The Impact of Terrorism Across Industries: An Empirical Study*

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Abstract: This paper uses scoring matching techniques and event study analysis to elucidate the impact of terrorism across different economic sectors. Using the Israeli-Palestinian conflict as a case study, we differentiate between Israeli companies that belong to the defense, security or anti-terrorism related industries and other companies. The findings show that whereas terrorism has a significant negative impact on non defense-related companies, the overall effect of terrorism on defense and security-related companies is significantly positive. Similarly, using panel data on countries' defense expenditures and imports from Israel, we find that terror fatalities in Israel have a positive effect on Israeli exports of defense products. These results suggest that the expectation of future high levels of terrorism has important implications for resource allocation across industries. (*JEL* D74, G14, L64, P16)

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1. Introduction

Politically motivated violence in general and terrorism in particular have a strong negative effect on economic prosperity. This is, at least, the main message we obtain from a rapidly growing literature that analyzes the effects of terrorist acts on various aspects of the economy. Although there is no reason to believe that terror attacks have a homogenous impact across all economic activities, the extant literature seldom probes terrorism in terms of its impact on different industries.

This paper marks the first attempt to analyze systematically the impact of terrorism across different industries in a specific country. The main purpose is to determine whether terrorism affects defense and security-related industries differently than it does other economic sectors. Our hypothesis is intuitive: terror attacks dampen the activity of most economic sectors but, at the same time, may enhance expected business for companies in the defense and security industries.[1]

To test this hypothesis, we focus on Israeli companies that are traded in American markets and build, using matching score methods, a control group of American companies. The stock-market valuations of each Israeli company and its assigned American control allow us to differentiate between the effect of terrorism on companies involved in or with the defense, security or antiterrorism industries and other companies. Additionally, we use panel data to perform a correlation analysis of countries' defense expenditures and defense imports from Israel with terror fatalities in Israel. The purpose of this analysis is to evaluate potential explanations of the effect of terrorism on Israel's defense industries.

[1] Zussman and Zussman (2005) suggest, independently, the same basic idea. The section of their paper that deals with this hypothesis provides only an illustration, since it focuses on only two companies. Their exercise is not intended to identify and assess the differential effect of terrorism across economic sectors—the main objective of our study.

The main results show that terrorism has no significant impact on the average stock-market valuation of Israeli companies vis-à-vis the valuation of the control group's stocks. However, after controlling for companies that belong to the defense or security industry, we observe that terrorism has a significant positive impact on these companies, and a significant negative impact on the rest of the companies. The results are robust to different samples of Israeli companies, different measures of terrorism, and different econometric specifications. We also observe that terror attacks in Israel are positively correlated with Israeli defense exports, even after controlling for the level of terrorism abroad and the observed defense expenditures of the importing countries.

This paper contributes to the growing number of studies that, focusing on the Israeli-Palestinian conflict, attempt to quantify the economic costs of terrorism. Naturally, the empirical literature quantifying the effects of conflict on the Israeli economy has used time series analysis. Fishelson (1993) studied the impact of the first *intifada* (Palestinian uprising) on the levels and trends of various real economic activities in Israel in 1987-89. Fielding (2003a, 2003b) investigated the impact of political instability on saving and investment, respectively, during 1987-99. Eckstein and Tsiddon (2004) conducted a similar analysis on consumption, investment, exports and per-capita GDP. And Eldor and Melnick (2004) studied the impact of terrorism on the valuation of companies that are traded in the Tel Aviv Stock Exchange (TASE) and on the Israeli foreign exchange rate.

A fundamental problem that arises in any attempt to quantify the effect of terrorism on economic fluctuations is that the estimates obtained may be biased due to a plausible interaction between the two variables. The aforementioned studies use different approaches to identify the effect of terrorism and politically motivated

violence on the economic variable of interest from the effect of other macroeconomic distortions and shocks. Fishelson (1993) uses the years 1985-1987 that immediately preceded the first Palestinian uprising as his source of identification. Fielding (2003a, 2003b) isolates the effect of terrorism by relying on the relative stability of the Israeli economy after 1984 and including several control variables in his analysis. Eckstein and Tsiddon (2004) use a similar approach. Finally, Eldor and Melnick (2004) include in their analysis the S&P500 index as a control to help them identify the effect of terrorism on the valuation of an index that includes the 100 largest companies traded on the TASE.

These efforts to identify the impact of terrorism may not be enough to overcome the intrinsic difficulty of the task. To surmount these problems, we construct a control group and conduct an event-study analysis following the study of Abadie and Gardeazabal (2003, henceforth AG) on the Basque Country.

There are, however, several important differences between our approach and that adopted by AG. First, our proposed approach uses a matching method based on the most important characteristics of every stock to find the closest control stock for each Israeli stock, whereas AG use the stocks of all Spanish companies not identified with the Basque Country as their control variable. Second, we exploit the greater fluctuation in the number of fatalities of the Israeli-Palestinian conflict relative to the conflict in the Basque Country to better assess the economic impact of terror attacks. AG's results on the impact of conflict on the returns of Basque stocks relative to non-Basque stocks are based on two dummy variables that reflect whether the unilateral truce declared by ETA was credible or not. These variables neither quantify the marginal economic cost of an additional terror attack nor account for the impact of small changes on the credibility of the truce. Our paper uses the available detailed

data on the daily number of terror attacks to estimate the economic cost of terror attacks when measured on a daily, weekly and monthly basis.

Additionally, unlike AG, we decompose the impact of terrorism to identify the different effects of terrorism on defense-related as against non-defense-related companies. Given the large size of Israel's defense sector, this decomposition is crucial for an accurate determination of the overall effect of terrorism. In fact, a seemingly insignificant effect of terrorism on Israeli companies at large actually masks important differential effects across industries.

2. Impact of Terrorism on Individual Companies' Stock-Market Valuation

2.A Data Description

For the purposes of this research, we identified all Israeli companies that were traded on the Amex, NYSE and Nasdaq exchanges as of November 2001. The classification used was that of *Globes,* a leading financial Israeli newspaper that analyzes and monitors Israeli companies.[2] This results in an original sample of 125 Israeli companies. Table 1 lists all the companies identified as Israeli.

For each Israeli company, we built a set of prospective controls comprised of American companies traded in the same market and from the same industry. For all these companies (Israelis and their set of prospective controls) we collected daily end-of-the-day share prices for the sample period of January 1, 1998 – September 10, 2001.[3]

[2] This classification is not based solely on the companies' registered addresses. Rather, it identifies all companies that were perceived to conduct a significant part of their business in Israel.

[3] Companies not traded before January 1, 1998, were deleted from our sample. Only companies traded both before and after September 28, 2000, were included, even if complete data for the entire sample

The procedure used to find an American company that best corresponds each Israeli company based on the 1994-1997 period can be described in several steps. First, we calculated the size and book-to-market ratio (BE/ME) for each and every stock, as in Fama and French (1993). With these characteristics at hand we obtained the coefficients measuring the returns of the size and book-to-market equity factors for every stock from Fama and French (1993). The coefficient that measures each company's excess market return was obtained from *Security Risk Evaluation*, a quarterly publication of Merrill Lynch. We computed the excess-return coefficient of companies that lacked this parameter in *Security Risk Evaluation* following the methodology employed by this publication.[4] The market's benchmark factors (Rm–Rf, SMB, HML) for the 1994 – 1997 period were obtained from Fama and French's calculations.[5]

We then weighted each company's coefficients using the market benchmark factors to obtain the company's score. The score reflects the important characteristics of the company and allows us to compare different stocks. For every Israeli company, we chose as its American control the company in the prospective set of controls that had the closest score. The final sample of Israeli companies and their respective American controls—65 pairs of companies—appears in Table 2.

For the purposes of the empirical estimation, we further classified companies by main economic activities, differentiating between those that are substantially

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period were not available for some. The September 11, 2001, terrorist attacks on US soil invalidate the use of American stocks as valid controls after this date.

[4] The necessary data to calculate these companies' excess return were obtained from the Center for Research in Security Prices (CRSP) data set.

