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Rockets: The Housing Market Effects of a Credible Terrorist Threat

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Abstract

This paper explores the economic costs of conflict using a unique experiment. We analyze the housing market effects of Hezbollah's massive surprise rocket attack against northern Israel during the 2006 Second Lebanon War and the continued threat posed by the organization's expanding rocket arsenal. Relying on a hedonic approach and using a difference-in-differences identification strategy for 2000-2012, we show that the rocket threat had a large effect: house prices declined by 15%- 22% in the north relative to a "control" group of localities in southern Israel, and by 6% in the most severely hit localities relative to others in the north.

Rockets: The Housing Market Effects of a Credible Terrorist Threat*

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Abstract

This paper provides a novel perspective on the credibility of terrorist threats and the effectiveness of policies to eliminate them. In mid-2006 Hezbollah, a Lebanese terrorist organization, carried out a massive surprise rocket attack on northern Israel. Since then the organization continued to expand its rocket arsenal while Israel invested heavily in trying to eliminate the threat. Using a difference-in-differences identification strategy for 2000-2012, we show that the 2006 attack led to a 6-7 percent decline in house prices and rents. The results indicate that the public continued to view the rocket threat as credible as late as 2012.

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1 Introduction

During the 2006 Second Lebanon War Hezbollah, a Lebanese terrorist organization, carried out a massive attack on northern Israel, firing almost 4,000 rockets on dozens of civilian and military targets. This was by far the most intensive and longest rocket attack against Israel until then. The Hezbollah attack came as a surprise, as the years following the 2000 withdrawal of Israeli troops from southern Lebanon were characterized by almost complete calm. Since the 2006 war Hezbollah has continued to build and improve its rocket arsenal and repeatedly threatened that it will carry out an additional attack on Israel. It is estimated that today Hezbollah has more than 100,000 rockets, an order of magnitude more than it had before the war.

Israel was not standing idly by as the Hezbollah threat developed. In an attempt to deter future rocket attacks, the country has adopted a policy of “massive retaliation” against Hezbollah, committing itself to use overwhelming force in the event of such an attack. Moreover, Israel has invested substantial resources in offensive and defensive measures aimed at eliminating the rocket threat emanating from Hezbollah as well as from other terrorist organizations (mainly operating in the Gaza strip), Arab countries and Iran.

In this paper we offer a housing market perspective on the credibility of the Hezbollah rocket threat and on the effectiveness of the Israeli measures aimed at eliminating it. The idea behind the analysis is simple. In the context of the housing market, the threat of rocket attacks can be viewed as a disamenity. An increase in the perceived threat should lead to a decline in house prices and rents. Conversely, measures taken to reduce the threat would have the opposite effect on prices if they are perceived as effective.

To carry out the investigation we merge confidential data on the location of rocket hits during the Second Lebanon War with comprehensive and detailed data on house prices and rents in northern Israel for 2000-2012. Identification of causal effects relies on the surprising nature of the attack and on the spatial variation in rocket hits. Our difference-in-differences approach compares pre- and post-war house price and rent dynamics between the most severely hit

localities and others in northern Israel.

The analysis yields striking results. House prices in the most severely hit localities started to decline relative to the other localities in the north immediately after the war. The cumulative decline in house prices reached a peak of about 7% in the first quarter of 2008, i.e. about a year and a half after the war, and remained at this approximate level until the end of 2012. Rent dynamics were similar: the cumulative relative decline in rents was about 5% by the first quarter of 2008 and roughly 7% from 2010 through 2012.

How do we interpret these results? Before the war the Israeli public was not aware of the severity and the credibility of the rocket threat posed by Hezbollah. The war revealed the organization's significant capabilities and willingness to attack. It also revealed that some areas in northern Israel face greater risk than others (e.g. because they host major military bases and key infrastructure facilities). The elevated risk perceptions made the affected areas less attractive and generated a decline in relative demand for housing in the most severely hit localities.¹ Our analysis indicates that the rocket threat had practically no differential effect on real economic activity in the most severely hit localities vs. others in the north in the post-Second Lebanon War period. This further suggests that the decline in prices directly reflects the disamenity associated with living under the shadow of the rocket threat.

The persistence of the effects until 2012 implies that since the war the Israeli public continued to view the rocket threat as credible and was skeptical about the government's ability to eliminate it. This is consistent with several facts. First, in the post-war period Hezbollah has dramatically increased and improved its rocket arsenal and continued to threaten Israel. Second, since 2006 Israel was subjected to several major rocket attacks from the Gaza Strip, exposing the failure of Israeli deterrence strategy. Third, defensive anti-rocket systems developed by Israel in recent years, while highly sophisticated, are unlikely to provide full protection in the face of a future massive Hezbollah

¹We also find a large and negative (although imprecisely estimated) effect on the supply of new housing units in the most severely hit localities vs. others in the north. It is important to note in this context that the war caused little physical damage to houses and thus did not directly affect the housing stock.

attack.²

Our paper builds on and contributes to three lines of research in the literature. The first analyzes the capitalization of amenities and disamenities into house prices. The second examines the effects of conflict on asset markets. The third examines the effectiveness of counter-terrorism policies.

A vast literature investigates the impact of various amenities and disamenities on house prices. These include, for example, neighborhood school quality (Black, 1999; Figlio and Lucas, 2004), environmental externalities (Chay and Greenstone, 2005; Greenstone and Gallagher, 2008), access to transportation (Baum-Snow and Kahn, 2000; Gibbons and Machin, 2005), crime (Linden and Rockoff, 2008; Ajzenman, Galiani, and Seira, 2014), and racial and ethnic tensions (Collins and Margo, 2007; Gautier, Siegmann, and Van Vuuren, 2009).

Numerous studies have documented that various forms of conflict affect prices of financial assets. Examples include the impact of war (Willard, Guinane and Rosen, 1996; Guidolin and La Ferrara 2007) and of terrorism (Abadie and Gardeazabal, 2003). Within the last category, several papers have focused on the Israeli-Palestinian conflict (Eldor and Melnick, 2004 and 2010; Zussman, Zussman and Nielsen, 2008; Berrebi and Klor, 2010).

A number of studies examine how terrorism affects the housing market.³ Abadie and Dermisi (2008) show that following the 9/11 terrorist attacks office vacancy rates increased at the three main landmark buildings in downtown Chicago relative to nearby buildings. Besley and Mueller (2012) examine the effect of political violence on house price indices in Northern Ireland by exploiting variation across regions and over time in violence intensity. The study shows that violence depressed house prices and, conversely, that the prospects of peace led to house price appreciation.

²We note that the first successful interception of rocket fire (from the Gaza Strip) by these defensive systems took place at the very end of the period under investigation.

³A related literature explores the long-term effects of conflict on urban and regional development. Examples include Davis and Weinstein (2002), Berkman, Garretsen, and Schramm (2004), and Miguel and Roland (2011). In the Israeli context, see Glaeser and Shapiro (2002).

In the Israeli context, two studies estimated the effect of Palestinian bombing and shooting terrorist attacks during the Second Intifada of the early 2000s on the Jerusalem housing market. Exploiting variation across neighborhoods in the intensity of violence, Hazam and Felsenstein (2007) show that terrorism had a stronger negative effect on rents than on purchase prices. Arbel et al. (2010) focus on the Gilo neighborhood, which suffered from sporadic gunfire from a neighboring Palestinian locality. Results indicate that the shooting depressed house prices in Gilo, and especially in “frontline” streets facing the Palestinian locality.

Nevo (Ben-Or) and Shechter (1999) compare list prices for properties in three cities in northern Israel which were differentially exposed to rocket fire from Lebanon in the 1990s (discussed below). In late 1997-early 1998 the authors collected data from newspaper ads and follow-up phone calls on 200 properties. The paper shows that list prices were about 7% lower in the most exposed city than in the least exposed one. Given the cross-sectional nature of their analysis, however, the results cannot be interpreted as causal.

The third line of related literature, which is relatively thin, investigates the effectiveness of counter-terrorism policies. Within this body of research, the study most closely related to ours is Zussman and Zussman (2006). The paper shows that the Israeli stock market does not react to assassinations of low-ranked members of Palestinian terrorist organizations but does react strongly to the assassinations of senior leaders: negatively in the case of political leaders but positively in the case of military leaders. Although the context is completely different, like Zussman and Zussman (2006) in this paper we rely on the forward-looking, information aggregating nature of asset markets to argue that data from such markets can be fruitfully used to gauge the cost of terrorism as well as the effectiveness of counter-terrorism policies.

