934		1.810	

[a] Dependent variable is ln(sales). Included in the regressions are the variables from Table 1.
[b] $N = 63$ for small attack; $N = 20$ for mid-size attack; $N = 21$ for large attack.
* $p < 0.05$.
** $p < 0.01$.

and effective screening at the mall gates. Our findings suggest that customers respond to this higher level of security by not reducing patronage following an attack. Indeed, the modest evidence for increased patronage, especially pronounced in Table 2, could reflect a tendency by individuals who feel at risk in other coffee houses to shift their leisure-time activity to Mevasseret.

The time paths in sales after an attack at the two exposed coffee houses, Hillel and German Colony, show considerable day to day differences, reflecting the particulars of the establishments. To get a sense of the more stable dynamics of the adjustment process we present in Fig. 1 the aggregated response of the two establishments to both the totality of attacks (Aroma—

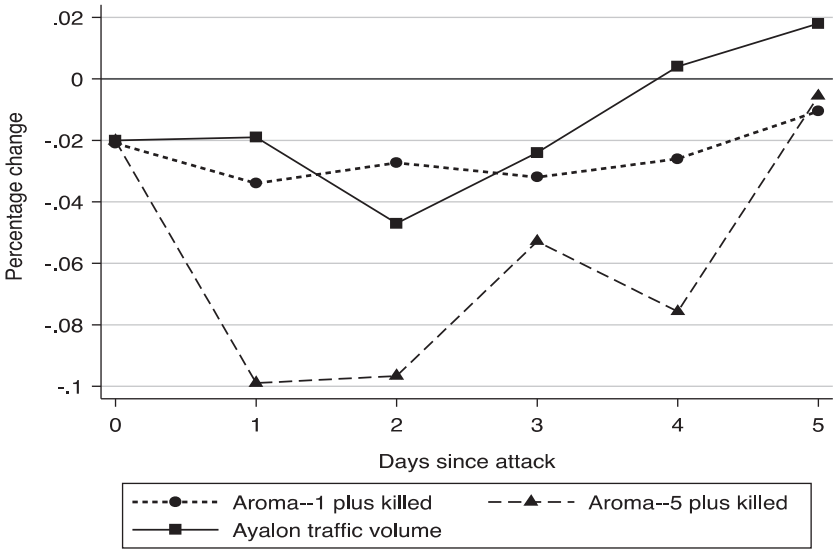

Fig. 1. Impact of terror attacks on Hillel and German Colony coffee sales and on traffic volume, by days since attack (Ayalon traffic data from Stecklov and Goldstein (2010)).

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1 plus killed) and to attacks with five or more fatalities (Aroma—5 plus killed). We also include, as an overlay, the daily adjustments in traffic volume on Israel's main highways following a terror attack, as reported by Stecklov and Goldstein (2010). From these graphs it is evident that even when an attack is severe the effect tends to be of short duration, with a return to normal routine within a week. Further, the response time paths in coffee house patronization and in travel decisions appear qualitatively similar, and this may be indicative of a general time course in the expression of vulnerability that applies to a variety of behavioral areas.

3.2. Considerations of past history

Even though the short-term dynamics shows a rapid return to customary behavior, there remains the prospect of long-term consequences from the terror attacks. We examine two formulations of long-term effects. The first involves a "memory effect" in which there is a lag in the response arising from a rethinking of one's behavioral choices in the weeks and months following an attack, perhaps leading to a delayed decision to avoid certain settings. The second relates to an "habituation process," in which there is a growing acclimation to living with terror such that, after many assaults over a long time period, individuals become inured in their reaction to an attack. Both sorts of adjustments can be examined with our data.

At this point we are less interested in the short term dynamics of the response than in whether the coffee house sales are conditioned by the past history of terrorism. It is therefore convenient to represent an attack by a single term, Att_t, that summarizes the effect over the 6 day response period. This permits us to disregard the day to day variations with no loss in com-

Table 4
Impact of history of all attacks (cols. 1) and severe attacks (cols. 2) on Jerusalem coffee house sales, 2000–2005 (GLS estimates, standard errors in parentheses).[a]