[5] These calculations appear in French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). The data were collected for the entire 1994-2001 period for later use in the computation of the expected returns of the companies.

related to the defense, security or antiterrorism industries and all the others.[6] The classification was based on the companies' profiles by market analysts at *Yahoo Finance* and information provided by the companies at their website or at other financial sites. We found 23 Israeli companies in the sample that were involved in or with the defense, security, or antiterrorism industries. Table 2 separates these companies from the others.

Table 3 provides summary statistics differentiating between defense-related and non-defense-related companies. Both types of companies experienced, on average, lower abnormal returns than their controls during the analyzed time period. The main difference across sectors is observed before the Palestinian uprising that started on September 28, 2000. For that period, the defense-related companies had lower average abnormal returns than those observed for their controls, whereas the average abnormal return of the rest of the Israeli companies was higher than that observed for their controls. All four groups of companies exhibit negative average abnormal returns between January 1, 1998, and September 28, 2000, and positive average abnormal returns for the remainder of the analyzed period. This observation highlights the importance of the control group. Absent a proper control group, a statistically significant positive effect of terrorism on the stock-market valuation of the Israeli companies would have been wrongfully obtained.

To measure the level of terrorism we use the daily number of terror attacks and noncombatant Israeli fatalities from these attacks. The particular definition of terror attacks that we use for the construction of our data set is the one set forth by the US State Department, contained in Title 22 of the United States Code, Section 2656f(d). Accordingly,

[6] We merged the companies in these three different but related industries into only one group in order to avoid conclusions based on very small samples.

"-- The term "terrorism" means premeditated, politically motivated violence perpetrated against noncombatant targets by sub-national groups or clandestine agents, usually intended to influence an audience."

Specifically, our data set on terror attacks contains daily information on each and every *fatal* terror attack against *noncombatants* that occurred on *Israeli soil* between January 1st, 1998, and September 10, 2001.[7] Several explanations about the definition of terror attacks are in order.

a. Fatal: Due to constraints on the collection procedure, only attacks that claimed the life of someone other than the terrorist were included.

b. Noncombatants: This term is construed as including, in addition to civilians, military personnel who were unarmed and/or not on duty at the time of the incident.

c. Israeli Soil: This includes occupied territories when under Israeli control.

The main sources of the data are the Israeli Foreign Ministry, the National Insurance Institute, the Israeli Defense Forces and the archives of two newspapers (*Ma'ariv* and *Ha'aretz*). To the best of our knowledge, this is the most accurate and comprehensive unclassified data set that exists on fatal terror attacks against noncombatants on Israeli soil. Figure 1, which depicts the data, and Table 4, which presents the summary statistics, clearly reflect the impact of the second Palestinian uprising: On average, there was less than one attack per month between January 1, 1998, and September 28, 2000, whereas from September 28, 2000, to September 10, 2001, the monthly average climbed to 7.25.

Several potential problems with the data are worth emphasizing. First, the data on terror attacks indicate only attacks in which someone other than the terrorist died.

[7] The available data set on terror attacks extends from 1949 until 2004. See Berrebi (2003) for a detailed description of the data set and its sources.

Thus, foiled attacks as well as "unsuccessful" attacks in terms of producing fatalities are not included. Terror attacks not on Israeli soil were also excluded. Since such attacks may affect the stock-market valuation of Israeli companies vis-à-vis their American controls, we may be omitting relevant events.

Second, some of the stocks of the Israeli companies are dually listed, i.e., traded in an American market and on TASE.[8] Since short-term arbitrage opportunities are generally not available, it has been shown that for this type of stocks the domestic country usually emerges as the dominant market and the foreign market as the satellite (Lieberman et al., 1999). Therefore, these companies' share prices are mainly determined on the TASE, casting serious doubts about the validity of the match with their American controls. In particular, differences in returns between stocks that are dually-listed and their respective control may be attributed to differences in the general performance of the TASE relative to the corresponding American market and not necessarily to the effect of terrorism, which affects only Israeli companies. We solved this problem by conducting the same analysis twice, first including all available companies and afterwards excluding arbitrage stocks.

A third potential concern about the data is that observed fluctuations on the returns on Israeli companies' shares may be caused by shocks to the Israeli economy that are unrelated to terrorism. If this is the case, we should observe an Israeli effect. According to our econometric specification, if such an effect exists it would be captured by the intercept. Similarly, every pair of companies may exhibit a specific permanent effect on the companies' abnormal returns due to particularities of the companies. For this reason, we repeat all our econometric estimations adding fixed effects for each set of companies.

[8] Fifteen of the resulting 65 Israeli companies in the sample were dually-listed by January 1, 1999. These companies are identified in Table 2.

2.B Methodology

This section describes the empirical strategy used to test the impact of terrorism on stock returns. For this purpose, we employ event study methods, whereby we treat a given event that occurs at a predetermined point in time as exogenous, and study the impact of this event on the realizations of a variable of interest (Campbell et al., 1997). For the current analysis, we defined terrorist attacks as the event of interest and measured their effect on the returns of Israeli companies' stocks relative to those of American companies.

The full econometric estimation proceeds in several steps. First, we compute the daily abnormal returns of every stock in the data set during the analyzed period. This step proceeds as follows. First, we obtain the expected returns of company *i*'s stock at date *t*, $\hat{R}^i_t$, from the following equation:

$$(1) \qquad \hat{R}^i_t = R^f_t + \beta^i_1 R^m_t + \beta^i_2 SMB_t + \beta^i_3 HML_t ,$$

where R^f_t is the market's risk-free rate, R^m_t is the excess return on the market portfolio, SMB_t is the difference between the returns on portfolios composed of small and big size stocks, and HML_t is the difference between the returns on portfolios composed on high and low book-to-market stocks, all measured at time *t*.

Thus, the abnormal return of stock *i* at time *t*, $AR_{i,t}$, is given by the difference between observed returns and expected returns:

$$(2) \qquad AR_{i,t} = R^i_t - \hat{R}^i_t .$$

We then subtract from the abnormal returns of every Israeli stock the abnormal returns of its American control. This yields the difference in abnormal returns for every pair of stocks, $DAR_{i,t}$. Finally, we estimate the following model:

(3) $$DAR_{i,t} = \alpha_1 + \alpha_2 \, (Terror\ Attacks)_t + \upsilon_{i,t}.$$

The coefficient α_2 reflects the economic impact of an increase in the level of terrorism on Israeli stocks relative to their American controls.

Conventional wisdom has it that the economic impact of terror should be significantly negative. This is indeed the consensus reached by the constantly growing body of related research. Several studies, using mostly cross-country panel data sets, show that political factors (such as the extent of civil rights or local politically motivated violence) have a negative effect on investment and savings [Venieris and Gupta (1986) and Alesina and Perotti (1996)], and on economic growth [Barro (1991), Mauro (1995), Alesina et al. (1996) and Easterly and Levine (1997)].

Studies using Israeli data obtained similar findings. Fielding (2003a, 2003b) investigated the impact of political instability on saving and investment, respectively, during 1987-99. His results show that the savings ratio in Israel would almost double and investment would rise on average by 20 percent if politically related deaths in Israel were to cease. Eckstein and Tsiddon (2004) conducted a similar analysis on consumption, investment, exports and GDP per capita. They concluded that had Israel not suffered from terrorism during 2000-2003, its GDP per capita would have been 4 percent higher than its actual level. Perhaps more related to the variables of interest in the current paper, Eldor and Melnick (2004) studied the consequences of terrorism on stocks traded at the TASE and found that the Palestinian uprising caused a significant decrease of around 30 percent on a TASE market index.

In this study, we allow for the possibility that the effect of terror may be positive for some industries even if its overall effect is negative. In particular, the expected impact of terror is not constrained to be uniform across companies but rather to depend on the company's main economic activities.[9]

To account for this effect, we add in the second part of the econometric analysis a dummy variable that indicates whether a company is associated with defense, security or anti-terrorism products, services or clients. That is, we estimate the following model,

$$(4) \qquad DAR_{i,t} = \gamma_1 + \gamma_2 (Terror\ Attacks)_t + \gamma_3 (Defense)_i + \gamma_4 (Terror\ Attacks)_t * (Defense)_i + u_{i,t}$$

where γ_2 measures the effect of terrorism common to all companies, γ_3 is a defense effect that controls for possible differences in the abnormal returns of companies in the defense sector as against non-defense companies, and γ_4 is an interaction effect of terrorism on defense-related companies.