Several features of our study facilitate credible identification of causal effects – the exogenous nature of the shock and its magnitude, the spatial variation in treatment intensity, and the quality of the data. By offering these advantages, we believe that this study contributes to the literatures discussed above.

The rest of the paper is organized as follows. Section 2 provides a background on the rocket threat and the Second Lebanon War. In Section 3 we describe our data sources. Section 4 presents the results of the analysis and Section 5 discusses possible mechanisms underlying them. Section 6 concludes.

2 The Rocket Threat

The rocket threat facing Israel has a long history.⁴ For the last half century Israel's enemies, both countries and terrorist organizations, have acquired and used rockets as a means to counter Israeli military superiority. To aid the discussion below, Figure 1 shows a map of Israel.

In the early 1960s, Egypt developed rocket technology with the aid of German scientists, a project that was derailed by Israeli intelligence. During the 1973 Yom Kippur War, Soviet forces stationed in Egypt fired Scud missiles at frontline Israeli forces and the Syrian army fired Frog missiles at a major air force base in northern Israel.

During the 1991 Gulf War, Iraq fired 39 Scud missiles at Israeli cities, marking the first major missile attack by an Arab country against Israeli civilian population. While the attack caused only two fatalities and minor property damage, it created widespread anxiety and led to population exodus from the Tel Aviv metropolitan area (which suffered a large share of the hits).

Since the Gulf War the rocket threat posed by Arab countries (and Iran) has increased in terms of the number of rockets and their range, accuracy and payload. Moreover, the threat was magnified by the concern that Israel's enemies would arm their missiles with non-conventional (chemical, biological, and nuclear) warheads.

All along, terrorist organizations contributed to the growing rocket threat facing Israel. From the late 1960s and until the early 1980s, the Palestinian Liberation Organization sporadically launched rockets from southern Lebanon into northern Israel. This eventually led to an Israeli invasion of Lebanon in

⁴We use the terms "rocket" and "missile" interchangeably. While missiles have a guidance system, rockets do not. In both cases we refer solely to surface-to-surface projectiles.

1982 (the First Lebanon War). Israeli forces stayed in the country for the next 18 years, in part because decision makers were concerned that withdrawal would lead to the renewal of rocket fire. One of the consequences of the Israeli invasion was the establishment of Hezbollah (discussed below).

Since the turn of the millennium, an additional terrorist rocket threat emerged along Israel's southern border. Following the outbreak of the Second Intifada (uprising) in late 2000, Palestinian terrorist organizations started to fire primitive self-made rockets from the Israeli-occupied Gaza Strip. This threat increased after the Israeli pullout from the Gaza Strip in 2005, and especially following the 2007 takeover of the Strip by Hamas, a radical Islamic terrorist organization. The takeover was followed by sporadic attacks against Israeli border localities (initially mainly with mortar fire and short-range rockets) and also facilitated the smuggling of relatively sophisticated rockets into the Gaza Strip via tunnels dug under its border with Egypt. The increasing threat from the Gaza Strip led Israel to initiate three large-scale military operations: "Cast Lead" (December 2008 – January 2009), "Pillar of Defense" (November 2012) and "Protective Edge" (July-August 2014). During all three operations, the Palestinians were able to fire a large number of rockets (with increasing range and payload) despite the efforts of the Israeli military.

Finally, in recent years a new, and until now a relatively minor, threat emerged: Islamist organizations operating near the Israeli-Egyptian border fired rockets into Eilat, a resort city located on the shore of the Red Sea in the southern tip of Israel.

2.1 The Hezbollah Rocket Threat

Hezbollah was founded by Shia clerics in the early 1980s with the primary aim of resisting Israel's occupation of southern Lebanon. Over the years the organization gained in popularity and is today one of the strongest political and military forces operating in Lebanon. In the 1980s and 1990s it carried out guerrilla operations against Israeli troops stationed in Lebanon and their Lebanese allies. The organization first fired rockets against border localities

in northern Israel in 1992, in response to the Israeli assassination of its leader. Hezbollah carried out several additional relatively minor rocket attacks on border localities in the following years. These attacks ceased after Israel pulled out of Lebanon in 2000. Over the years Hezbollah, aided by its sponsors, Iran and Syria, acquired a large and sophisticated rocket arsenal. On the eve of the Second Lebanon War in 2006 Hezbollah had roughly 14,000 rockets.

2.1.1 The Second Lebanon War and its Aftermath

The Second Lebanon War started in July 12, 2006 with a Hezbollah cross-border kidnapping operation against an Israeli military patrol. Israel immediately responded with great force to the provocation. During the war, which ended with a cease-fire agreement in August 14, 2006, large scale Israeli forces operated in Lebanon in an attempt to destroy Hezbollah's rocket arsenal, command and control infrastructure, and military posts. Despite this effort, throughout the war and even on its last days, Hezbollah managed to continue firing rockets. All in all, the organization fired almost 4,000 rockets against civilian and military targets in northern Israel, up to 75km from the Israel-Lebanon border. We discuss and analyze the pattern of rocket hits in detail below.

The war resulted in 165 Israeli fatalities (44 of them civilians) and more than 1,000 Lebanese fatalities. The severity of Hezbollah's rocket attack led to a population exodus from localities in northern Israel during the war.

Since the war Hezbollah has not carried out additional rocket attacks against Israel. However, with the help of Syria and Iran it has continued to build and improve its rocket arsenal. It is estimated that today Hezbollah possesses more than 100,000 rockets, making the organization's arsenal one of Israel's major national security threats.⁵

The Second Lebanon War was a turning point in public concern about the threat of rocket attacks. Using *Google Trends*, Figure 2 demonstrates that before the war the public showed little interest in built-in shelters (see next

⁵Source: a public speech given by Israel's head of military intelligence in January 2014 at The Institute for National Security Studies (Tel Aviv University).

section); the war changed this state of affairs. Interest in the shelters increased substantially in the year following the war and then stabilized, well before the escalation in the south which led to operation “Cast Lead”.

2.2 Israeli Response to the Rocket Threat

To counter the rocket threat, Israel has developed a set of defensive and offensive measures and worked to strengthen its deterrence posture.

On the defensive side, underground shelters – originally intended to protect the population from aerial bombardment and artillery fire – were built since the 1950s. Following the 1991 Gulf War, Iraqi Scud attack the state mandated that all new apartments will have built-in shelters (rooms made out of fortified concrete). It is estimated that today less than 50% of apartments have built-in shelters.⁶

A second set of defensive measures consists of anti-rocket and anti-missile surface-to-air missile systems. The *Patriot* anti-missile system was deployed in Israel during the 1991 Gulf War but proved ineffective in intercepting Iraqi missiles. The *Arrow* system was developed against long-range ballistic missile and has been operational since 2000. This system was designed to counter the threat posed by Iraq’s and Iran’s long-range missiles and not Hezbollah’s shorter range rockets (Hezbollah’s arsenal currently consists of rockets with a range of up to 250km). The *Magic Wand* system, still in development, is intended to operate against medium-range (70-250km) rockets and missiles. Finally, the *Iron Dome* system is designed to operate against short-range rockets fired from distances of up to 70km. This system became operational in 2011. It was used for the first time during operation “Pillar of Defense” in November 2012 and later during operation “Protective Edge” in July-August 2014. In both cases it intercepted a large number of rockets fired from the Gaza Strip with a high success rate. At the time of operation “Pillar of Defense” Israel had five *Iron Dome* batteries; this figure increased to nine during operation

⁶Built-in shelters offer two advantages relative to underground shelters. First, the population can get into them almost immediately. Second, they are more convenient to stay in for a prolonged period.

“Protective Edge”. The protection these batteries provide is geographically limited: each battery covers an area of only 150 square km. They are deployed in different parts of the country based on changing military needs.

Israel has also developed offensive measures to counter the rocket threat. These include building intelligence and military (especially air force) capabilities to detect and destroy rockets and launchers. In recent years Israel has invested heavily in efforts to disrupt rocket shipments to terrorist organizations. For example, according to media reports it assassinated in Beirut, Damascus, and Dubai top Hezbollah and Hamas activists who were in charge of rocket acquisition, development, and operation; it conducted air strikes in Syria and Sudan destroying long range missile systems bound for Hezbollah and Hamas; the Israeli navy intercepted ships in the Mediterranean Sea and in the Red Sea which carried rockets to these organizations.

Finally, following the Second Lebanon War Israeli officials announced the adoption of a deterrence strategy known as the “Dahiya doctrine”. The doctrine is named after a suburb of Beirut where Hezbollah headquarters are located and which was flattened by the Israeli Air Force during the war. According to the doctrine, Israel will achieve deterrence by committing to use disproportionate force against terrorist organizations, including the destruction of civilian infrastructure that supports them.