	Hillel		German Colony		Meverseret	
	(1)	(2)	(1)	(2)	(1)	(2)
A. Memory effects model[b]						
Current attack	−0.017**	−0.047**	−0.032**	−0.085**	0.003	0.010
	(.005)	(.013)	(.008)	(.020)	(.008)	(.020)
Attacks within 7–30 days	−0.015**	−0.023**	−0.028**	−0.045**	0.012	0.024**
	(.004)	(.006)	(.007)	(.009)	(.006)	(.009)
Attacks 1–2 months prior	0.004	0.007	−0.015*	0.001	0.010	0.013
	(.004)	(.005)	(.007)	(.008)	(.007)	(.008)
Attacks 2–3 months prior	0.006	−0.001	0.003	0.005	0.011	0.021**
	(.004)	(.005)	(.008)	(.008)	(.007)	(.008)
R-Squared	0.491	0.493	0.402	0.411	0.574	0.573
Number of days	1767	1767	1488	1488	1477	1477
DW-OLS	1.923	1.928	2.214	2.223	1.845	1.853
DW-GLS	2.003	2.002	1.934	1.934	1.812	1.814
B. Habituation model[c]						
Attack in 2000–2001	−0.014	−0.051	0.002	−0.037	0.011	0.027
	(.010)	(.028)	(.015)	(.044)	(.017)	(.045)
Attack in 2002	−0.029**	−0.066**	−0.062**	−0.126**	0.014	0.016
	(.008)	(.019)	(.012)	(.030)	(.013)	(.031)
Attack in 2003	−0.002	−0.016	−0.023	−0.078	−0.012	−0.041
	(.009)	(.027)	(.015)	(.043)	(.015)	(.043)
Attack[d] in 2004–2005	−0.011	−0.016	−0.001	0.008	−0.010	−0.011
	(.013)	(.034)	(.029)	(.067)	(.020)	(.050)
Attacks within 7–30 days	−0.014**	−0.023**	−0.025**	−0.046**	0.012	0.020*
	(.004)	(.005)	(.007)	(.009)	(.006)	(.009)
R-squared	0.487	0.489	0.386	0.394	0.574	0.574
Number of days	1827	1827	1548	1548	1477	1477
DW-OLS	1.934	1.940	2.208	2.217	1.843	1.844
DW-GLS	2.003	2.002	1.939	1.939	1.813	1.814

[a] Dependent variable is ln(sales). All models contain controls for the variables in Table 1.
[b] In Panel A, models (1) are based on all 104 attacks, with the regressor "current attack" equal to ln(number killed + 1) in an attack in the preceding 6 days. The other regressors are ln(number killed + 1) in the indicated time interval. Models (2) are based on the 41 severe attacks (5 + fatalities). "Current attack" is a dummy variable for a severe attack within the preceding 6 days. The other regressors are counts of the number of severe attacks in the indicated time interval.
[c] In Panel B, models (1) are based on all 104 attacks. "Attack in year *k*" is has the value ln(number killed + 1) in an attack in the preceding 6 days in the noted year. "Attacks within 7–30 days" equals ln(number killed + 1) in this time interval. Models (2) are based on the 41 severe events. "Attack in year *k*" is a dummy variable for a severe attack (5 + fatalities) in the noted year. "Attacks within 7–30 days" is a count of the number of severe attacks in this time interval.
[d] Years 2004 and 2005 are grouped together because there were no attacks with 5 or more fatalities in 2005.
* $p < 0.05$.
** $p < 0.01$.

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prehension of the process since the full story of the short-term effects is conveyed in Table 3 and Fig. 1 Our formulation of coffee house sales on day t, S_t, then becomes,

$$\log(S_t) = \boldsymbol{\beta}_0 + \boldsymbol{\beta X_t} + \gamma Att_t + d\mathbf{H}_t + e_t \quad (2)$$

where $Att_t = v$ if $\sum_{k=0}^{5} terror_{t-k} > 0$, $Att_t = 0$ if $\sum_{k=0}^{5} terror_{t-k} = 0$, $terror_{t-k} = 1$ if an attack with fatalities occurred on day $t-k$ and is otherwise 0, and v is a parameter to be assigned, indexing the severity of the attack. Further, $\mathbf{H}_t$ is a vector of aspects of the history of the terror attacks and $\boldsymbol{X}_t$ is a vector of controls for year, month, and day of the week.

3.2.1. Memory effects

With this specification we explore the long term consequences of a terror attack on coffee house sales. In the top panel of Table 4 we report two formulations of the memory model—the possibility of a delayed effect from prior assaults. Both formulations incorporate attack severity, and both include terms for earlier time periods: an attack within the past month (excluding the initial 6 days), between one and two prior months, and between two and three prior months. The difference in the formulations relates to the specification of attack severity, which is varied to explore the robustness of the results to the coding of this variable.

In both instances we base attack severity on the number killed in an attack since this is the only relevant attack characteristic that is available for the terror incidents. In the first formulation, severity is taken into account by assigning the value log(number killed + 1) to v in Eq. (2) and coding the earlier periods ($\mathbf{H}_t$) by log(total fatalities from attacks in the designated time interval + 1).[9] The findings from this coding are reported in columns (1) and are based on all 104 terror incidents. The second formulation, in columns (2), takes account of severity by restricting the analysis to the 41 attacks with 5 or more fatalities. In this case, the current attack term is a dummy variable ($v = 1$ in Eq. (2)) and the historical variables ($\mathbf{H}_t$) are counts of the number of attacks in the noted time intervals.