This specification allows us to explicitly test any systematic difference between the impact of terrorism on the returns of stocks of defense-related companies and that of all other companies. It also let us address the question of whether terrorism increases the abnormal returns of Israeli defense-related companies compared with the abnormal returns in the control group.

If our hypothesis is correct, i.e., if the effect of terror is not evenly distributed across industries, we should expect γ_2 to be negative and γ_4 positive. Moreover, if

[9] Fishelson (1993) performed an industry decomposition to study the impact of the first Palestinian uprising on the levels and trends of various real economic activities in Israel in 1987-89. He found that the uprising had a statistically significant effect on most economic activities, with the exception of some related to exports. He did not, however, study the specific effect of violence on defense-related industries.

terrorism has a positive effect on the stock prices of Israeli defense companies vis-à-vis their American controls, the sum of γ_2 and γ_4 should be greater than zero.

2.C Results

Tables 5 and 6 provide parameter estimates for the two models shown above, using different time spans to account for the level of terrorism. The only difference between the tables is that Table 5 includes all the available stocks whereas Table 6 includes only stocks that are not dually-listed. The results of all specifications convey a similar message: terrorism has a positive effect on the stock returns of Israeli companies involved in or with defense, security or anti-terrorism products or clients, and a negative effect on the rest of the Israeli companies, irrespective of the time frame used to measure the level of terrorism.

Table 5 reports the results of our estimation of equations (3) and (4) by ordinary least squares. In the first two columns, we measure terrorism using a dummy variable equal to one from September 28, 2000, onward. In Columns (3) and (4), we measure terrorism using the number of monthly terrorist attacks. Columns (5) and (6) contain the results of the estimation when looking at the weekly number of attacks. Finally, the last two columns report the results obtained on the basis of attacks per day.[10]

According to all the results obtained, the data show a significant negative relationship between terrorism and abnormal returns of Israeli companies only when the estimation includes the defense effect and the interaction effect. In other words,

[10] The time difference between Israel and the U.S. creates a problem when daily attacks are used. Attacks perpetrated before the closing of the stock markets may show an effect the same day, whereas the effects of attacks perpetrated after the closing of the stock market are captured the next trading day. Weekends and holidays create the same concern. To account for this possibility, we repeated the empirical analysis including lags of the daily attacks. The results, available from the authors upon request, are basically the same.

since terrorism has a negative effect on some sectors of the economy and a positive effect on other sectors, the overall effect of terrorism is misrepresented when the sectors are pooled. Moreover, if the positive and negative effects cancel each other out one may reach the wrong conclusion, i.e., that terrorism has no significant impact on the abnormal returns of Israeli companies relative to their controls.

The terrorism effect, shown in Column (2), indicates that over 5 percent of the decrease in the valuation of an Israeli company not related to the defense industry may be explained by the Palestinian uprising that started in September 2000. Columns (4), (6) and (8) provide additional estimates of the impact of an increase in the level of attacks on the abnormal returns of a non-defense-related Israeli company. These effects vary from 0.7 percent to 2 percent depending on whether attacks are measured on the basis of monthly, weekly or daily data. The effect of monthly attacks is significant at statistically accepted levels; that of weekly attacks is only marginally significant (at the 12 percent level).[11]

The defense effect, estimated in the even-numbered columns, is not consistently significant. This suggests that the behavior of the relative abnormal returns of Israeli defense-related companies is not significantly different from that exhibited by the other companies. The fact that the intercept, too, is not statistically significant for any of the different specifications implies that there isn't an Israeli effect on the companies' abnormal returns.[12]

According to the results of our estimation, it is terrorism that influences the abnormal returns of companies in the defense sector differently from the rest of the

[11] Daily attacks are not significant in any of the estimated models, even when we include lags of this variable. Given the aforementioned issues that arise when using daily data, we are reluctant to conclude that markets are not efficient.

[12] The fact that the intercept is not significant does not mean that there may not be specific fixed effects for each company. Table 7 addresses this alternative specification using a model with company fixed effects.

companies. The estimates indicate that the abnormal returns of Israeli defense-related companies increased by over 7 percent relative to their American controls as a consequence of the Palestinian uprising. The evidence regarding the overall effect of terrorism on defense-related Israeli companies in shorter time spans is also significantly positive: an effect of 1 or 2.5 percent was obtained using monthly and weekly data, respectively.[13]

As mentioned above, the fact that several of the Israeli companies are traded simultaneously at the Tel Aviv Stock Exchange and at one of the American markets could potentially bias the results. Table 6 addresses this issue by showing the results of the analysis with the sample restricted to Israeli companies that are traded only in American markets.

The findings using this subsample are essentially identical to those observed using the full sample. Namely, the observed effect of terrorism on abnormal stock returns is still insignificant when no differentiation across industries is made. Moreover, once we introduce the interaction variable for the defense sector, terror attacks show a significantly negative effect on Israeli companies overall, and a positive effect on defense related companies. From the table follows that the positive impact of terrorism on companies related to the defense sector is higher than that observed when the full sample is used. In particular, once we exclude dually-listed companies from the sample, the observed effect of terror on the defense sector is roughly one standard deviation higher than that obtained before, irrespective of the time frame used to proxy for terrorism. Furthermore, the overall effect of terrorism on the defense sector ($\gamma_2 + \gamma_4$) is also higher under this restricted sample and is significantly positive (at the 5 percent level) for all specifications.

[13] The hypothesis that $\gamma_2 + \gamma_4 = 0$ is rejected at the 10 percent significance level for all specifications except that using daily terror attacks.

Table 7 provides estimates for equations (3) and (4) including companies' fixed effects. The results are basically the same as those obtained without the inclusion of fixed effects. Moreover, an F-test of the null hypothesis that all pairs of matched companies' specific fixed effects are equal to zero cannot be rejected at the 99 percent level. This provides empirical support for the matching procedure used to build the control group, as the particular characteristics of each company seem to cancel out with the particular characteristics of its control. In other words, the results of the F-test corroborate our finding that the behavior of the relative abnormal returns of every pair of matched companies is not significantly different from that observed among the rest of the pairs, once we control for the level of terrorism and whether or not these companies are related to the defense industry.

3. The Effects of Terror on the Israeli Defense Industry

This section investigates possible channels of positive influence of terror attacks in Israel on Israeli companies that are related to the defense, security or antiterrorism industries.

The Israeli defense sector expanded significantly during the period at issue, mostly due to an increase in exports. Indeed, Israel more than doubled its defense exports over the last decade, elevating its share in global defense exports to nearly 8 percent today (Defense News, 2004).[14] During the same period, despite the significant increase in terror attacks and the deterioration of the security situation in the Middle East, the share of orders by the Israeli Defense Forces fell to less than 30 percent of

[14] In view of this significant increase, *Defense News*, a leading magazine specializing in military issues, ranked Israel as the world's no. 3 exporter of defense products in 2002, behind only the U.S. and Russia.

the domestic defense industries' output. Thus, more than 70 percent of Israeli defense manufacturing output is exported (Lavi, 2002).

It is therefore obvious that the successful performance of the Israeli defense industry in the past few years originates in changes in demand for its products abroad. Israeli defense exports are influenced by a variety of factors, e.g., the level of terrorism abroad and the level of defense expenditure that the importing countries wish to maintain. The main goal of the empirical exercise that follows is to establish whether fluctuations in Israeli defense exports also correlate with terror attacks in Israel, after controlling for the factors listed above. At this point, it is important to stress that the empirical analysis in this section is solely based on correlations; in itself, it cannot prove causality.