3 Data

The paper merges data on rocket hits during the Second Lebanon War with data on house prices and rents. To support the analysis we use complementary data on construction starts and the labor market.

3.1 Rocket Hits

We obtained confidential data on the universe of rocket hits during the Second Lebanon War from the Home Front Command of the Israeli Defense Forces (IDF). For each hit we have information on locality and date. During the war

Hezbollah fired 3,854 rockets.⁷ All rockets fell within a distance of 75km from the Israel-Lebanon border; from now on we refer to this area in northern Israel as the “rocket range” (Figure 1). Figure 3 highlights the five localities that suffered from the largest number of hits: Qiryat Shemona (401), Nahariyya (299), Ma‘alot-Tarshiha (226), Zefat (193) and Haifa (128). Together these *Top5* localities account for almost a third of the total number of hits and stand out relative to the more than five hundred other localities within rocket range (Figure 4).

Several factors likely account for the concentration of rocket hits in the *Top5* localities. Qiryat Shemona, Nahariyya and Ma‘alot-Tarshiha are relatively populous border localities. Zefat hosts the IDF’s Northern Command and is also close to the Israeli Air Force’s northern control and command center. Haifa is northern Israel’s major city, where several strategic facilities – such as an oil refinery, a large civilian port and a key naval base – are located; during the war Hezbollah’s leader, Hassan Nassrallah, specifically mentioned that Haifa is a prime target for the organization’s rocket fire.⁸

We next examine more rigorously potential determinants of the spatial variation in the number of hits. Table 1 shows that the number of hits per locality within rocket range is negatively correlated with distance from the Lebanon border and with the locality being Arab⁹; the number is positively correlated with the locality having a large population, hosting a major military base, and being in the vicinity of the *Top5* localities (the last association likely reflects the inaccuracy of Hezbollah’s rocket fire). These patterns illustrate that rockets were not fired at random and therefore may suggest that the Israeli population could expect that past targets would become future targets. An additional perspective on the spatial variation in the number of hits is

⁷This number includes mortar fire. Our data source does not differentiate between mortars and rockets, and also does not provide information about the damage caused in each case.

⁸For example, on July 16, 2006 Nassrallah said that he is proud that the organization was able to attack the city of Haifa and military command centers in northern Israel. Source: Hezbollah’s TV station via *BBC Worldwide Monitoring*.

⁹During the war Nassrallah apologized for the death of several Arab Israelis from Hezbollah’s rocket fire.

provided in Figure A1 in the Appendix, which illustrates that the natural areas encompassing the *Top5* localities suffered the largest number of hits.¹⁰

3.2 Housing Market

3.2.1 Purchase Transactions

We use administrative data on the universe of household purchases of residential properties. The data were obtained from the Israel Tax Authority (Ministry of Finance) via the Bank of Israel. These data are used by the Israeli Central Bureau of Statistics (CBS) to construct the official Prices of Dwellings Index; transactions that do not meet criteria set by the CBS to construct the index were dropped.¹¹ For each transacted property we have date, location, price, number of rooms, size (in square meters) and building year.¹² It is important to note that for technical reasons we can uniquely identify only a subset of the properties in the dataset. This limits the number of observations available for examination using repeat sales approaches. Our analysis focuses on the years 2000-2012; we thus have periods of similar length before and after the 2006 war. In total, 141 thousand transactions are available for the localities within rocket range for this period.

3.2.2 Rents

Our data on rents come from the CBS rent surveys for 2000-2012. The rent survey is carried out throughout the year among a representative sample of

¹⁰A natural area is the smallest geographical area defined by the Israeli Central Bureau of Statistics. We note that a similar pattern emerges when we examine the variation in the *per capita* number of hits by natural area.

¹¹The most important criteria are the following: (1) the number of rooms is between 1.5 and 5.0 (the share of properties outside this range is negligible); (2) the size to rooms ratio is within a certain range; (3) the price to size ratio in a given locality is within a certain range.

¹²Several property characteristics may be associated with an elevated risk of being hit by Hezbollah's rockets. These include north-facing windows and location in the top floors of high-rises. Unfortunately, we do not have reliable information on these characteristics. There is also no information on seller or buyer characteristics.

households which rent from individual property owners.¹³ The dataset has a panel structure: the same property may appear multiple times. For each observation we have a unique property identification number, several property characteristics, location, survey date, and monthly rent. These survey data are used by the CBS in constructing the housing component of the Consumer Price Index. In total, around 24 thousand observations are available for the localities within rocket range for the 2000-2012 period.

3.2.3 Construction Starts

We obtained information on the quarterly number of all private construction starts (in housing units terms) per locality-statistical area (sub-neighborhood) from the CBS, which collects it from construction companies and planning committees.

3.3 Labor Market

In Section 5 we examine the possibility that the Second Lebanon War and the continued rocket threat has affected the housing market not only directly but also indirectly, through a deterioration in economic conditions in northern Israel. To test this hypothesis, one would preferably use regional output measures, such as GDP. Unfortunately, such measures are not available for Israel. A plausible alternative is to examine the behavior of regional labor market indicators. We thus use the 2000-2011 Labor Force Surveys and Income Surveys conducted by the CBS.¹⁴ Both surveys collect a large number of socio-demographic characteristics and cover representative samples of the Israeli population.

Summary statistics for the housing market and labor market data are provided in Table A1 in the Appendix.

¹³We note that the commercial rental market is extremely thin and that there is no rent control in the private market.

¹⁴The survey methodology changed considerably in 2012, making comparison with the earlier surveys difficult.

4 Results

4.1 House Prices

We use a difference-in-differences strategy to identify the (net) effect on house prices of the Second Lebanon War, Hezbollah’s expanding rocket arsenal and Israel’s policies aimed at eliminating the rocket threat. Our approach builds on the spatial variation in the number of hits during the war. As we have shown above, variation in the number of hits per locality is explained by several key variables, such as the locality’s distance from the Lebanon border, its size, and the existence of major military bases within its confines. This suggests that, based on past experience, the public could roughly estimate which localities are more likely to be targeted by Hezbollah in a future confrontation.

Our difference-in-differences identification strategy therefore compares house price dynamics before and after the war between “high-dosage” and “low-dosage” localities within rocket range, where the dosage category is determined by the number of rocket hits per locality. In particular, we estimate the following hedonic equation:

$$\ln(p_{ilt}) = \alpha + \beta' \mathbf{x}_i + \delta_l + \theta_t + \gamma Treatment_l * \theta_t + \varepsilon_{ilt}, \quad (1)$$

where p is the price of property i in locality-statistical area l sold on date t ; \mathbf{x} is a vector of property characteristics: number of rooms (in groups: 1.5-2, 2.5-3, 3.5-4, 4.5-5), log area (in square meters) and log age; δ is a locality-statistical area fixed-effect; θ is a year fixed effect; and ε_{ilt} is a well-behaved error term clustered at the locality-statistical area level.¹⁵ In our baseline specification $Treatment$ is an indicator that receives the value of one for properties in the five localities that saw the largest number of hits during the war (*Top5*) and the value of zero for properties in all other localities within rocket range. We divide the year 2006 into two sub-periods: “2006-1” (January 1 to July 11) and “2006-2” (August 15 to December 31).¹⁶ Our interest is in the coefficient

¹⁵The dependent variable and the hedonic covariates are identical to those used by the CBS when constructing the “Prices of Dwellings” Index.

¹⁶Throughout this section, we omit from the analysis transactions that took place during

γ , which might be interpreted as capturing the average willingness to avoid the disamenities associated with living under the shadow of the rocket threat.¹⁷

As a preliminary step, we estimate a baseline model that excludes from equation (1) the interaction terms between *Treatment* and the year fixed effects. Results (column 1 of Table 2) show that property characteristics have the expected signs and are highly statistically significant: prices rise with the number of rooms and property size and decline with age. The explanatory power of the regression is high, about 0.8.

In column 2 we present results from estimating the full version of equation (1), where the first part of 2006 (“2006-1”) is the basis for comparison (i.e. we exclude this period from the set of year fixed-effects and its interaction with the treatment variable). The results indicate that before the war there was no difference in the behavior of prices between properties in the *Top5* localities and properties in other localities within rocket range. In contrast, already in the months immediately following the war (“2006-2”), relative prices in the *Top5* started to decline. By 2008 the cumulative price decline (relative to the first part of 2006) reached a peak of 6.7%. In the next four years the cumulative price decline fluctuated around 6%.