The results in Table 4 are quite clear. In the case of Hillel and German Colony, whichever formulation is used it is evident that an attack earlier in the month as well as an assault within the preceding 6 days depressed coffee house patronage. Net of these effects there is little indication that earlier history matters, though one coefficient, for German Colony, does reach significance. An assessment of the magnitude of the impact can be drawn from the severe events analyses (columns 2),[10] which indicate that a severe incident lowered Hillel sales by 4.7% over the subsequent 6 days, with a somewhat larger 8.5% reduction in German Colony. Attacks earlier in the month appear to have had effects half as large as the immediate reductions, though this interpretation is only an approximation since the variable for past month is a count of number of attacks, not a dummy term. It is the case, however, that very few of the entries exceeded one, so the approximation is probably not far off. Finally, the results for Mevasseret, sequestered in its protected mall, continue to deviate from those of the other coffee houses, providing further evidence of increased patronage following an attack.

3.2.2. Habituation effects

What can be said about habituation to chronic terror? After years of living with the threat of violence, do individuals become inured to news of a new attack, with the consequence that the response is weaker than it was in earlier years? Such a possibility was suggested by Lopez-Rousseau (2005) and Rubin et al. (2005) in their examinations of the reaction to terror in Spain and Great Britain. Israel is an appropriate site for probing this issue because its residents have had to cope with violent attacks since the founding of the State in 1948. While suitable information is not available for the initial decades of Israel's existence, with our data we can approximate the experience of a growing acquaintance with terror. In particular, there was a hiatus in attacks during the late 1990s in anticipation of a peace agreement. With the failure of the Camp David talks in 2000 a new outbreak of terror began, and our time series dates to that occasion. We can therefore inquire as to whether there was a more pronounced response to attacks in the first years of this period than in later years. A similar question was raised by Stecklov and Goldstein (2010) with respect to change in highway traffic fatalities following a terror attack; they found little support for an habituation thesis. However, café and restaurant choices involves different considerations from highway driving decisions, and an habituation process might well pertain to the former.

In the lower panel of Table 4 we address this issue with the two specifications of severity. As before, models (1) utilize all 104 terror attacks with coding that reflects the ferocity of an incident, while models (2) are restricted to the 41 instances of severe attacks, ones with five or more fatalities. The key variables in both formulations are the terms for the year of an incident; they are analogous to the "current attack" variable from the top panel and are coded identically.[11] A cautious reading of the results fails to support an habituation thesis since there is no consistent decline over the years in the magnitude of the effect. Rather it appears that 2002 was an especially harrowing and dispiriting period, possibly due to the immense number of attacks in that year (42), far more than in the other years (see Table A1).

[9] There is no compelling reason for a selecting a particular scaling of the number killed in an attack. Our choice of the log measure reflects the amount of newspaper attention given to an attack. In general, an attack with 10 killed received more coverage than an attack with 5 killed, but less than twice the amount. And an attack with 30 killed did not receive 10 times the coverage of an attack with three fatalities. Thus, the log measure appeared to be an appropriate choice. Alternative measures, such as the square root of fatalities were examined with no notable difference in results.

[10] The variables in the "all attacks" models (cols. 1) are fatality counts, making an interpretation of the coefficient magnitudes less revealing for the purpose of assessing the effect on sales.

[11] The year-of-attack variables are interactions of "attack" with "year." These terms are reported for all years because we utilize the formulation in Brambor et al. (2006, pp. 69-70), in which multicolinearity is avoided by omitting the main effect of "attack".

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Thus, irrespective of the specification that is used, along with Stecklov and Goldstein (2010) we fail to find support for an habituation thesis, though we do find evidence of a short term "memory effect," limited to about a month in duration. At the same time, we cannot exclude the possibility that the behavioral response to terrorist attacks was more acute in the early years of the State, when Israelis were less familiar with the phenomenon of terrorism and when the shock value of each attack might have been considerably greater.

4. Characteristics of the attacks and assessments of vulnerability

The dynamics of the response has made clear the time course in perceptions of vulnerability, as evidenced by changes in coffee house patronage in the days and weeks following an attack. We now expand the examination of risk perception to take into account two additional considerations that have been a focus of research—distance from the site of an attack and similarity of the target to some contemplated behavior. The theme of risk perception is a central issue in the terrorism literature since a principal goal of terrorist groups is to create fear and disarray, thereby disrupting the normal functioning of society (Hoffman, 2006, chap. 5; Krueger, 2007, pp. 119–129). It is therefore of some importance to ascertain the structural dimensions along which the disruption from terror attacks is most acute.

Distance from the site of an attack has been found to be a factor in predicting post-traumatic stress. Thus, Galea et al. (2002) observed that 20% of lower Manhattan residents, in the proximate vicinity of the 2001 World Trade Center attack, showed severe stress symptoms, in contrast with 6.8% of residents in more distant upper Manhattan. Schlenger et al. (2002) reported similar effects of distance in a national sample but also noted an association of stress symptoms with the amount of television viewing of the attack, which might mitigate the effect of physical distance. Analogously, considerations of situational similarity in assessing vulnerability—the comparability of a contemplated undertaking to the features of some traumatic event—have been a research motif in studies of risk perception (Magnusson and Ekehammar, 1978; Sitkin and Weingart, 1995; Burns, 2007) and might well affect the behavioral response to a terror attack.