To study the determinants of the international demand for Israeli defense products we estimate the following model:

$$(5) \qquad (Def\_Imp)_{i,t} = \alpha + \beta_1 (Isr\_Ter)_t + \beta_2 (Def\_Exp)_{i,t} + \beta_3 (Imp\_Ter)_{i,t} + \beta_4 (World\_Ter)_t + \varepsilon_{i,t}$$

where α, β_1 - β_4 are parameters to be estimated and $\varepsilon_{i,t}$ is a random disturbance, for $i = 1, \ldots, N$ countries, and $t = 1, \ldots, T$ years. $(Def\_Imp)_{i,t}$ denotes total defense imports from Israel by country i in year t; $(Isr\_Ter)_t$ denotes the number of terror fatalities in Israel in year t; $(Def\_Exp)_{i,t}$ denotes total defense expenditures by country i in year t; $(Imp\_Ter)_{i,t}$ is the number of terror fatalities in the importer country i in year t; and $(World\_Ter)_t$ is the worldwide total number of terror fatalities in year t.

For the purposes of the estimation we merged two distinct data sets. First, we use the data on military exports and expenditures published by the Stockholm International Peace Research Institute (SIPRI). This data base covers over 160 countries and provides consistent time series for the period at issue (see

www.sipri.org). Specifically, we focus on the value of total military imports from Israel and the total military expenditure of each country.

According to the SIPRI data, 29 countries purchased defense products from Israel between 1994 and 2003.[15] We construct a balanced panel data set by confining our attention to countries that had a regular trading relationship with Israel during the entire period at issue; i.e., we abstract from countries' political considerations that might lead them to refrain from trading defense products.[16] This allows us to relate to fluctuations in the quantity of defense products traded as a reflection of the countries' reaction to their security concerns and their wish to acquire Israeli defense products as against those of other potential exporters. Our final data set is composed of 27 countries.

To control for the effects of local and global terrorism, we use data on terror fatalities collected by RAND Terrorism Chronology 1968-1997 and RAND®-MIPT Terrorism Incident database (1998-Present).[17] The data on terror fatalities in Israel were described in Section 2 above. Here we use the updated series shown in Berrebi and Klor (2004).

Table 8a presents summary statistics classifying the data by country; Table 8b presents summary statistics differentiating between the years 1994-2000 and 2001-2003. As expected, individual countries' defense imports from Israel fluctuate severely over time even though their defense expenditures are relatively constant. Furthermore, the distribution of terror fatalities is extremely right-skewed, with India

[15] The data set includes an additional entry for a country listed as "unknown". We decided to disregard this entry because we were unable to link it with any existing country.

[16] Among the 29 countries in the sample, only Sri Lanka (which renewed diplomatic relations with Israel in 2000) and the Southern Lebanese Army (which Israel stopped providing defense products when it withdrew all its troops from southern Lebanon in May 2000) did not have diplomatic relations with Israel during the entire time period. Adding these countries to our analysis does not affect our findings qualitatively.

[17] See www.tkb.org/RandSummary.jsp for a description of the data as well as a precise definition of terror fatalities.

and the U.S. showing extreme values relative to the rest of the sample. Average annual fatalities during the period at issue were lower in Israel than in India and the U.S. but significantly higher than in the other countries.

Table 8b provides some preliminary evidence of the important increase of defense imports from Israel during the years 2001-2003. On average, annual defense imports from Israel between the years 2001-2003 increased by over 50 percent compared to the years 1994-2000, whereas the annual increase in defense expenditures for the same set of countries is slightly below 15 percent. That is, Israeli defense products captured a larger share of these countries defense expenditures during the last few years. We also observe from this table a highly significant increase over time in the number of fatalities from terrorism, either in Israel, the importer countries and worldwide.

Two important caveats about the data are worth mentioning. First, our data from SIPRI concern major conventional weapons transfers from Israel during the period at issue. Since weapon contracts are usually signed before the sale is made, the data may not be highly accurate in regard to the actual timing of the transaction. To solve this problem we also estimated equation (5) using a one-year lag for all terror variables as well. Qualitatively, the results are very similar; we present the results without the lag variables because this allows us to take advantage of additional observations, rendering a more accurate estimation.[18] Second, imports from Israel account for only a small fraction of these countries' defense expenditures (Table 8a). Since Israel supplied between 5 and 10 percent of worldwide defense exports during the period at issue, we must conclude that most defense expenditure consists of

[18] Major transfers of conventional weapons between countries may be a consequence of bilateral agreements under which the two partners in the transaction exchange different types of weapons. If this is the case, defense imports from Israel are affected by defense exports to Israel. We also estimated model (5) using net defense imports from Israel as our dependent variable. The main conclusions from the two different estimations are basically the same.

domestic manufacture. Therefore, it seems more likely that Israeli defense imports crowd out imports from other countries rather than substitute for local production. Consequently, total defense imports may be a better control than total defense expenditures. Unfortunately, we were unable to find the necessary information on this variable.

We initially estimate equation (5) using OLS.[19] The results appear in Column (1) of Table 9. The effect of terror fatalities in both the importer country and Israel is positive and statistically significant. We should interpret these findings with caution, however, since for OLS estimates to be efficient it is necessary to assume that all error processes have the same variance (homoscedasticity) and are independent of each other. In studies like ours, it is likely that these assumptions do not hold; namely, errors may be contemporaneously correlated because the scale of defense imports from Israel varies across countries. Moreover, errors may also be serially correlated if countries' choices of defense imports from Israel show some persistence over time.

To control for country-specific effects, we estimate model (5) using OLS with country fixed effects. The results appear in the second column of Table 9. Most variables have similar qualitative effects to those found above: Terror fatalities in Israel and in the importer country have a positive effect on defense imports from Israel. The F-test shows that there are significant country fixed effects on the level of defense imports from Israel. The estimated coefficients, however, are still inefficient since the error terms obtained from the fixed-effect estimation follow a first-order autoregressive process.

To solve this additional complication, we estimate equation (5) using a Prais-Winsten regression with panel-corrected standard errors (OLS-PCSE). This method

[19] This and all subsequent estimated models include year-specific fixed effects.

uses the Prais-Winsten estimation and adjusts standard errors to account for heteroskedasticity and panel correlation in the error process, as recommended by Beck and Katz (1995). The results of this estimation are reported in Column 3 of Table 9.

According to this estimation, too, both measures of terror fatalities are positively associated with defense imports from Israel, confirming our earlier panel-data analyses. If one takes the results literally, it would mean that a marginal increase in the number of terror fatalities in Israel translates into an increase of over $21,000 in defense exports, all else equal. A marginal increase in the number of terror fatalities in the importer country translates into an increase of over $15,000 in defense imports from Israel. Note also that the coefficient for total expenditures is almost equal to zero. Thus, the evidence obtained partly supports the hypothesis that increases in Israeli defense exports crowds out local manufacture of defense products and/or imports from other countries.

The above estimation supports our hypothesis that an increase in the global demand for Israeli defense-related products is responsible for most of the growth observed in this sector. We are left wandering, however, how this process is carried out. For the time being, we lack a complete answer. As a conjecture, we suggest that the constant risk of war and terrorism has placed Israeli companies under continuous pressure to create innovative defense products in order to thwart constantly evolving threats. As a consequence, these companies have become highly specialized in defense manufacturing. This specialization (highlighted constantly by continuous

terror attacks) gives Israeli companies an advantage in global defense product and technology markets. In the words of Defense Minister Shaul Mofaz:[20]

> "The Israeli defense industries are accustomed to providing the highest quality, innovative solutions to its most demanding clients – the Israel Defense Forces, including the Air Force and Navy. The technology we have to offer has been developed and tested by some of the world's leading defense experts. We are pleased to share our years of expertise with our partners in the war against terror and look forward to successful, cooperative mission."

4. Conclusions

This paper empirically assessed the impact of terrorism on the stock-market valuation of Israeli companies that are traded in American markets. Its main contribution was to show that the impact of terrorism varies across companies in different industries. Overall, the evidence obtained strongly suggests that terrorism has a positive effect on the stock-market valuation of companies involved with defense, security or antiterrorism products or clients, and a significantly negative effect on that of other companies. We also found that the most likely explanation for the observed gains traces to an increase in other countries' demand for Israeli defense products.