A graphical illustration of these price dynamics is provided in Figure 5. We re-estimate equation (1), replacing the year fixed-effects with year-quarter fixed-effects, and plot the value of the estimated interaction coefficients between the year-quarter fixed-effects and the treatment indicator (together with 95% confidence intervals).¹⁸ The figure shows a sharp and monotonic relative price decline following the war, reaching a peak of about 7% already by the

the war (July 12 to August 14, 2006) and define transactions in the first eleven days of July as belonging to the second quarter of 2006.

¹⁷A possible concern about this interpretation is that, as in all empirical work on amenities and property values, we can observe prices only for houses that sell. If the war changed the composition of buyers and sellers (e.g. in terms of risk tolerance) or of houses actually sold (in terms of unobserved property characteristics), this interpretation may not be correct. However, it is not clear ex-ante whether such composition effects would lead us to overestimate or underestimate the average willingness to pay to avoid the disamenities associated with the rocket threat. See Linden and Rockoff (2008) and Ajzenman, Galiani, and Seira (2014) for discussion of these issues.

¹⁸The second quarter of 2006 is used as the basis for comparison.

first quarter of 2008, i.e. about a year and a half after the war.¹⁹ From then until the last quarter of 2012, the cumulative price decline fluctuates between 5% and 7% with no apparent trend.

While the drop in relative house prices in the *Top5* localities following the war was quick, one may still wonder why it was not immediate. We offer several possible explanations for this result. First, and most importantly, in the period immediately following the war there was uncertainty about Hezbollah’s future rocket threat and Israel’s ability to eliminate it.²⁰ Second, delayed price adjustment may have been driven by nominal loss aversion, as in Genesove and Mayer (2001). Third, difficulties in changing place of residence could have worked to delay adjustment; such difficulties may reflect attachment to the workplace and family and community ties (which are highly important in the Israeli context).

In column 3 of Table 2 we again rely on the spatial variation in the intensity of hits to explore the effect of the rocket threat, but instead of dividing localities in the north into high-dosage and low-dosage we simply use the number of hits per locality as a (continuous) dosage treatment variable. Using this approach yields a similar pattern to the one obtained using the original approach. As can be seen in the table and in Figure 6, by 2008 the adjustment was practically complete: the cumulative relative price decline fluctuated at around 3% per 100 rocket hits from that year through 2012.

In columns 4 and 5 we conduct a repeat sales analysis for properties that we were able to uniquely identify and which were sold at least twice during the period under investigation. Specifically, we estimate the following equation:

$$\ln(p_{it}) = \alpha + \delta_i + \theta_t + \gamma Treatment_i * \theta_t + \varepsilon_{it}, \quad (2)$$

¹⁹The coefficient for the third quarter of 2006 should be discounted as it is based on a very small number of observations.

²⁰For example, the war ended with a United Nations Security Council resolution which was approved by all sides. Among other things, the resolution called for the deployment of the Lebanese army and United Nations peace keeping troops in southern Lebanon and the disarmament of armed groups in the country (implying Hezbollah). It took months before it became apparent that Hezbollah would not be disarmed but rather increase in strength.

where p is the price of property i on date t ; δ is a property fixed effect; θ is a year fixed effect; $Treatment$ is an indicator for affected areas; and ε_{it} is a well-behaved error term clustered at the locality-statistical area level. Remarkably, despite the sharp drop in the number of observations, the results are very similar to those presented in columns 2-3.

We next conduct several robustness checks for the baseline comparison of price dynamics in the *Top5* localities relative to other localities within rocket range. The first check addresses the concern that some of the 531 localities outside the *Top5* suffered a non-trivial number of hits during the war (Figure 4). In Table 3A we therefore omit from the analysis in sequence the “Top 6-10”, “Top 6-20” and “Top 6-40” localities in terms of the number of hits. Excluding these intermediate cases does not have much of an effect on the results.

The second check addresses the concern that the *Top5* localities are all relatively populous, a characteristic that might influence price dynamics. In Table 3B we therefore exclude from the control group in turn localities with a population of less than 2,000, 10,000 and 20,000 residents. Again, there is little influence on the results.

Finally, a possible concern is that Haifa, being by far the most populous city in the north – and thus the market with the largest number of transactions – may be the sole driver of house price behavior in the *Top5* localities. In Table 3C we thus separately compare price dynamics in (a) Haifa and (b) the four other *Top5* localities relative to all the non-*Top5* localities within rocket range. The results demonstrate that price dynamics were similar in Haifa and in the other *Top5* localities.

4.2 Rents

We next analyze the effect of the rocket threat on rents by estimating the following equation:

$$\ln(r_{it}) = \alpha + \delta_i + \theta_t + \gamma Treatment_i * \theta_t + \varepsilon_{it}, \quad (3)$$

where r is the monthly rent of property i at month t ; δ is a property fixed effect; θ is a year-quarter (or year) fixed effect; $Treatment$ is an indicator for affected areas; and ε_{it} is a well-behaved error term clustered at the locality-statistical area level. We remove from the analysis observations from July and August of 2006 (the war period) and define January-June as “2006-1” and September-December as “2006-2”. As before, “2006-1” serves as the basis for comparison.

We again use two approaches. In the first we compare rent dynamics between high-dosage localities (*Top5*) and low-dosage localities. In the second we use the number of hits as our treatment variable. Results are presented in Table 4. We find that before the war rent dynamics were similar in the *Top5* localities and in other localities within rocket range (column 1 and Figure 7). Rents started to decline already by 2007. The cumulative decline reached a level of about 5% by 2009 and fluctuated at a level of around 6%-7% in 2010-2012. A similar pattern emerges when using the number of hits per locality as the treatment variable, with the cumulative rent decline being similar to that estimated in the house price analysis – about 3% per 100 rocket hits.

5 Discussion

So far our analysis has established that the Second Lebanon War and the rocket threat exerted a strong and persistent negative effect on house prices and rents in “treated” localities in northern Israel. This outcome could reflect shifts in both demand and supply.

On the supply side, we emphasize (again) that the war had practically no effect on the housing stock in the north since very few buildings were severely damaged.²¹ At the same time the war could have affected the supply of new housing units. We explored this issue with data on the universe of private construction starts by locality and quarter. Results are presented in Appendix

²¹Data from the Israeli Tax Authority, which is responsible for compensating house owners for war-related damages, indicate, for example, that only 149 such payments exceeded NIS 200,000 (about half of the construction costs for a typical apartment).

Table A2. While quite noisy, they suggest that the war had a negative effect on construction starts in the localities that saw the largest number of hits relative to others within rocket range. This indicates that the drop in prices is due to a decline in demand.

The question remains whether the decline in demand solely reflects the disamenity associated with living under the shadow of the rocket threat or captures other effects of the war, most notably a protracted deterioration in real economic activity in the affected localities.²²

In order to explore the latter mechanism we conduct a difference-in-differences analysis of labor market outcomes. Using individual level data from Labor Force Surveys and Income Surveys, we estimate the following equation:

$$outcome_{ilt} = \alpha + \beta' \mathbf{x}_i + \delta_l + Y_t + Q_t + \gamma Treatment_l * Y_t + \varepsilon_{ilt}, \quad (4)$$

where *outcome* is the labor market outcome of individual *i* in locality *l* at time *t*; \mathbf{x} is a vector of standard individual characteristics (gender, age, family status, number of children, highest educational degree, new immigrant status, and ethnicity); δ is a locality fixed effect; *Y* is year fixed effect; *Q* is a quarter fixed effect; *Treatment* is an indicator for affected areas²³; ε_{ilt} is a well-behaved error term clustered at the locality level.

Our analysis uses three outcome variables. First, an indicator for participation in the labor force. Second, for those in the labor force, an indicator for unemployment. Third, for salaried employees, the monthly gross wage. The results, presented in Table 5, are inconsistent with the hypothesis that the Second Lebanon War had a lasting negative effect on real economic activity

²²We note that in addition to covering war-related property damages, the Israeli government compensates firms and individuals for economic losses caused directly by the war (e.g. decline in revenue for firms and lost wages for employees).

²³Since the public use versions of the surveys contain scrambled locality codes, we cannot replicate our original categorization of localities into those receiving high-dosage treatment (*Top5*) and others. Instead, we now include in the high-dosage treatment individuals from the sub-districts adjacent to the Lebanon border and the sub-district surrounding Haifa. All *Top5* localities are included in this high-dosage treatment group.

in the north.