We formulate our test of the distance effect by comparing the change in sales at the Aroma coffee houses according to whether an attack took place in Jerusalem or elsewhere in the country. Correspondingly, we investigate the salience of situational similarity by assessing the impact on sales from an attack at a coffee house or restaurant[12] versus at a different target type. It is these differential effects that relate to how individuals code their vulnerability, whether or not along the postulated dimensions, even though, as noted earlier, neither location of a prior assault nor target type provides useful information about a next attack.

4.1. Methodological approach and findings

The appropriate formulation of these effects should include terms for both attack location and target type since the target categories are not uniformly distributed in the country. For example, there are more restaurants in Tel Aviv than in Jerusalem, and, for this reason, more attacks at restaurants can be expected to have taken place in the former city. Thus, if there is a differential response in coffee house sales according to target type, this effect will be confounded with location unless the two variables are examined together. However, the simultaneous inclusion in a regression of both target type and location creates an estimation problem.

Our coding of location has three categories. For each day, one of the following could have occurred: no attack; attack in Jerusalem, attack elsewhere in the country. Similarly, to test the situational similarity calculation we use three target categories: no attack, attack at a cafe/restaurant, attack against a different target. Normally, one category would be excluded from each variable. However, since "no attack" is common to both variables, it is necessary to drop a second category from one of the variables to secure identification. But if a second category is omitted, the reference term would be a mixture of the two deleted categories, muddying the interpretation of the attack effects.

Fortunately, since we are interested in contrasts—the effect of an attack of severity v in Jerusalem relative to a similar attack elsewhere; the impact of an attack of this severity at a cafe/restaurant versus one against a different target—it is possible to define regressors to achieve this purpose without having to estimate the individual effects. As noted in Appendix A, the model,

$$\log(S_t) = \boldsymbol{\beta}_0 + \boldsymbol{\beta}\boldsymbol{X}_t + \gamma Att_t + \delta_1 Jeru_t + \delta_2 Cafe/rest_t + e_t \tag{3}$$

produces the following differential effects: δ_1 = sales difference from a Jerusalem attack relative to a similar attack at another location, δ_2 = sales difference from a cafe/restaurant attack relative to a different target. In this regression $\boldsymbol{X}_t$, is a vector of control variables, Att_t denotes an attack of severity v as specified in relation to Eq. (2), $Jeru_t$ notes an attack of this severity in Jerusalem, and $Cafe/rest_t$ indexes a commensurate attack at a cafe/restaurant. For reasons explained in the appendix, γ, the coefficient of Att_t does not have an informative interpretation.

The findings from this analysis are presented in Panel A of Table 5. To assess the robustness of the findings to the coding of severity, we report the two formulations that were introduced in Table 4. In particular, in column (1) the effects are based on

[12] Although the Aroma shops are termed coffee houses they also serve light meals. Consequently, there is little substantive basis for distinguishing between the two target categories, coffee house and restaurant, and we combine them in the analysis.

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Table 5
Effects of all terror attacks (cols. 1) and severe attacks (cols. 2) on Jerusalem coffee house sales in 2000–2005, by location of attack and target type (GLS estimates, standard errors in parentheses).[a]

	Hillel		German Colony		Mevasseret	
	(1)	(2)	(1)	(2)	(1)	(2)
Panel A[b]						
Attack	0.002	−0.006	0.006	−0.017	−0.001	0.002
	(.006)	(.016)	(.010)	(.026)	(.010)	(.026)
Jerusalem	−0.023**	−0.045	−0.014	0.005	0.001	−0.007
	(.009)	(.024)	(.014)	(.037)	(.015)	(.039)
Cafe/Rest.	−0.032**	−0.097**	−0.110**	−0.316**	0.009	0.006
	(.010)	(.029)	(.016)	(.045)	(.018)	(.050)
R-squared	0.482	0.483	0.391	0.393	0.575	0.575
No. cases	1857	1857	1578	1578	1477	1477
DW-OLS	1.919	1.920	2.232	2.236	1.836	1.835
DW-GLS	2.000	2.003	1.942	1.942	1.812	1.812
Panel B[c]						
Attack	0.022	0.018	0.019	0.007	−0.017	−0.025
	(.012)	(.026)	(.019)	(.040)	(.019)	(.041)
Jerusalem	−0.015	−0.036	−0.010	−0.032	−0.006	−0.013
	(.010)	(.019)	(.015)	(.031)	(.016)	(.033)
Cafe/Rest.	−0.053**	−0.079**	−0.121**	−0.172**	0.025	0.040
	(.014)	(.029)	(.022)	(.045)	(.024)	(.053)
Bus attack	−0.034**	−0.041	−0.017	−0.009	0.022	0.035
	(.013)	(.030)	(.021)	(.047)	(.020)	(.048)
Retail shop	−0.007	0.023	−0.028	−0.024	0.011	0.033
	(.015)	(.036)	(.024)	(.056)	(.025)	(.057)
Indoor attack[d]	−0.001	0.028	0.050	0.225	0.008	−0.087
	(.025)	(.086)	(.038)	(.134)	(.040)	(.138)
Outdoor attack[e]	0.008	0.050	−0.018	−0.018	0.013	0.019
	(.016)	(.052)	(.026)	(.081)	(.026)	(.085)
R-squared	0.487	0.488	0.397	0.389	0.575	0.575
No. cases	1857	1857	1578	1578	1477	1477
DW-OLS	1.929	1.933	2.239	2.247	1.837	1.837
DW-GLS	2.002	2.001	1.942	1.945	1.812	1.812

[a] Dependent variable is ln(sales). Controls present for Table 1 variables.

