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US Israel Foreign Direct Investment and Terrorism

by

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ABSTRACT

The Israeli economy has been subjected to a continuous flow of terror since its creation. The focus of our study is how terrorism's impacts the level of production of the high-tech sector.

The two main objectives and novelties of the paper are: First our paper can be a major contribution to as yet a new subfield in applied microeconomics attempting to measure the impact of terror on economic issues like FDI and Industry output in general and that focused on the High-Tech industries. Second our research is designed to help us understand the impact of terror news, especially on U.S citizens' reactions to terror in Israel. Our terror variable isn't how many bodies or but how many negative articles regarding terror there are in leading American news paper. We focus on the volatility clustering of terror information arrivals in major US financial papers and its impact on high-tech production and FDI to Israel.

Introduction

The Israeli economy has been subjected to a continuous flow of terror since its creation. Terror has traditionally been defined as the "intentional use of violence against civilians or against civilian targets, in order to attain political aims."¹ In particular, continuous terror is expected to have economic consequences on a country's GDP, tourist sector, R&D policy, financial markets, among others.² The focus of our research is on terrorism's ability to effect the production of the high-tech sector that is mainly soled in foreign markets like the U.S and is based on foreign direct investments (FDI) originating from the United States. The focus on US-Israel FDI to the high tech sector is due to that fact that this flow represents approximately 75 percent of the total investment.³

FDI like any other financial flows are generated because of the future returns that can be expected. Because these returns are uncertain and depend on unknowable future developments, the value of these FDI flows requires forecasts of the distribution of these returns based on the best information available today. As time passes, investors get new information on future events and revalue the returns. On a fundamental level the volatility of returns is due to the arrival of new information.

The actual effect on the value of FDI will depend on the local macro economic condition of the host country, the specific project and world markets for the products especially in the high-tech sector. If a terrorist effect reduces the flow of FDI and the latter is an important element of the host economy the resulting negative ripple effect

¹ Ganor .1998. "Defining Terrorism: Is One Man's Terrorist Another Man's Freedom Fighter?" <http://www.ict.org.il/articles/define.htm>.

² On terror in Israel see Eckstein and Tsiddon (2004), who found a 5% reduction in Israel's GDP over the 2000-03 period due to Palestinian terror and Fleischer and Buccola (2002) who found that terror negatively affected tourism in Israel.

³ See Avnimelech and Teubal (2006).

will have an adverse impact on a specific project. If the reporting of the terrorist attack has no general macro repercussions the impact on an FDI project may be negligible. We are therefore not surprised to find higher volatility in a period of terrorist activity even if we have a constant long term flow of terror. This slow moving volatility clustering can provide FDI cycles of several years or longer.

One can also expect high frequency volatility. When an act of terror is reported the market will not immediately be able to estimate its value on FDI flows. Agents may disagree and may rest on information of others, the heard mentality. Others may discount the accepted forecasts and re-assess their FDI decisions. This process of evaluating the information of terror incidence will result in high volatility of FDI flows.

The literature

Although studies investigating the impact of terrorism on economic activity are relatively new, they are quickly gaining popularity following the events of September 11, 2001.⁴ The research estimating the impact of terror on the economy is in its first stages. There are a few works about terror but it primarily focuses on the impact of terror and tourism (Enders and Sandler, 1991; Downes-Le Guin and Hoffman, 1993; Sloboda, 2003; Ito and Lee, 2005). Frey, Luechinger and Stutzer (2004) claim that terrorism's impact on various aspects of the economy including tourism, FDI, savings and consumption, investment, stock markets, foreign trade, urban economy and national income and growth. Blomberg, Hess and Orphanides (2004) and Abadie and Gardeazabal (2003) discovered that terrorist attack in a country reduces its GDP growth. A study by the World Bank (2002) on the Palestinian-Israeli conflict estimates that its cost on the Israeli economy is about 4

⁴ See Barth et.al. (2006) for a literature review.

percent of GDP. Furthermore, Gupta, Clements, Bhattacharya and Chakravarti (2004) find that terrorism has a significant positive effect on the government budget this additional fiscal cost effect GDP growth. Tavares (2003) terrorism study found to have a negative and significant impact on growth in real GDP per capita. However, when taking into account other determinants of growth, such as exports, size of government, and spending on education, terrorism is no longer significant. There are also some studies that claim that terror has a small direct cost on capital stock in the U.S (Navarro and Spencer, 2001). Nitsch and Schumacher (2004) find that a 100 percent increase in the number of terrorist incidents is found to reduce bilateral trade by about 4 percent.