We next elaborate on the disamenity associated with living under the shadow of the rocket threat in the north. The Second Lebanon War erupted after several years of calm along the Israel-Lebanon border. The war demonstrated that Hezbollah is able and willing to lob thousands of rockets deep into Israel. Moreover, rockets were not fired randomly but rather tended to target specific localities due to their strategic importance and other considerations. This made some localities in the north riskier than others. Crucially, in the years following the war Hezbollah improved its arsenal in terms of the number of rockets and their range, accuracy, and payload. Hezbollah was also able to develop methods to better conceal and protect rockets and launchers, making it more difficult for the Israeli military to destroy them. This, together with the constraints on the use of force put on Israel by the international community, might work to prolong future confrontations.

On the defensive side, the anti-rocket (and anti-missile) systems developed by Israel might still be insufficient to provide adequate protection against the Hezbollah rocket threat. Especially relevant here is the “Iron Dome” system, which was first successfully used to intercept rockets (from the Gaza Strip) during operation “Pillar of Defense” in November 2012. The number of “Iron Dome” batteries and intercepting rockets is limited due to budgetary constraints. This implies that in case of a future massive and prolonged Hezbollah attack, the system is likely to be overwhelmed. Moreover, it is plausible that Israel’s first priority in case of such an attack would be to protect key military bases, thus leaving civilian population centers vulnerable.²⁴

Another consideration that needs to be taken into account is the apparent failure of Israel’s deterrence strategy vis-a-vis the Palestinian terrorist organizations operating in the Gaza Strip. The “Dahiya doctrine” of massive retaliation was announced by Israel following the Second Lebanon War. It failed to deter the Palestinians from attacking Israel with rockets in 2007-2008. Further-

²⁴Even if defensive systems provided near-perfect coverage, the rocket threat would still constitute a disamenity because of concerns regarding system failure and “side effects” of the attacks (e.g. the need to enter a shelter when warnings are given).

more, even though during operation “Cast Lead” at the end of 2008 Israeli forces inflicted massive damage to civilian infrastructure in the Gaza Strip, rocket attacks against Israel from the Strip continued in the following years. The Israeli public might thus reasonably deduce from the failure of deterrence against the Palestinian organizations that deterrence against Hezbollah may also fail.

6 Conclusion

In January 2014, Israel’s military intelligence chief gave a speech at the Institute for National Security Studies at Tel Aviv University where he outlined the national security challenges facing Israel. The preeminent challenge, according to his assessment, is the rocket threat. He noted that Hezbollah has about 100,000 rockets, by far more than any other of Israel’s enemies.

In this paper we take a first rigorous look at the implications of the rocket threat for the Israeli economy. Specifically, we examine the effect of the 2006 Second Lebanon War and the continued threat emanating from Hezbollah’s growing rocket arsenal on the Israeli housing market. During the war Hezbollah fired around 4,000 rockets on northern Israel. Our examination relies on the surprising nature of the attack, on the spatial variation in rocket hits during the war, and on detailed housing market data for the years 2000-2012. Using a difference-in-differences approach we compare the behavior of housing market outcomes between the most severely hit localities and others in the north.

Results are striking. Following the Second Lebanon War, house prices and rents declined in the most severely hit localities relative to others in the north, reaching a trough of about 6%-7%. This effect persisted until the end of the period under investigation. Our analysis suggests that these housing market outcomes reflect a drop in demand rather than an increase in supply. The results indicate that despite the major investments made by Israel to eliminate the Hezbollah rocket threat, throughout the post-war period the Israeli public continued to view it as credible.

7 References

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Table 1
Hezbollah Targeting During the Second Lebanon War

<i>Dependent variable: number of rocket hits per locality</i>					
	(1)	(2)	(3)	(4)	(5)
Distance from Lebanon border	-0.38*** (0.07)	-0.40*** (0.07)	-0.41*** (0.07)	-0.39*** (0.07)	-0.36*** (0.07)
City		55.63*** (19.46)	56.59*** (19.42)	49.47** (19.45)	49.95** (19.44)
Arab locality			-7.55*** (2.81)	-6.50** (2.74)	-6.34** (2.78)
Major military base				93.77*** (32.03)	94.46*** (32.08)
In vicinity of the <i>Top5</i> localities					7.77** (3.68)
Observations	536	501	501	501	501
R-squared	0.08	0.26	0.27	0.33	0.34

Sources. Data on localities are from the Israeli Central Bureau of Statistics: *List of Localities 2006*. Data on rocket hits are from the Home Front Command of the Israeli Defense Forces.

Notes. “Distance from Lebanon border” is the aerial distance of the locality from the Israel-Lebanon border in km. “City” is an indicator variable for localities with a population of at least 20,000. “Arab locality” is an indicator for localities with a majority of Arab population as defined by the Israeli Central Bureau of Statistics. “Major military base” is an indicator for localities where a major army, air-force or navy base is situated. “In vicinity of the *Top5* localities” is an indicator for localities situated within a 5km range from the center of the five most severely hit localities. See text for details.

Estimated by OLS. Robust standard errors in parentheses.

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

Table 2
Effect of the Rocket Threat on House Prices

	<i>Dependent variable: log price</i>				
	Hedonic Approach			Repeat Sales Approach	
	Baseline	<i>Top5</i> vs. other localities within rocket range	Number of hits per locality	<i>Top5</i> vs. other localities within rocket range	Number of hits per locality
(1)	(2)	(3)	(4)	(5)	
2.5-3.0 Rooms	0.051 ^{***} (0.008)	0.050 ^{***} (0.008)	0.050 ^{***} (0.008)		
3.5-4.0 Rooms	0.146 ^{***} (0.010)	0.146 ^{***} (0.011)	0.146 ^{***} (0.010)		
4.5-5.0 Rooms	0.233 ^{***} (0.012)	0.232 ^{***} (0.012)	0.232 ^{***} (0.012)		
Log (area)	0.744 ^{***} (0.015)	0.745 ^{***} (0.015)	0.745 ^{***} (0.015)		
Log (age)	-0.020 ^{***} (0.001)	-0.020 ^{***} (0.001)	-0.020 ^{***} (0.001)		
2000 x Treatment		-0.000 (0.019)	-0.007 (0.011)	-0.070 ^{**} (0.033)	-0.025 (0.017)
2001 x Treatment		-0.001 (0.018)	0.002 (0.010)	-0.058 ^{**} (0.028)	-0.015 (0.015)
2002 x Treatment		0.003 (0.016)	0.007 (0.009)	-0.010 (0.029)	0.006 (0.015)
2003 x Treatment		0.006 (0.015)	0.006 (0.008)	-0.028 (0.025)	-0.006 (0.014)
2004 x Treatment		0.010 (0.012)	0.010 (0.007)	-0.007 (0.026)	0.006 (0.013)
2005 x Treatment		0.005 (0.011)	0.003 (0.006)	-0.010 (0.026)	-0.004 (0.014)
2006-2 x Treatment		-0.008 (0.013)	-0.005 (0.007)	-0.002 (0.033)	0.003 (0.018)
2007 x Treatment		-0.034 ^{***} (0.012)	-0.010 (0.007)	-0.029 (0.027)	-0.019 (0.015)
2008 x Treatment		-0.067 ^{***} (0.014)	-0.029 ^{***} (0.009)	-0.072 ^{**} (0.029)	-0.040 ^{**} (0.017)
2009 x Treatment		-0.051 ^{***} (0.016)	-0.034 ^{***} (0.009)	-0.044 (0.031)	-0.038 ^{**} (0.017)
2010 x Treatment		-0.055 ^{***} (0.017)	-0.033 ^{***} (0.010)	-0.059 [*] (0.034)	-0.051 ^{***} (0.018)

2011 x Treatment		-0.063***	-0.031***	-0.055	-0.044**
		(0.016)	(0.009)	(0.034)	(0.019)
2012 x Treatment		-0.064***	-0.027***	-0.067**	-0.043***
		(0.015)	(0.008)	(0.030)	(0.016)
Locality-SA FEs	Yes	Yes	Yes	No	No
Year FEs	Yes	Yes	Yes	Yes	Yes
Property FEs	No	No	No	Yes	Yes
Observations	141,358	141,358	141,358	38,449	38,449
R-squared	0.810	0.811	0.811	0.927	0.928

Sources. Data on housing transactions are from The Israel Tax Authority (via the Bank of Israel); *Karmen* Database. Data on rocket hits are from the Home Front Command of the Israeli Defense Forces.

Notes. In columns (2) and (4) “treatment” is an indicator for the five most severely hit localities. In columns (3) and (5) “treatment” is the number of hits per locality (divided by 100). See text for details.

The excluded category in terms of the number of rooms is 1.5-2.0. Area is in square meters. Age is in years. “2006-2” is the period from August 15, 2006 to December 31, 2006. Locality-SA is a combination of locality and statistical area (sub-neighborhood).