[b] In Panel A, columns (1) report effects on coffee house sales with the 104 attacks coded by ln(number killed + 1) in preceding 6 days. Columns (2) report effects with dummy coding of the 41 severe attacks. The coefficient of "attack" has no useful interpretation. The coefficient of "Jerusalem" conveys the effect of an attack in that city relative to one elsewhere in Israel. The coefficient of "cafe/restaurant" repots its effect relative to "other target," the omitted term. See text and Appendix A for details.

[c] In Panel B, columns (1) report effects on coffee house sales with the 104 attacks coded by ln(number killed + 1) in preceding 6 days. Columns (2) report effects with the 104 attacks coded by "number killed" in preceding 6 days. The target type coefficients refer to effects relative to "misc. target," the deleted term. "Misc. target" covers attacks against assorted target types, each with a small *N*. Column (2) entries have been multiplied by 10.

[d] "Indoor attack" includes attacks in a home, an office, or at another sort of workplace.

[e] "Outside attack" includes bomb and knife attacks on public streets.

* $p < .05$.

** $p < .01$.

all 104 attacks with severity coded by $v = \ln(\text{killed} + 1)$, while the column (2) entries reflect a dichotomous coding of the 41 severe events ($v = 1$). The results are fairly consistent across the two formulations. With respect to situational similarity, an attack at a cafe/restaurant caused a substantial fall off in patronization at both the Hillel and German Colony, relative to an attack against a different target type. From the column (2) entries, it is the case that a severe attack produced a 9.7% decline at Hillel and a 31.6% decline at German Colony in the days following the attack. In contrast, there is only weak support for the proximity thesis. While the Jerusalem term is significant for Hillel in one formulation, and nearly significant in the second, there is no evidence from German Colony for a proximity effect. The Mevasseret shop, once again, does not show a decline in cash register receipts, neither with respect to attack location nor target type.

One caveat with our assessment of a situational similarity effect is that the omitted category is heterogeneous and might well include some target types that produce declines in patronage at the Jerusalem coffee houses commensurate in size with a cafe/restaurant attack. This possibility is examined in Panel B where the category "other target" has been decomposed into five specific target types: bus attack, incident at a retail shop, indoor attack (home, workplace), outdoor attack, and miscellaneous target, with the last serving as the reference term. In models (1), as before, severity is coded by ln(killed + 1). In models (2), however, because of the increase in the number of attack categories, we cannot restrict consideration to the 41 severe events. Instead, we retain all 104 incidents and code severity by the number killed, which assigns a greater weight to the more severe events than in models (1), thereby serving as a rough approximation to considering only the severe events.

In every case, with respect to Hillel and German Colony, the point estimates for the new categories are smaller than for cafe/restaurant, suggesting that there is a particularly intense response when an activity is contemplated that bears similar-

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ity to the target of a recent attack. Moreover, even though the Ns of many of the attack categories are quite small (see Table A1), with the exception of Hillel following a bus attack, a one-tail test of the null hypothesis that an attack at a cafe/restaurant has no different effect from an attack against a different target type is rejected in favor of the alternative that a cafe/restaurant attack was more disruptive of sales. In short, the findings with the detailed target types are consistent with the contention that situational similarity has an impact on decision making following a terror attack; at least this is the case with respect to patronization of cafes and restaurants.

5. Evidence from the expenditure survey

The Aroma data convey the response to terror attacks as witnessed by three coffee houses in Jerusalem. While the findings are informative of how patrons assess their risk and the way this influences behavior, there remains a question of generalizability of the results because they derive from a few establishments in a single city. We therefore turn to a second data set, the Israel Household Expenditure Survey, which is representative of the Israeli population. This survey is administered annually by the Israel Central Bureau of Statistics. Each workday some 30 households are interviewed; this provides an annual sample size of approximately 6000. As part of the survey each household is asked to record its expenditures on a daily basis over a 15 day period for a detailed list of items. The list includes expenditures at cafes and restaurants, and it is this material for the years 2000–2005 that we draw upon to complement the establishment-level data from the Aroma chain.

The Expenditure Survey is not without its limitations. For one, there appear to be considerable differences in the comprehensiveness of the reports filed by the different households. More serious is the fact that on any given day relatively few households were in the diary panel and thus exposed to the shock of an attack; even fewer were exposed to an attack against a particular target type. Finally, for three-quarters of the households—those residing outside the three main cities of Israel—we lack residence information because of confidentiality restrictions. In consequence, given the limitations of both the Aroma data set and the Household Expenditure Panel, we choose to base our assessment of the terror effects on the robustness of the findings across the two data sets, rather than relying on results from a single investigation.