Even on Israeli terrorism there are just a few articles from the economic perspective and even they deal mostly with the local effect and not with a bilateral affect (Eldor and Melnick 2004; Levy and Galili, 2006). Fleischer and Buccola (2002) found that the Israeli hotel industry was negatively impacted by terrorism between 1992 and 1998 because revenues from foreign visitors dropped. The net loss increased with the deterioration of the situation in 1996. Drakos and Kutan (2003) used monthly data from 1991 to 2000 to investigate the effect of terrorism on tourism in Greece, Israel and Turkey. They found significant negative effects. Fielding (2003) focused on the impact of terror on aggregate savings in Israel. He calculated terror by the number of deaths in Israel during 1989-1999. He estimates that if the number of fatalities in Israel decreased by its average level, consumption would fall by over 7%. The savings ratio in Israel would double if a complete cessation of violence occurs. Eckstein and Tsiddon (2004) using VAR methodology estimate with quarterly data for the Israeli economy from 1950-2003, that there is a significant effect of terrorism on consumption. Berrebi and Klor (2005) find that terrorism has

no significant impact on the average stock-market valuation of Israeli firms. This is due to a *positive* effect on defense stocks that offsets a *negative* effect on non-defense stocks.

Terrorism affects FDI flows because foreigners can choose among many countries and projects, some of which are not subject to terrorism. Enders and Sander (1996) research on Spain find that terrorism has been estimated to have reduced annual FDI inflow by 13.5% on average for the period 1975-1991. They also estimated that terror in Greece reduced FDI on average by 11.9% annually. This translates into a loss in FDI amounting to almost \$400 million. Because FDI is an important source of savings, investment and economic growth are negatively affected in countries on the receiving end of terror. Moreover, the transfer of technological know-how into the country is reduced. Abadie and Gardeazabal (2005) examine the impact of terrorism on FDI which, they hypothesize, may be greater than its impact on economic growth. In most cases their 'terrorism index' is found to be negatively related to net FDI. Moreover, a one standard deviation increases in terrorism leads – on average – to a decrease in the ratio of net FDI to GDP of between 4.16 and 6.54 percentage points. Investigating the effects of terror on economic variables is clearly an important issue of research that more studies and resources have to be devoted to (Brück and Wickström,2004).

Objectives

The novelty of the research lies in two main issues. First after the 'September 11' world trade center terror attack, the world has become more aware of the risks of terror. This risk impacts the economy and lives today more than ever. But the economy research and literature is still in its first steps. Furthermore, most of the new research is on transnational terrorism because it appears to be one of the greatest concerns for the international community while at the same time neglecting the local terror that a lot of countries and communities deal with. This research can be a major contribution to the effect of local terror on economic issues like production and FDI to the high-tech industries.

In order to measure the impact of terror and its volatility on FDI we must first understand why FDI flows change. FDI are international assets which are purchased and owned because of the future payments that can be expected. Because these payments are uncertain and depend upon unknowable future developments, the fair price of these FDI assets will require forecasts of the distribution of these payments based on our best information today. As time goes by, we get more information on these future events and re-value the asset. So at a basic level, financial price volatility is due to the arrival of new information. Volatility clustering is simply clustering of information arrivals. The fact that this is common to so many assets is simply a statement that news is typically clustered in time.

The second contribution of our research is to try to understand the impact of terror news, especially on U.S citizens' reactions to terror in Israel. Our terror variable is different from the ones researches are using today. Our terror variable isn't how many bodies, casualties or events that occur but how many negative articles regarding terror there are in leading American news paper, and its location in the media.

Consequently we focus on the volatility clustering of terror information arrivals in major US financial papers.

Our research deals mainly how American investors to the high-tech and start up sectors react to volatility of terror in Israel and how production that is mainly exports in the high-tech sector is affected by this volatility. We investigate the high-tech industry for a number of reasons. High-tech companies, and particularly start-ups, are viewed as mobile enterprises that can transfer their operations to a different country with relative ease for a wide variety of reasons, consequently sensitive to terror volatility. Another explanation for why the high-tech sector should be less affected by local conditions is that the risk in investing in start-up companies is so high that the marginal risk of a security situation is rendered virtually meaningless. Furthermore, the products developed by domestic high-tech enterprises are designed for foreign markets and not for the relatively small domestic market.⁵ In the last decade the Israeli high-tech industry has become the leading industry of the Israeli economy. Its business cycle heavily impacts the Israeli economy business cycle. In the first eight month of 2006 73% of the Israeli exports were from the high-tech or semi high-tech industries (Central Bureau of Statistics, 2006). A substantial portion of the FDI invested in the Israeli high tech industry comes from the USA. Consequently the focus on the US-Israel bilateral relationship on the volatility of terror is crucial. Furthermore, the results of this research should be of interest to other countries that attempt to attract US FDI investors or sale to the U.S market.