Estimated by OLS. Standard errors, clustered by locality-statistical area, in parentheses.

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

Table 3
Effect of the Rocket Threat on House Prices: Robustness Checks

Panel A: Excluding Localities with an Intermediate Number of Hits				
<i>Dependent variable: log price</i>				
	Baseline (1)	Excluding localities in top		
		6-10 (2)	6-20 (3)	6-40 (4)
Pre-war x <i>Top5</i>	0.004 (0.013)	0.010 (0.014)	0.021 (0.014)	0.029** (0.015)
Post-war x <i>Top5</i>	-0.055*** (0.012)	-0.049*** (0.013)	-0.058*** (0.014)	-0.062*** (0.014)
Property characteristics	Yes	Yes	Yes	Yes
Locality-SA FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	141,358	133,670	122,183	117,459
R-squared	0.811	0.812	0.812	0.813

Panel B: Excluding Small Localities				
<i>Dependent variable: log price</i>				
	Baseline (1)	Excluding localities with population of less than		
		2,000 (2)	10,000 (3)	20,000 (4)
Pre-war x <i>Top5</i>	0.004 (0.013)	0.000 (0.013)	-0.004 (0.013)	-0.022 (0.014)
Post-war x <i>Top5</i>	-0.055*** (0.012)	-0.057*** (0.013)	-0.060*** (0.013)	-0.060*** (0.013)
Property characteristics	Yes	Yes	Yes	Yes
Locality-SA FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	141,358	138,406	134,204	123,825
R-squared	0.811	0.807	0.811	0.810

Panel C: Separating Haifa from the other *Top5* Localities

<i>Dependent variable: log price</i>			
	Baseline	Haifa vs. non- <i>Top5</i>	Other <i>Top5</i> vs. non- <i>Top5</i>
	(1)	(2)	(3)
Pre-war x <i>Top5</i>	0.004 (0.013)	0.013 (0.014)	-0.021 (0.018)
Post-war x <i>Top5</i>	-0.055*** (0.012)	-0.053*** (0.013)	-0.063*** (0.019)
Property characteristics	Yes	Yes	Yes
Locality-SA FEs	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes
Observations	141,358	126,628	103,392
R-squared	0.811	0.812	0.802

Sources. Data on housing transactions are from The Israel Tax Authority (via the Bank of Israel): *Karmen* Database. Data on rocket hits are from the Home Front Command of the Israeli Defense Forces.

Notes. “*Top5*” is an indicator for the five most severely hit localities. “Pre-war” is an indicator for the period January 1, 2000 to December 31, 2005. “Post-war” is an indicator for the period from August 15, 2006 to December 31, 2012. The period from January 1, 2006 to July 11, 2006 is the basis for comparison. “Property characteristics” include number of rooms (in groups), log area, and log age. Locality-SA is a combination of locality and statistical area (sub-neighborhood).

In all panels the analysis in column (1) includes all localities in rocket range. Panel A: columns (2)-(4) exclude the top 6-10, top 6-20, and top 6-40 localities in terms of the number of hits. Panel B: columns (2)-(4) exclude localities with a population of less than 2,000, 10,000 and 20,000. Panel C: column (2) compares Haifa to non-*Top5* localities while column (3) compares the *Top5* localities other than Haifa to non-*Top5* localities. See text for details.

Estimated by OLS. Standard errors, clustered by locality-statistical area, in parentheses. *, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

Table 4
Effect of the Rocket Threat on Rents

<i>Dependent variable: log rent</i>		
	<i>Top5 vs. other localities within rocket range</i>	<i>Number of hits per locality</i>
	(1)	(2)
2000 x Treatment	0.007 (0.019)	0.010 (0.013)
2001 x Treatment	0.014 (0.017)	0.005 (0.009)
2002 x Treatment	0.005 (0.016)	-0.001 (0.009)
2003 x Treatment	0.004 (0.015)	0.002 (0.008)
2004 x Treatment	0.003 (0.012)	0.000 (0.007)
2005 x Treatment	0.006 (0.010)	0.000 (0.006)
2006-2 x Treatment	0.008 (0.012)	-0.003 (0.007)
2007 x Treatment	-0.010 (0.010)	-0.006 (0.006)
2008 x Treatment	-0.034** (0.014)	-0.014 (0.009)
2009 x Treatment	-0.049*** (0.016)	-0.021** (0.009)
2010 x Treatment	-0.063*** (0.018)	-0.029*** (0.011)
2011 x Treatment	-0.070*** (0.019)	-0.033*** (0.012)
2012 x Treatment	-0.065*** (0.019)	-0.030** (0.005)
Apartment FEs	Yes	Yes
Year FEs	Yes	Yes
Observations	23,907	23,907
R-squared	0.949	0.949

Sources. Data on rents are from the Israeli Central Bureau of Statistics. Data on rocket hits are from the Home Front Command of the Israeli Defense Forces.

Notes. In column (1) “treatment” is an indicator for the five most severely hit localities. In column (2) “treatment” is the number of hits per locality (divided by 100). See text for details. “2006-2”

is the period from September 1, 2006 to December 31, 2006. Apartment is an ID number of each surveyed apartment.

Estimated by OLS. Standard errors, clustered by locality-statistical area, in parentheses.

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

Table 5
Effect of the Rocket Threat on Labor Market Outcomes

<i>Dependent variable</i>	Labor Force	Unemployment	Log Wage
	Participation		
	(1)	(2)	(3)
2000 x Treatment	-0.012 (0.016)	-0.009 (0.014)	-0.038 (0.040)
2001 x Treatment	-0.021 (0.014)	-0.004 (0.016)	-0.048 (0.042)
2002 x Treatment	-0.029 (0.018)	0.001 (0.013)	-0.033 (0.043)
2003 x Treatment	-0.028* (0.016)	0.010 (0.013)	-0.025 (0.039)
2004 x Treatment	-0.018 (0.015)	0.000 (0.010)	-0.062 (0.053)
2005 x Treatment	-0.030** (0.013)	0.005 (0.012)	-0.018 (0.032)
2006-2 x Treatment	-0.025 (0.021)	0.009 (0.017)	0.036 (0.056)
2007 x Treatment	-0.018 (0.017)	-0.006 (0.013)	-0.061 (0.054)
2008 x Treatment	-0.036** (0.015)	0.013 (0.013)	-0.027 (0.050)
2009 x Treatment	-0.025* (0.014)	-0.006 (0.013)	-0.018 (0.040)
2010 x Treatment	-0.023 (0.016)	0.002 (0.013)	-0.042 (0.036)
2011 x Treatment	-0.024 (0.015)	-0.019 (0.012)	-0.049 (0.050)
Individual characteristics	Yes	Yes	Yes
Locality FEs	Yes	Yes	Yes
Year and quarter FEs	Yes	Yes	Yes
Observations	164,977	116,736	24,617
R-squared	0.256	0.051	0.254

Sources. Data on labor force participation and unemployment are from the Israeli Central Bureau of Statistics: *Labor Force Surveys 2000-2011*. Data on (gross) wages are from the Israeli Central Bureau of Statistics: *Income Surveys 2000-2011*. Data on rocket hits are from the Home Front Command of the Israeli Defense Forces.

Notes. Analysis is restricted to individuals of prime working age (25-54). Wage analysis is additionally restricted to salaried employees in localities with a population of at least 20,000 (the CBS does not provide location data for employees from smaller localities). The analysis compares outcomes in the sub-districts adjacent to the Lebanon border and the sub-district surrounding Haifa to all other sub-districts in the north. See text for details.

“2006-2” is the last quarter of 2006. “Individual characteristics” include sets of indicators for gender, age, family status, number of children, highest educational degree, new immigrant status (immigrated since 1989), and ethnicity.

Estimated by OLS. Standard errors, clustered by locality, in parentheses.