A few changes in analytic formulation are required. With the Aroma data, we distinguished between attacks in Jerusalem and attacks elsewhere in the country in order to get a sense of the consequence of proximity to a recent incident. With the Expenditure Survey too few Jerusalem residents are in the sample to replicate this model. Instead, we generalize the formulation to distinguish between local and non-local attacks, with the former referring to incidents that took place in the city of one's residence. However, since the Expenditure Survey identifies only three localities—Tel Aviv, Jerusalem, and Haifa—we add a term for location unknown in order to retain the full sample of respondents.[13]

Our intent, then, is to examine the change in patronization of cafes and restaurants in Israel following an attack, as a function the target type and of whether or not the attack was local to the household. Accordingly, for each of the 15 days that respondent i was in the diary sample we assign a binary term for attendance at a cafe/restaurant, and estimate the impact of an attack on patronization using a logit model with household fixed effects,[14]

$$\log(P_{it}/1-P_{it}) = \boldsymbol{\beta}_0 + \boldsymbol{\beta}\boldsymbol{X}_{it} + \gamma\ Att_t + \delta_1\ local_t + \delta_2\ LocUnk_t + \delta_3\ Cafe/rest_t + w_i + e_{it} \tag{4}$$

where P_{it} is the probability of dining out on day t, $\boldsymbol{X}_{it}$ is a vector of controls for the terms in Table 1, and the other variables provide the location contrasts (versus "non-local attack) and the target type contrast (versus "other target") as specified in Appendix A. The term w_i in the residual $w_i + e_{it}$ represents the household-specific component and differs between households, and e_{it} is a normally distributed error term. Thus, the fixed-effect specification removes the influence of unobserved heterogeneity that is constant over time and provides an estimate of the average within-household change from the occurrence of an attack. A cost of this specification is that households are dropped if there was no attendance at a cafe/restaurant during the 15 day observation period. For these households we have no way of knowing whether patronization was lessened by an attack or whether they are of a sort that rarely goes to cafes or restaurants.

5.1. Findings from the expenditure survey analysis

The results, presented in columns (1) and (2) of Table 6, are consistent with the Aroma analysis. In column (1) findings are reported for the 104 attacks with severity coded by ln(killed + 1) while in column (2) the findings reflect a dummy coding of the 41 severe events. In both instances we find clear support for the situational similarity thesis, but only a weak suggestion of a proximity effect—the coefficient of "local attack" is negative relative to "non-local attack" in both specifications though it fails to reach significance.

A more detailed examination of the target type effects is presented in columns (3) and (4), with the "other target" category disaggregated into the five subcategories that were used in Table 5. Following the earlier formulation, severity is indexed by ln(number killed + 1) in column (3) and by number killed in column (4), the latter an approximation to examining only the severe events, as explained in relation to Panel B of Table 5. Also, since there is no compelling reason to select a

[13] Respondents residing outside the three cities are considered "non-local" if an attack took place in one of the three cities. The "location unknown" category is used for respondents who live outside the three cities when an attack also took place outside these cities.

[14] The STATA panel data command *xtlogit* with the *fe* specification was used in the estimation. Since the model is nonlinear, estimation is by a conditional fixed effects procedure.

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Table 6
Effects of all terror attacks (cols. 1, 3) and severe attacks (cols. 2, 4) on Cafe/Restaurant Patronage in Israel, 2000–2005, by proximity to attack site and target type (panel fixed effects logit estimates, standard errors in parentheses).[a]

	(1)[b]	(2)[c]	(3)[b]	(4)[d]
Attack	0.042	0.023	0.088	0.023
	(.116)	(.030)	(.133)	(.024)
Proximity[e]				
Local Attack	−0.648	−0.161	−0.635	−0.095
	(.387)	(.104)	(.388)	(.076)
Locality Unknown	−0.157	−0.055	−0.109	−0.071
	(.184)	(.050)	(.189)	(.040)
Target type[f]				
Cafe/Restaurant	−0.666**	−0.188**	−0.702**	−0.175**
	(.202)	(.055)	(.210)	(.038)
Retail Shop			−0.027	−0.015
			(.263)	(.059)
Indoor attack			−0.068	0.093
			(.426)	(.160)
Outdoor attack			−0.338	−0.122
			(.286)	(.090)
Misc. target			−0.221	−0.048
			(.304)	(.057)
LR chi2	424.75	423.71	426.50	445.68
No. groups	13432	13432	13432	13432
Obs. per group	15	15	15	15