This paper marks the first step toward a better understanding of the differential impact of terrorism on different economic activities. The important economic ramifications of studies along these lines cannot be overstated in a world in which terrorism has attained unexpected magnitudes. We conjecture that the differing effects

[20] The quote is from the Paris Air Show (2003) and can be found at the official website of the Israeli Ministry of Defense (http://www.airshow.mod.gov.il/over.htm).

of terrorism across industries should lead to a reallocation of resources in countries that expect to suffer lengthy periods of violence in the future. Specializing in antiterrorism products and technologies may not only be a natural way to cope with this threat but may also prove to be an efficient way to alleviate some of the economic costs of conflict. We hope to be able to assess our empirical conjecture in the near future.

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Figure 1: Deadly attacks on a monthly basis

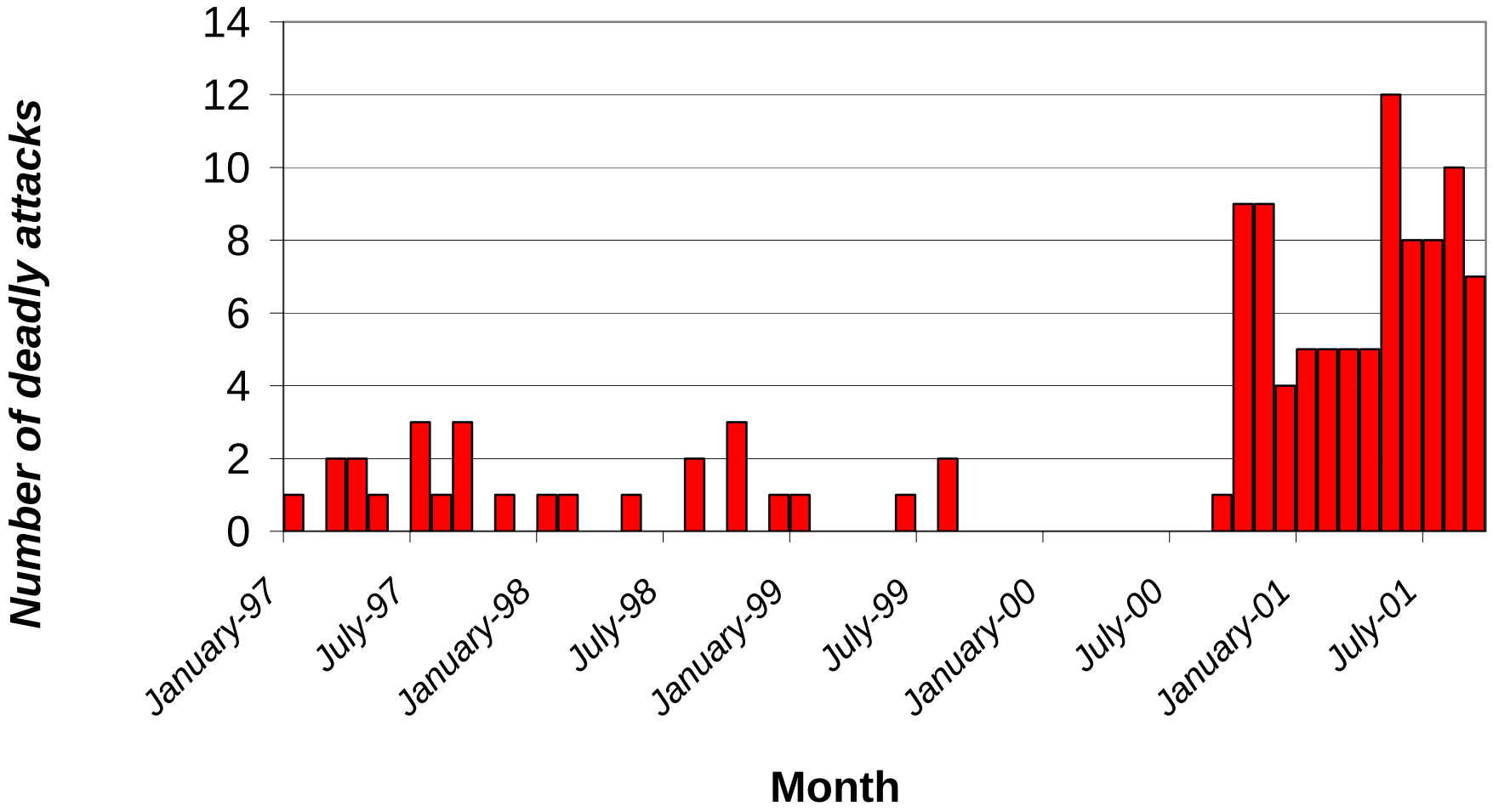

Table 1: List of Israeli Stocks Traded at American Markets

ACSEF	ACS-Tech80 Ltd		KERX	Keryx Biopharmaceuticals Inc
ALDN	Aladdin Knowledge Sys Ltd		KOR	Koor Industries Ltd
AIP	American Isreali Paper Mills		LANTF	Lannet Data Communications
ARLC	Arel Communications & Software		LNOP	Lanoptics Ltd
ATTU	Attunity Ltd		LVEL	Level 8 Sys Inc.
AUDC	Audiocodes Ltd		MAGS	Magal Security Sys Ltd
BWEB	Backweb Technologies Ltd		MGIC	Magic Software Enterprises
BTGC	Bio Technology General Corp		MATV	Matav-Cable Sys Media -ADR
BSI	Blue Squre Israel Ltd - ADR		MDSLF	MEDIS EL Ltd
BOSC	BOS Better Online Solutions		MEMCF	Memco Software Ltd
BRZE	Breezecom Ltd		MNTE	Mentergy Ltd.
BVRT	BVR Technologies Ltd		MTSL	Mer Telemgmt Solutions Ltd
CAMT	Camtek Ltd		MTLK	Metalink Ltd
KML	Carmel Container Sys -ORD		MNDO	Mind CTI Ltd
CHKP	Check Point Software Techn		FLSH	M-Systems Flash Disk Pioneer
CIMT	Cimatron Ltd		NNDS	NDS Group PLC -SPON ADR
CKSW	Clicksoftware Technologies Ltd		DDDDF	New Dimension Software Ltd
CTCH	Commtouch Software Ltd		NXUS	Nexus Telocation Sys Ltd
CGEN	Compugen Ltd		NICE	Nice Systems Ltd -SPON ADR
CMVT	Comverse Technology Inc		NOGAF	Noga Electro-Mechanical Inds.
CREO	Creo Products Inc.		NVMI	Nova Measuring Instruments Ltd
CRYS	Crystal Systems Solutions Ltd		NURM	Nur Macroprinters Ltd
DSSI	Data Systems & Software Inc.		OBAS	Optibase Ltd
DELT	Delta Galil Inds. Ltd -ADR		OPTL	Optisystems Solutions Ltd
DDDC	Deltathree Inc		ORFR	Orbit/FR Inc
DSPG	DSP Group Inc		ORBK	Orbotech Ltd
ESIM	E Sim Ltd		ORCT	Orckit Communications Ltd
ECIL	Eci Telecommunications -ORD		PGEO	Paradigm Geophysical Ltd
ECTX	Ectel Ltd		PTNR	Partner Comm. Co Ltd -ADR
EDNTF	Eduentics Ltd		PARS	Pharmos Corp
EDUSF	Edusoft LTd		PLCM	Polycom Inc.
ELOFC	El De Electro-Optic Dev Ltd		PRSE	Precise Software Solutions Ltd
ELBT	Elbit Ltd		RADIF	Rada Electronics Inds
EMITF	Elbit Medical Imaging Ltd		RDCM	Radcom Ltd
ESLT	Elbit Systems Ltd		RVSN	Radvision Ltd
EVSN	Elbit Vision Systems Ltd		RDWR	Radware Ltd
EFCX	Electric Fuel Corp.		RTLX	Retalix Ltd
EIL	Electrochemical Indus Frutar		RITT	RIT Technologies Ltd
EFII	Electronics for Imaging Inc.		ROBO	Robo Group Tek Ltd
ELRN	Elron Electronics Inds -Ord		3RBMXF	Robomatix Tech Ltd
ELT	Elscint Ltd -ORD		SPNS	Sapiens Intl Corp N V
ELTK	Eltek Ltd		SCIX	Scitex Corp. Ltd - ORD
ENGEF	Engel General Developers Ltd		SILCF	Silicom Limited
EQY	Equity One Inc		3SMPL	Simplayer.com Ltd
ESCM	ESC Medical Systems Ltd		SAE	Super Sol Ltd -ADR
ETZ	ETZ Lavud Ltd		TAD	Tadiran Ltd -SPON ADR
FLRE	Floware Wireless Systems Ltd		TTELF	Tadiran Telecommunications Ltd
FORTY	Formula Sys 1985 Ltd		TARO	Taro Pharmaceutical Inds Ltd
FORS	Forsoft Ltd.		TATTF	TAT Technologies Ltd -ORD
FNDT	Fundtech Ltd		TCNO	Tecnomatix Technologies Ltd
WILCF	G Willi-Food Intl Ltd		TFR	Tefron Ltd.
GALT	Galileo Technology Ltd		TLDCF	Teledata Communications Ltd
GILTF	Gilat Satellite Networks Ltd		TERM	Terayon Comm. Systems Inc
HCTL	Healthcare Technologies Ltd		TEVA	Teva Pharm. Inds. -ADR
HOMEF	Home Centers (DIY) Ltd		TIGA	Tioga Technologies Ltd
ICTS	ICTS International N V		TISA	Top Image Systems Ltd
IISL	IIS Intelligent Info -ORD		TSEM	Tower Semiconductor Ltd
INDG	Indigo NV		TTIL	TTI Team Telecom Intl. Ltd
IGLD	Internet Gold -GLDN Lines Ltd.		VRYA	Viryanet Ltd
IPLLF	Interpharm Labs Ltd -ORD		VOCL	Vocaltec Communications Ltd
ISRL	Isramco Inc.		3WIZTF	Wiztec Solutions
ISEFE	Istec Industries & Tech Ltd		ZRAN	Zoran Corp
JCDA	Jacada Ltd			