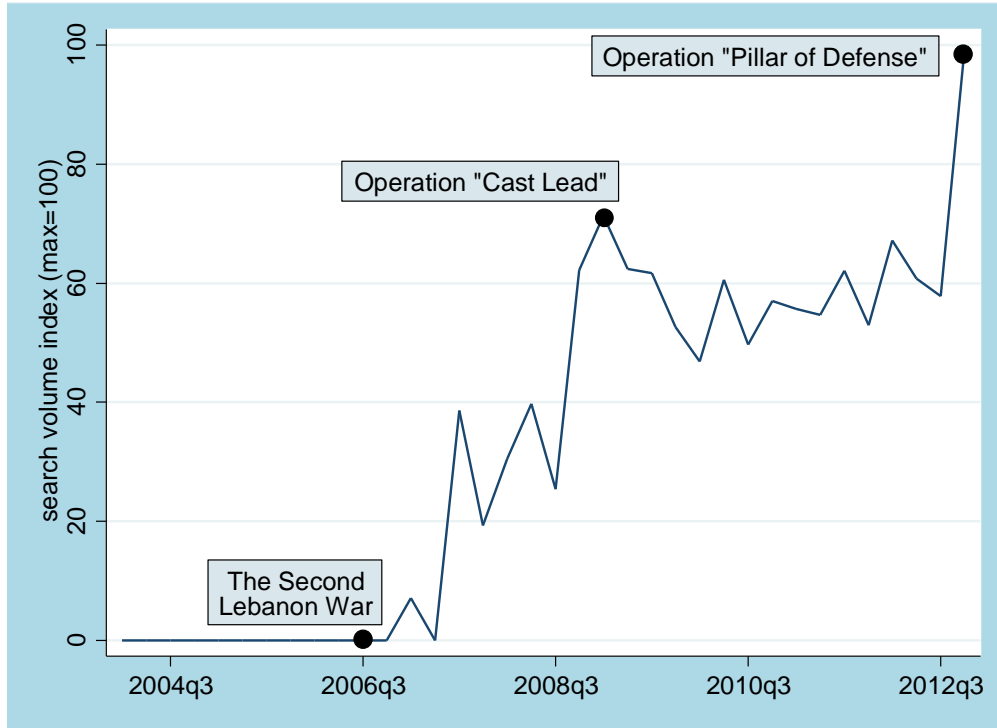
*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

Figure 1
Map of Israel



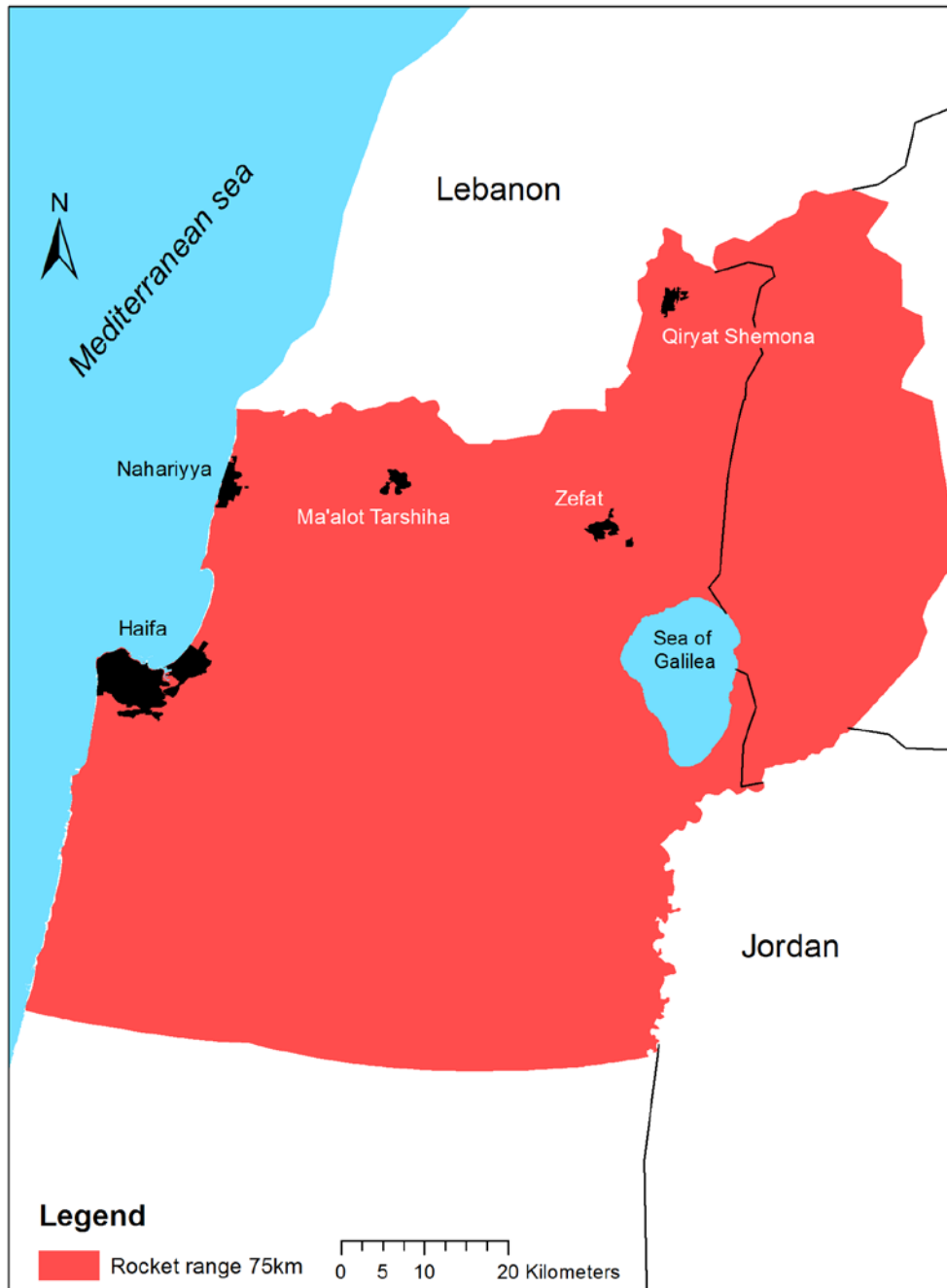
Sources. Home Front Command of the Israeli Defense Forces; GIS Lab, Department of Geography, The Hebrew University of Jerusalem.

Figure 2
The Rocket Threat: A Google Trends Perspective
(searches for “built-in-shelter”, 2004-2012)



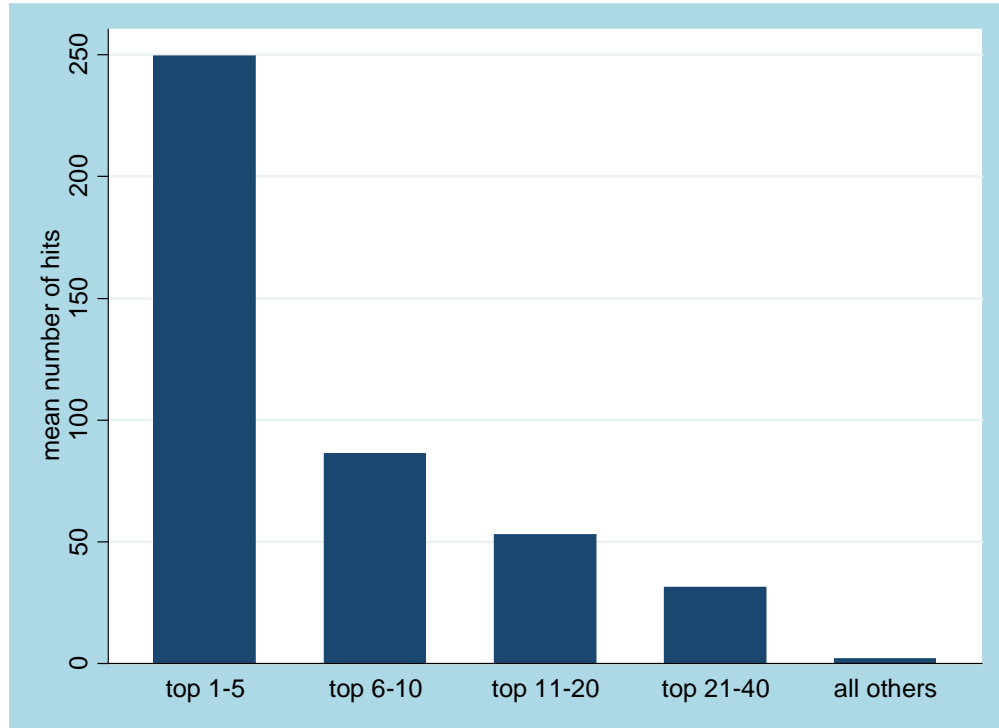
Notes. The figure covers the period from January 1, 2004 until December 31, 2012.

Figure 3
Rocket Range in Northern Israel
(75km from the Lebanon border)



Sources. Home Front Command of the Israeli Defense Forces; GIS Lab, Department of Geography, The Hebrew University of Jerusalem.

Figure 4
Number of Rocket Hits per Locality
(536 localities within rocket range)



Sources. Home Front Command of the Israeli Defense Forces.