[a] Data from the 15 day diary of the Israel Survey of Household Expenditures, 2000–2005. Dependent variable is patronage at a cafe or restaurant on a day during the 15 day period. Controls present for Table 1 variables. Household fixed effects estimates; chi-sq. test has 26 degrees of freedom in regressions (1) and (2), 30 degrees of freedom in regressions (3) and (4).
[b] Severity coded by ln(number killed + 1) in preceding 6 days for 104 attacks. Coefficients multiplied by 10.
[c] Binary coding of 41 severe attacks.
[d] Severity coded by number killed in preceding 6 days for 104 attacks. Coefficients multiplied by 10.
[e] "Local attack" is an incident in the city in which respondent resides. "Non-local attack" (omitted term) is one in a city in which respondent does not reside. Information on "Local" and "Non-local" is available only for Tel Aviv, Jerusalem, Haifa. "Locality unknown" is coded for respondents not residing in one of the three main cities of Israel when attack took place outside the cities.
[f] In Eqs. (1) and (2) the omitted target type is "Non-cafe/restaurant attack." In Eqs. (3) and (4) the omitted target type is "bus attack".
* $p < .05$.
** $p < .01$.

particular category as the reference term, for convenience of presentation we exclude "bus attack." The results are quite similar to the findings with the Aroma data. The point estimates show a sharp decline in cafe and restaurant patronization when the target was an establishment of this sort, though a one tailed test of the "cafe/restaurant" effect versus each of the other target types is not always significant, possibly because of the small attack numbers associated with the detailed target types (see Table A1).

To summarize our results, we find strong evidence, consistent across two data sets and different codings of severity, that in a context of chronic terrorism individuals assess their vulnerability in terms of the similarity of a contemplated activity to the target of a recent attack. With respect to location, the findings are less compelling, but suggestive of the possibility that distance from an attack site might also be a factor in the reckoning of risk. Indeed, the failure to obtain significant results in regard to proximity may reflect the small areal size of Israel, with many residents of one city commuting to work in a different city and having to contemplate their exposure to attack in both communities. In a more spacious country, such as the US, it might well be the case that an incident in a distant city is less anxiety provoking than a nearby attack, but this possibility cannot be assessed from the Israeli experience.

It is also worth noting out that the findings for Mevasseret provide clear evidence of the economic returns to retail establishments from conveying a sense of security to customers. These benefits were quickly understood by shopkeepers, and the rapid growth of the security industry in Israel during the Intifada period is testimony to this appreciation (Spilerman and Stecklov, 2009). Hillel and German Colony, incidentally, also posted guards at the entrance to intercept terrorists. Yet, the screening of suspicious customers at the doorway carries a risk that a committed suicide bomber will set off an explosion which might injure patrons within the establishment. While streetfront shops have few alternatives other than to protect the entrance, the advantage perceived by customers from location in a gated mall is made evident by the Mevasseret results.

6. Conclusions

The objective of terrorism is to create angst and havoc and disrupt the normal functioning of society. To probe the impact of the terror attacks in Israel during the Second Intifada period we have utilized a unique data set on daily expenditures in

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Jerusalem coffee houses. While the patronization of restaurants and coffee houses is hardly a matter of deep interest to social scientists, we suggest that the variations in patronage may be indicative of more general behavioral adaptations made by individuals to reduce their perceived exposure to terrorist attacks. With the coffee house data we are able to address the question of how individuals code their risk in relation to characteristics of the prior attack, as well as the matter of the summary effects of an attack.

While our analysis supports the contention of a situational similarity calculation in the way individuals assess a lethal threat, in point of fact we have only shown such an effect for when the target is a restaurant or a cafe. It is therefore of importance to ascertain whether our findings generalize to other target types. Some information on this issue is available from a recent study by Becker and Rubinstein (2011). Using data from the Israel Household Expenditure Survey for the same time period that we examined, as well as from other sources, they report results for bus ridership that are consistent with our findings. In particular, they note that in the week after a terrorist attack there was a reduction in ridership when the target was a bus, but no comparable decline when the target was of a different sort. Accordingly, it is possible to speak with some confidence about situational similarity as constituting an essential reference frame in a variety of social contexts in the way that individuals assess risk and, accordingly, modify their behavior.

Related to the disruptive intentions of terrorist groups, there is a controversy in the literature as to whether the impact of terrorism on a society is "large" or "small" (e.g., Morag, 2006; Chernick, 2005; Abadie and Gardeazabal, 2003; Krueger, 2007, chap. 3). Clearly, this is matter that cannot be answered apart from a consideration of the characteristics of the impacted society, the diversity of effects on different industries, and the pattern of the attacks. A review of these issues is undertaken in Spilerman and Stecklov (2009).

But from our analysis we can say that the immediate impact of an attack appears be of short duration, with much of the effect on patronization dissipating within a week. One might, therefore, be tempted to conclude that the terror attacks had only a modest effect on Israeli society. We suggest, however, a quite different assessment. As a consequence of the attacks, substantial investments were made by the Israeli government in military and civilian infrastructure to identify and thwart potential threats, much as occurred in the United States following the September 11, 2001 strike. This extensive redirection of resources, in and of itself, reveals the massive effect terrorism had on the social order, even though it did not pose an existential threat to the Israeli state.