Table 2: Final list of Israeli companies with their respective American controls

	Israeli Company Name		Respective US Control	Industry
ACSEF	Acs-Tech80 Ltd	SOFT	Softech Inc	CMP INTEGRATED SYS DESIGN
ARLC	Arel Communications & Sftwre	INGR	Intergraph Corp	CMP INTEGRATED SYS DESIGN
ATTU	Attunity Ltd	TMBS	Timberline Software Corp	PREPACKAGED SOFTWARE
BOSC	Bos Better Online Solutions §	NPIX	Network Peripherals Inc	COMPUTER COMMUNICATION EQUIP
BSI	Blue Square-Israel Ltd -Adr §	WMK	Weis Markets Inc	GROCERY STORES
BTGC	Bio Technology General Corp	CYAN	Cyanotech Corp	MEDICINAL CHEMS,BOTANICL PDS
BVRT	Bvr Technologies Ltd	DKEY	Datakey Inc	MISC ELEC MACHY,EQ,SUPPLIES
CHKP	Check Point Software Techn *	TTWO	Take-Two Interactive Sftwr	PREPACKAGED SOFTWARE
CIMT	Cimatron Ltd	TESI	Tangram Entp Solutions	PREPACKAGED SOFTWARE
CMVT	Comverse Technology Inc *	SYMM	Symmetricom Inc	TELE & TELEGRAPH APPARATUS
DSPG	Dsp Group Inc	ADAP	Adaptive Broadband Corp	RADIO,TV BROADCAST, COMM EQ
DSSI	Data Systems & Software Inc	ANLY	Analysts International Corp	COMPUTER PROGRAMMING SERVICE
ECIL	Eci Telecommunications -Ord *	ASPT	Aspect Communications Corp	TELE & TELEGRAPH APPARATUS
EFCX	Electric Fuel Corp *	CARD	Publicard Inc	MISC ELEC MACHY,EQ,SUPPLIES
EFII	Electronics For Imaging Inc	ESAN	Entrada Networks Inc	COMPUTER COMMUNICATION EQUIP
ELT	Elscint Ltd -Ord	VAR	Varian Medical Sytems Inc	ELECTROMEDICAL APPARATUS
ELTK	Eltek Ltd *	SGMA	Sigmatron International Inc	PRINTED CIRCUIT BOARDS
ESLT	Elbit Systems Ltd § *	COMS	3com Corp	CMP INTEGRATED SYS DESIGN
ETZ	Etz Lavud Ltd	II	Intersystems Inc/De	MISC PLASTICS PRODUCTS
EVSN	Elbit Vision Systems Ltd	SOFT	Softech Inc	CMP INTEGRATED SYS DESIGN
FLSH	M-Systems Flash Disk Pioneer	MTIC	Mti Technology Corp	COMPUTER STORAGE DEVICES
FORTY	Formula Sys 1985 Ltd -Adr § *	QSII	Quality Systems Inc	CMP INTEGRATED SYS DESIGN
GALT	Galileo Technology Ltd	LOGC	Logic Devices Inc	SEMICONDUCTOR,RELATED DEVICE
GILTF	Gilat Satellite Networks Ltd *	WRLS	Telular Corp	RADIO,TV BROADCAST, COMM EQ
HCTL	Healthcare Technologies Ltd	MABA	Amer Biogenetic Sci -Cl A	IN VITRO,IN VIVO DIAGNOSTICS
HOMEF	Home Centers (Diy) Ltd §	FAST	Fastenal Co	BLDG MATL,HARDWR,GARDEN-RETL
ICTS	Icts International N V *	TTEC	Teletech Holdings Inc	BUSINESS SERVICES, NEC
IISL	Iis Intelligent Info -Ord	NCDI	Network Computing Devices	COMPUTER TERMINALS
INDG	Indigo N V	CTCQ	Check Technology Corp	PRINTING TRADES MACHY, EQUIP
ISRL	Isramco Inc	CRED	Credo Petroleum Corp	CRUDE PETROLEUM & NATURAL GS
KOR	Koor Industries Ltd -Adr § *	SXI	Standex International Corp	CONGLOMERATES
LNOP	Lanoptics Ltd	CPCI	Ciprico Inc	COMPUTER COMMUNICATION EQUIP
LVEL	Level 8 Sys Inc	CVNS	Covansys Corp	COMPUTER PROGRAMMING SERVICE
MAGS	Magal Security Sys Ltd § *	NMRX	Numerex Corp -Cl A	COMMUNICATIONS EQUIP, NEC
MATV	Matav-Cable Sys Media -Adr	CMCSK	Comcast Corp -Cl A Spl	CABLE AND OTHER PAY TV SVCS
MGIC	Magic Software Enterprises *	EDGW	Edgewater Technology Inc	PREPACKAGED SOFTWARE
MNTE	Mentergy Ltd	EPRE	Epresence Inc	CMP PROGRAMMING,DATA PROCESS
MTSL	Mer Telemgmt Solutions Ltd	SIDY	Science Dynamics Corp	TELE & TELEGRAPH APPARATUS
NICE	Nice Systems Ltd -Spon Adr *	CIEN	Ciena Corp	TELE & TELEGRAPH APPARATUS
NOGAF	Noga Electro-Mechanical Inds	ABTE	Able Telcom Holding Corp	ELECTRICAL WORK
NURM	Nur Macroprinters Ltd	PRST	Presstek Inc	PRINTING TRADES MACHY, EQUIP
NXUS	Nexus Telocation Sys Ltd *	STCIA	Salient 3 Commun Inc -Cl A	RADIO,TV BROADCAST, COMM EQ
ORBK	Orbotech Ltd	CGNX	Cognex Corp	INDUSTRIAL MEASUREMENT INSTR
ORCT	Orckit Communications Ltd § *	PCTL	Picturetel Corp	TELE & TELEGRAPH APPARATUS
ORFR	Orbit/Fr Inc *	TLGD	Tollgrade Communications Inc	ELEC MEAS & TEST INSTRUMENTS
PARS	Pharmos Corp *	BSTC	Biospecifics Technologies Cp	PHARMACEUTICAL PREPARATIONS
PLCM	Polycom Inc § *	AFCI	Advanced Fibre Comm Inc	TELE & TELEGRAPH APPARATUS
RADIF	Rada Electronic Inds *	KVHI	Kvh Industries Inc	SRCH,DET,NAV,GUID,AERO SYS