Consequently our research questions become more specific:

1. To what extent does terror affect production in the high-tech sector?
2. What time lag there is between terror actions and real effect on production?

⁵ In 2005 approximately 75 percent of the Israeli high tech sector was destined for exports. See Central Bureau of Statistics (2006).

3. Do global conditions like global growth have bigger affects than local environment variables like terror on FDI and production?

Data and variables

The depended variable in this test is the industrial product index (seasonality was neutralized) of the Israeli high-tech sector.

The variable that we use as an indicator for the world economy is the NASDAQ composite index. Sulla and Ben-Horin (2000) found that the NASDAQ composite index had the greatest impact on the Tel Aviv Stock Exchange, and therefore may serve as the best indicator of the effect of the American economy on Israel and particularly on the Israeli high-tech industry.

The additional and most unique variable that we use in this study is the number of articles about Israel that appeared in *The New York Times*. We use *The New York Times* as an indicator of the extent and type of exposure the Israeli local environment as interpreted in the U.S.A. We intend to broaden this information base to other leading financial papers. This will let us also interpret the investors choice of source of 'reliable' information.

The empirical research will examine the extent to which the NASDAQ and the exposure of the local environment affect the Israeli high-tech sector. It will examine the link between the change in the log of the industrial product index (DLNI) as a factor of the change in the log of the NASDAQ (DLNN) and the change in the number of articles mentioning Israel in *The New York Times* (DSUM). As a first cut approximation we examined the data with a simple VAR model. The test was performed on the sample of data we have collected thus far, spanning the period January 1996 to October 2002. This data sample was collected on a monthly basis. We started the sample in 1996 because the Internet revolution emerged in full force in

the mid-1990s. Just as the electric revolution provided a major stimulus to industry, so to the Internet revolution gave a major boost to globalization by opening up rapid channels of communication that have shortened the distance between countries and transformed the world into a global village.

Results

Table 1 presents our test results using a simple VAR model results for 1996-2002. The results are backed up by a Granger causality test that was significant (p value < 0.005) for the NASDAQ explanation and *The New York Times* explanation. The Adj. R-squared is 0.54.

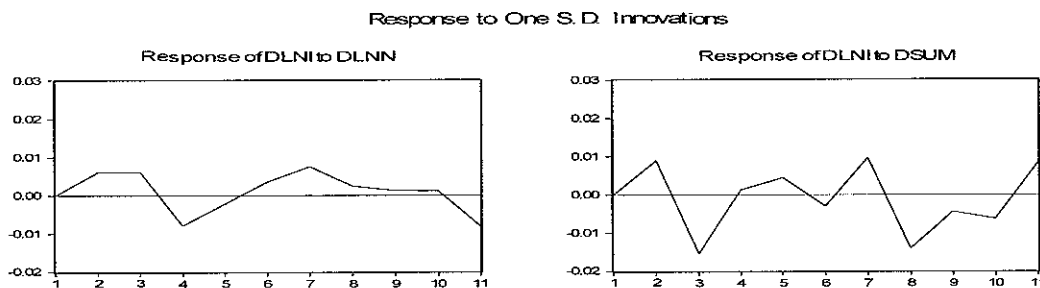
Table 1: Variance Decomposition of DLNI

Period	DLNI	DLNN	DSUM
1	100.0000	0.000000	0.000000
2	83.73397	5.204752	11.06128
3	66.35313	6.381135	27.26574
4	64.28932	10.65737	25.05332
5	64.07284	10.53851	25.38864
6	63.04426	11.29482	25.66092
7	57.45698	13.72182	28.82120
8	53.61919	11.75550	34.62531
9	53.46453	11.59847	34.93701
10	55.00269	10.78505	34.21226
11	54.63303	12.24126	33.12570

As can be seen from the reported results the Israeli high-tech industrial product index is much more sensitive to local conditions (DSUM) as it is reflected in the Americana media rather than by events in the global economy (DLNN). In Figure 1 we can see the impulse response function. This shows a positive shock of one standard deviation in the DLNN will have virtually no effect on DLNI throughout the first year after the shock. At the same time, a positive shock in the DSUM, meaning more articles about Israel in the newspaper (mainly negative due to terror and security situation), have a negative effect after two months and an additional negative effect

shows eight months later on the DLNI. In our opinion the first slump is the outcome of fewer orders by American firms and customers, and the second slump is an outcome of less FDI.

Figure 1



This result proved to be surprising since we had assumed that the high-tech industry would be less affected by local conditions. The reason for this conclusion was that high-tech companies and particularly start-ups are viewed as mobile enterprises that can transfer their operations to a different country with relative ease. If the high-tech industry is negatively impacted by negative reporting of local conditions (e.g. terror) during volatile times, it is certain that other industries with a large degree of mobility will be even more negatively affected.

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