Of greater relevance, in a context of chronic terrorism it is the aggregate impact of the multiple attacks that must be assessed. While the duration of dislocation from a single incident may have been brief, during the 5 year observation period of this study there were 111 sanguinary attacks with at least one fatality.[15] This occasioned a climate in which disruptions of the economy, and of social activity more generally, were quite frequent. Assessing the macroeconomic consequences of terrorism in Israel between 2000 and 2003, Eckstein and Tsiddon (2004) estimate that the attacks were responsible for a 10% reduction in per capita production output. Persitz (2007) reports similar findings, noting that the average Israeli lost some 12% of real income during the Intifada period. Durable goods consumption declined (Haj-Yehia, 2006), and the stock market values of non-defense companies were significantly eroded (Berrebi and Klor, 2005). Retail establishments were especially convulsed since they must convey a sense of security to patrons and many had to hire personnel to protect store entrances, significantly adding to the cost of business—though, at the same time, contributing to the emergence of a robust security industry in the country (Spilerman and Stecklov, 2009). In summary, despite the short impact duration of an individual attack, the experience of chronic terrorism has had a widespread and profound impact on Israeli society.

We conclude by emphasizing the very different experience that the United States has had with terror and, as a result, the distinctly different impact of terrorism on the lives of residents of this country. The essentially one-time traumatic event that Americans endured, with targets the kinds of locales that few people routinely visit, has served to disassociate the fear of attack from every-day activities. The behaviors of Americans do not appear to be much altered by risk calculations of exposure to terror when decisions are made about dining at a restaurant, taking bus or subway transport, patronizing congested department stores, or attending an entertainment event that draws a large crowd. In contrast, the Israeli experience has been very different and makes clear that chronic terror, when targeted on sites of rather ordinary activities, can have a pervasive impact on the behavior of individuals and, by extension, on the organization and viability of commercial firms.

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Appendix A

We are interested in estimating an equation of the sort,

$$\log(S_t) = \beta_0 + \beta_1\, Jeru_t + \beta_2\, Non\text{-}Jeru_t + \beta_3\, Cafe/rest_t + \beta_4\, Non\text{-}Cafe/rest_t + e_t \quad \text{(A1)}$$

[15] In our analysis, as noted earlier, seven events were excluded from this number because of multiple attacks on a single day.

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Table A1
Distribution of the 104 terrorist attacks, 2000–2005.

Characteristic	No of attacks
Year	
2000–2001	31
2002	42
2003	19
2004–2005	12
Month	
January–March	35
April–June	25
July–September	22
October–December	22
Day of week	
Sunday	23
Monday	14
Tuesday	14
Wednesday	18
Thursday	19
Friday	8
Saturday	8
Number of fatalities	
1–4	63
5–9	20
10 or more	21
Location of attack	
Jerusalem	35
Non-Jerusalem	69
Target type	
Bus	34
Coffee house/restaurant	13
Retail store	13
Indoor attack (home, workplace)	7
Outdoor attack	27
Misc. target type	10

where $Jeru_t = v$ if an attack of severity v occurred in Jerusalem on day t, $Non\text{-}Jeru_t = v$ if the attack took place elsewhere, $Cafe/rest_t = v$ if the target was a cafe or restaurant, and $Non\text{-}Cafe/rest_t = v$ if the target was of a different type. This would permit an assessment of the effect of an attack in Jerusalem on day t, or a similar attack elsewhere in the country, relative to no attack on day t, the omitted term. Similarly, this specification would permit an assessment of the effect of a day t attack on a cafe/restaurant or against a different target type versus no attack on that day.

Because "no attack on day t" is common to both the location and target type categories, it is necessary to omit a second term from one of the categories in order to secure identification. But deletion of this second term would mean that we are estimating the effect of an attack relative to a mixture of the two deleted terms, muddying the interpretation of the results.

However, since at most one attack can occur on day t (see note 4) we have, for any value of v,

$$Att_t = Jeru_t + Non\text{-}Jeru_t \tag{A2}$$

$$Att_t = Cafe/rest_t + Non\text{-}Cafe/rest_t \tag{A3}$$

and can therefore rewrite equation (A1) as

$$\begin{aligned}\log(S_t) &= \beta_0 + \beta_1\, Jeru_t + \beta_2[Att_t - Jeru_t] + \beta_3\, Cafe/rest_t + \beta_4[Att_t - Cafe/rest_t] + e_t \\ &= \beta_0 + [\beta_2 + \beta_4]Att_t + [\beta_1 - \beta_2]Jeru_t + [\beta_3 - \beta_4]Cafe/rest_t + e_t\end{aligned} \tag{A4}$$

It is evident that the coefficients of $Jeru_t$ and $Cafe/rest_t$ provide the desired contrasts, while the coefficient of $Att(n)_t$ does not have a useful interpretation.

Text equation (3) uses this very formulation, while in text equation (4) the Jerusalem versus non-Jerusalem contrast is replaced with contrasts of "local attack" and "location unknown attack" versus "non-local attack."

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