Table 2 – Continuation

RDCM	Radcom Ltd	CPCI	Ciprico Inc	COMPUTER COMMUNICATION EQUIP
RITT	Rit Technologies Ltd	CPCI	Ciprico Inc	COMPUTER COMMUNICATION EQUIP
ROBO	Robo Group Tek Ltd §	IMCI	Infinite Group Inc	MISC ELEC MACHY,EQ,SUPPLIES
SAE	Super-Sol Ltd -Adr §	SMF	Smart & Final Inc	GROCERY STORES
SCIX	Scitex Corp Ltd -Ord §	PRST	Presstek Inc	PRINTING TRADES MACHY, EQUIP
SILCF	Silicom Limited	AESP	Advanced Electr Support Pds	COMPUTER COMMUNICATION EQUIP
SPNS	Sapiens Intl Corp N V §	PTEC	Phoenix Technologies Ltd	PREPACKAGED SOFTWARE
TARO	Taro Pharmaceutical Inds Ltd	BLSI	Boston Life Sciences Inc	PHARMACEUTICAL PREPARATIONS
TATTF	Tat Technologies Ltd -Ord *	KRSL	Kreisler Manufacturing Corp	AIRCRAFT ENGINE,ENGINE PARTS
TCNO	Tecnomatix Technologies Ltd	IMIC	Indusri-Matematik Intl Corp	PREPACKAGED SOFTWARE
TEVA	Teva Pharm Inds -Adr §	VPHM	Viropharma Inc	PHARMACEUTICAL PREPARATIONS
TISA	Top Image Systems Ltd *	QMDC	Quadramed Corp	PREPACKAGED SOFTWARE
TSEM	Tower Semiconductor Ltd § *	OPTI	Opti Inc	SEMICONDUCTOR,RELATED DEVICE
TTIL	Tti Team Telecom Intl Ltd	DRCO	Dynamics Research Corp	CMP INTEGRATED SYS DESIGN
VOCL	Vocaltec Communications Ltd *	EGPT	Eagle Point Software Corp	PREPACKAGED SOFTWARE
WILCF	G Willi-Food Intl Ltd	PZZI	Pizza Inn Inc/Mo	GROCERIES & RELATED PDS-WHSL
ZRAN	Zoran Corp	ISSI	Integrated Silicon Solution	SEMICONDUCTOR,RELATED DEVICE

§ Arbitrage Stocks: Companies dually listed prior to January 1st, 1999.

* Companies Involved in or with Security/Defense Related Businesses

Table 3: Stock's summary statistics

		Israeli firms involved in or with defense or security related businesses, products or clients.					**Other firms**				
		Israeli firms		Control Group		Difference	Israeli firms		Control Group		Difference
Variable:		**Ri**	**ARi**	**Ri**	**ARi**	**DARi**	**Ri**	**ARi**	**Ri**	**ARi**	**DARi**
Entire Period 1.1.98 to 9.10.01	**Mean**	0.001	-0.054	0.002	-0.052	-0.003	0.001	-0.059	0.002	-0.055	-0.002
	STD	0.063	1.741	0.065	1.705	1.127	0.079	1.680	0.070	1.692	1.044
	Max	1.727	13.757	2.556	21.579	8.894	7.7	22.464	2.175	12.958	10.586
	Min	-0.611	-11.234	-0.800	-18.408	-8.374	-1	-19.570	-1	-13.540	-10.767
	Obs.	16813	16813	16569	16569	16569	30316	30316	29761	29761	29418
Pre Uprising 1.1.98 to 9.28.00	**Mean**	0.002	-0.081	0.003	-0.069	-0.012	0.003	-0.075	0.002	-0.078	0.005
	STD	0.061	1.621	0.065	1.582	1.042	0.083	1.573	0.068	1.563	0.946
	Max	1.727	13.757	2.556	21.579	7.642	7.7	22.464	2.175	12.958	9.614
	Min	-0.496	-11.107	-0.800	-13.849	-8.374	-0.590	-16.097	-1	-11.332	-9.946
	Obs.	12512	12512	12319	12319	12319	22835	22835	22435	22435	22422
Post Uprising 9.28.00 to 9.11.01	**Mean**	-0.002	0.039	0.001	0.012	0.027	-0.002	0.004	-0.000	0.033	-0.025
	STD	0.068	2.043	0.065	2.012	1.341	0.066	1.962	0.076	2.027	1.308
	Max	1.473	8.120	0.602	12.666	8.894	0.762	13.676	1.25	9.567	10.586
	Min	-0.611	-11.234	-0.414	-18.408	-7.888	-1	-19.571	-0.5	-13.540	-10.767
	Obs.	4278	4278	4227	4227	4227	7439	7439	7284	7284	6954

Table 4: Terrorism Summary Statistics

	Terrorist Attacks: 1-Jan-98 - 10-Sep-01	Terrorist Attacks: 1-Jan-98 - 28-Sep-00	Terrorist Attacks: 29-Sep-00 - 10-Sep-01
Daily Average	0.0719	0.014	0.2392
Daily STD	0.3009	0.1174	0.5244
Daily Max	2	1	2
Daily Min	0	0	0
No. of Days	1349	1002	347
Weekly* Average**	0.5026	0.0909	1.68
Weekly* STD**	1.0161	0.2885	1.3768
Weekly* Max**	5	1	5
Weekly* Min**	0	0	0
No. of Weeks	193	143	50
Monthly Average**	2.2444	0.4242	7.25
Monthly STD**	3.3585	0.7513	2.4909
Monthly Max**	12	3	12
Monthly Min**	0	0	4
No. of Months	45	33	12
Yearly* Average	30.25	6.5	54
Yearly* STD	37.3753	3.5355	43.8406
Yearly* Max	85	9	85
Yearly* Min	4	4	23
No. of Years	4	2	2
TOTAL	97	14	83

* Yearly data ending in 2001 include the entire year 2001; the entire year 2000 is included in the yearly statistics beginning in September 29, 2000 (2000 is omitted from the yearly statistics ending September 28, 2000).
** Monthly data ending in 2001 include the entire month of September 2001; September 2000 is entirely omitted from the monthly statistics beginning in September 29, 2000 (September 2000 was included in the monthly statistics ending September 28, 2000).
*** Weekly data ending in 2001 include the entire week of September 9, 2001; the entire week of September 24, 2000 is included in the weekly statistics ending on September 2000 (this week is omitted from the statistics beginning in September 29, 2000); Weeks start on Sunday and end on Saturday.

Table 5: The Effects of Terrorist Attacks on the Value of Stocks (includes all the available companies)

Dependent Variable: Difference between the abnormal return of every Israeli company and its respective control, DAR^{i}_{t}.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-0.0023	0.0098	-0.0034	0.0117	-0.0028	0.0054	-0.0039	-0.0025
	(0.0105)	(0.0126)	(0.0111)	(0.0133)	(0.0105)	(0.0127)	(0.0102)	(0.0124)
Defense		-0.0343		-0.0419*		-0.0230		-0.0040
		(0.0226)		(0.0237)		(0.0226)		(0.0218)
Uprising	-0.0077	-0.0556*						
	(0.0271)	(0.0338)						
Def*Uprising		0.1288**						
		(0.0565)						
Monthly Attacks			-0.0004	-.0075**				
			(0.0032)	(0.0040)				
Def*MonthlyAt.				0.0189***				
				(0.0067)				
Weekly Attacks					-0.0030	-0.0196		
					(0.0103)	(0.0129)		
Def*WeeklyAt.						0.0444**		
						(0.0215)		
Daily Attacks							-0.0045	-0.0139
							(0.0380)	(0.0478)
Def*DailyAt								0.0251
								(0.0789)
Obs	45987	45987	45987	45987	45987	45987	45987	45987

Notes: Heteroskedasticity-robust standard errors are in parentheses. Sample period: January 1, 1998 – September 10, 2001.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

Table 6: The Effects of Terrorist Attacks on the Value of Stocks (includes only companies that are not dually-listed)

Dependent Variable: Difference between the abnormal return of every Israeli company and its respective control, DAR^{i}_{t}.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	-0.0041	0.0106	-0.0062	0.0119	-0.0064	0.0024	-0.0061	-0.0053
	(0.0124)	(0.0146)	(0.0130)	(0.0154)	(0.0125)	(0.0148)	(0.0121)	(0.0145)
Defense		-0.0458*		-0.0555**		-0.0271		-0.0022
		(0.0273)		(0.0287)		(0.0273)		(0.0264)
Uprising	-0.0080	-0.0696*						
	(0.0324)	(0.0400)						
Def*Uprising		0.1832***						
		(0.0683)						
Monthly Attacks			0.0001	-0.0089*				
			(0.0039)	(0.0048)				
Def*MonthlyAt.				0.0265***				
				(0.0081)				
Weekly Attacks					0.0007	-0.0188		
					(0.0124)	(0.0153)		
Def*WeeklyAt.						0.0575**		
						(0.0259)		
Daily Attacks							0.0005	-0.0102
							(0.0457)	(0.0569)
Def*DailyAt								0.0313
								(0.0956)
Obs	35183	35183	35183	35183	35183	35183	35183	35183

Notes: Heteroskedasticity-robust standard errors are in parentheses. Sample period: January 1, 1998 – September 10, 2001.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 10% level.

Table 7: The Effects of Terrorist Attacks on the Value of Stocks (Includes Companies Fixed Effects)

Dependent Variable: Difference between the abnormal return of every Israeli company and its respective control, DAR^{i}_{t}.

	All Stocks				Non Arbitrage Stocks			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Defense	-0.1161*	-0.0622	-0.0524	-0.0436	-0.0660	-0.1371**	-0.1136*	-0.0441
	(0.0689)	(0.0970)	(0.0971)	(0.0972)	(0.0966)	(0.0696)	(0.0684)	(0.0973)
Uprising	-0.0533				-0.0664*			
	(0.0336)				(0.0398)			
Def*Uprising	0.1276**				0.1816***			
	(0.0565)				(0.0684)			
Monthly Attacks		-0.0072*				-0.0085*		
		(0.0040)				(0.0047)		
Def*MonthlyAt.		0.0188***				0.0262***		
		(0.0067)				(0.0081)		
Weekly Attacks			-0.0188				-0.0176	
			(0.0128)				(0.0152)	
Def*WeeklyAt.			0.0438**				0.0566**	
			(0.0215)				(0.0259)	
Daily Attacks				-0.0122				-0.0078
				(0.0479)				(0.0569)
Def*DailyAt				0.0236				0.0291
				(0.0790)				(0.0957)
F-test	0.41	0.41	0.39	0.39	0.41	0.42	0.38	0.39
	[1.0000]	[1.0000]	[1.0000]	[1.0000]	[0.9999]	[0.9999]	[1.0000]	[1.0000]
Obs	45987	45987	45987	45987	35183	35183	35183	35183

Notes: Heteroskedasticity-robust standard errors are in parentheses. Sample period: January 1, 1998 – September 10, 2001.
F-test is an F test of the null hypothesis that all pair of twins specific fixed effects in the FE-specification are equal, with p-values reported in brackets.
*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.

Table 8a: Defense Imports, Expenditures and Terror Fatalities, by Country, 1994 - 2003

	Yearly Defense Imports from Israel		Yearly Defense Expenditures		Importer Yearly Terror Fatalities	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Argentina	2,635	3,167	3,807,000	458,246	9.6	30.36
Australia	3,952	8,333	6,877,100	553,903	0.1	0.32
Belgium	395	889	3,145,900	111,589	0.1	0.32
Brazil	922	2,916	7,887,400	1,295,773	0	0
Cameron	1,054	2,222	112,400	19,046	0	0
Chile	33,729	30,103	2,555,900	392,619	0	0
China	18,972	9,999	20,700,000	6,916,004	6.5	15.73
Czech Republic	132	417	1,007,300	136,216	0	0
Ecuador	6,588	12,849	312,800	47,632	1.1	2.51
Eritrea	395	1,250	171,900	71,441	0.8	1.93
Estonia	132	417	68,770	30,684	0.1	0.32
Finland	132	417	1,521,600	73,278	0	0
France	791	2,079	34,768,400	1,109,277	3.7	4.40
India	30,039	25,463	10,030,700	1,490,561	193	243.62
Mexico	3,821	12,082	2,899,500	137,920	0.5	1.27
Romania	10,935	6,777	1,055	82,940	0.1	0.32
Singapore	41,634	32,292	4,018,500	711,483	0	0
Slovenia	2,635	5,692	264,000	30,122	0	0
South Korea	7,529	10,169	1,963,143	262,096	0	0
Switzerland	527	680	1,857,720	1,269,014	0.1	0.32
Taiwan	1,186	3,750	8,798,900	1,204,502	0	0
Thailand	395	889	2,258,500	421,333	4.5	6.96
Turkey	23,979	36,895	9,107,600	972,049	33.6	37.80
Uganda	2,240	7,083	117,640	27,975	15.7	20.89
Uruguay	1,845	5,833	328,800	82,166	0	0
USA	32,543	20,506	318,905,100	38,838,531	307	967.66
Venezuela	4,875	15,426	1,727,100	262,887	3.1	4.61

Sources: Defense Imports from Israel and Defense Expenditures are taken from SIPRI and measured in US dollars at constant 2000 prices (in thousands). Terror fatalities by countries were culled from RAND Terrorism Chronology (1968-1997) and RAND®-MIPT Terrorism Incident database (1998 – 2003).

Table 8b: Summary Statistics

	Yearly Defense Imports from Israel	Yearly Defense Expenditures	Yearly Israeli Terror Fatalities	Importer Yearly Terror Fatalities	Worldwide Yearly Terror Fatalities
			For Years 1994 – 2000 (186 Observations)		
Mean	7473	15,987,311	39.88	5.76	761.54
Std. Dev.	16,888	57,579,741	24.35	27.79	612.18
Max	89,592	334,539,000	72	325	2,160
Min	0	24,600	6	0	271
			For Years 2001 – 2003 (81 Observations)		
Mean	11,451	18,311,030	236.67	58.32	3103.33
Std. Dev.	20,950	67,443,642	81.65	351.70	1138.1
Max	92,227	417,363,000	351	3,061	4,643
Min	0	91,400	171	0	1,958

Sources: Defense Imports from Israel and Defense Expenditures are taken from SIPRI and measured in US dollars at constant 2000 prices (in thousands). Terror fatalities by countries and Worldwide Terror Fatalities were culled from RAND Terrorism Chronology (1968-1997) and RAND®-MIPT Terrorism Incident database (1998 – 2003). Israeli Terror Fatalities are taken from Berrebi and Klor (2004).

Table 9: The Effects of Terrorist Attacks on the Level of Defense Imports from Israel

Dependent Variable: Total Defense Imports from Israel by Country *i* in year *t*.

	(1)	(2)	(3)
Estimation Method	OLS	FE	PCSE
Israeli Terror Fatalities	31697**	32536**	21551***
	(15115)	(15035)	(4430)
Total Defense Expenditures	5×10^{-5}	-1×10^{-4}	7×10^{-5} ***
	(3×10^{-5})	(1×10^{-4})	(1×10^{-5})
Importer Terror Fatalities	13406***	11480**	15259***
	(4730)	(4778)	(5654)
Total Worldwide Terror Fatalities	281	296	512
	(1043)	(1037)	(369)
No. Observations	267	267	267
R^2	0.1229	0.0150	0.4377
F-test		6.61	
[p]		[0.000]	
Wald χ^2			189.34
[p]			[0.0000]

Notes: All the regressions include time fixed effects. Sample period: 1994 – 2003.
*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.