Figure 5
Effect of the Rocket Threat on House Prices:
Top5 vs. other Localities

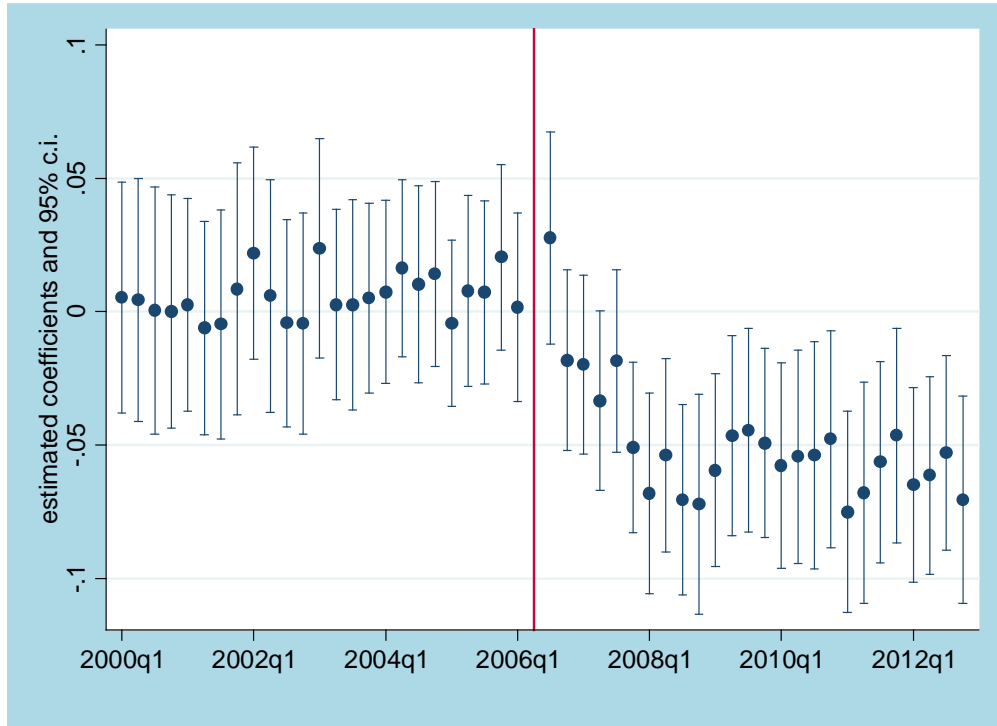


Figure 6
Effect of the Rocket Threat on House Prices:
Using the Number of Hits per Locality (/100) as Treatment

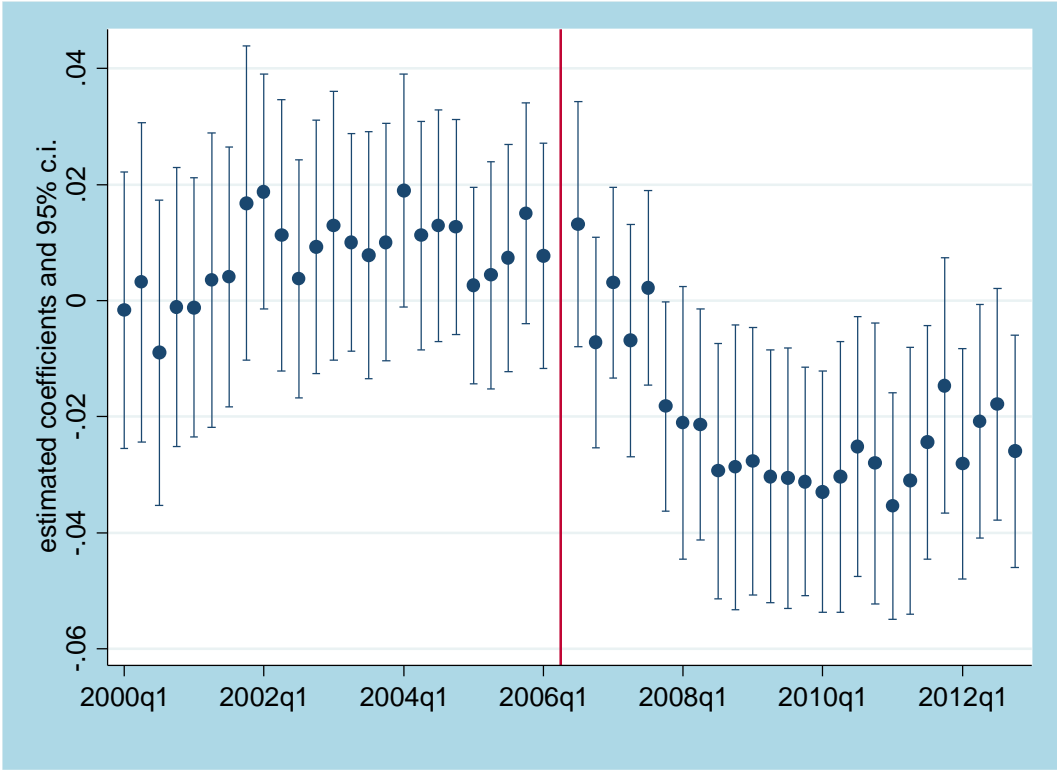
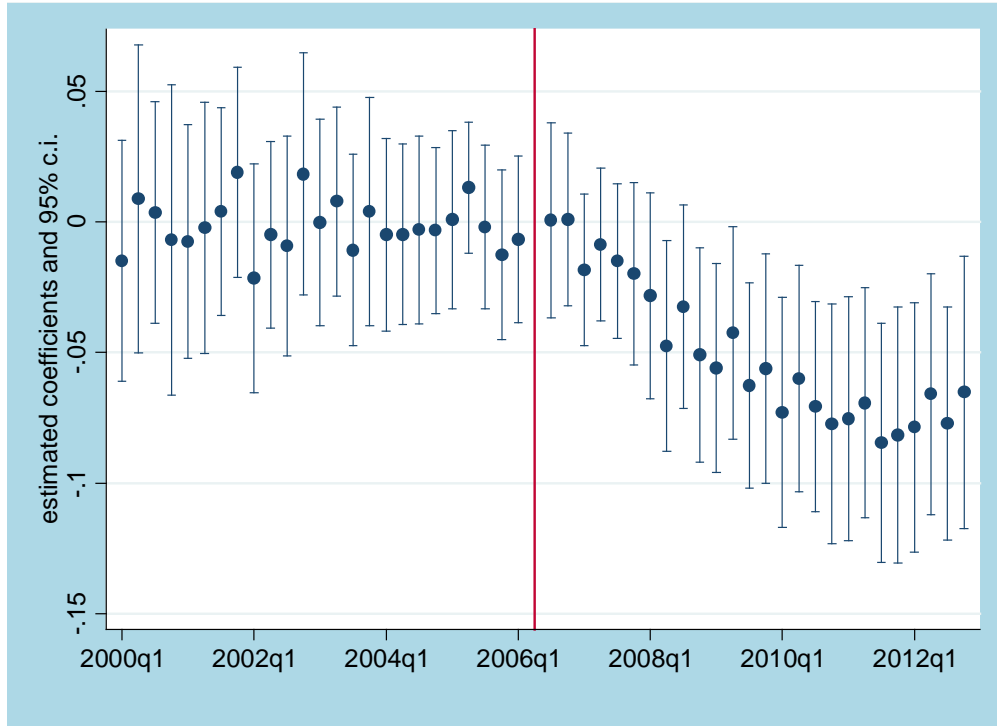


Figure 7
Effect of the Rocket Threat on Rents:
Top5 vs. other Localities



Appendix (for online publication)

Table A1
Summary Statistics for Localities within Rocket Range

Dataset	Variable	Mean	S.D.	N
House purchase transactions	Price (NIS thousands)	571	319	141,358
	Rooms	3.6	0.9	141,358
	Area (square meters)	84	27	141,358
	Age (years)	24	21	141,358
Rent survey	Monthly rent (NIS)	1,866	679	23,907
Private construction starts	Quarterly starts per locality (unit)	32.7	42.9	1,326
Labor force survey	Unemployment rate (%)	8.3	27.6	119,796
	Labor force participation rate (%)	70.0	45.8	171,095
Income survey	Monthly wage (NIS)	7,029	5,670	24,648

Sources. House purchase transactions - The Israel Tax Authority (via the Bank of Israel): *Karmen* database. All other data are from the Israeli Central Bureau of Statistics. Period covered is 2000-2012, except for the labor force and income surveys which are for the period 2000-2011. Construction starts data are restricted to cities (population of 20,000 or more).

See text for details. *Notes.* The figures in the table refer to localities within rocket range in northern Israel. The average exchange rate between the NIS and the \$US in 2000-2012 was 4.14.

Table A2
Effect of the Rocket Threat on Construction Starts

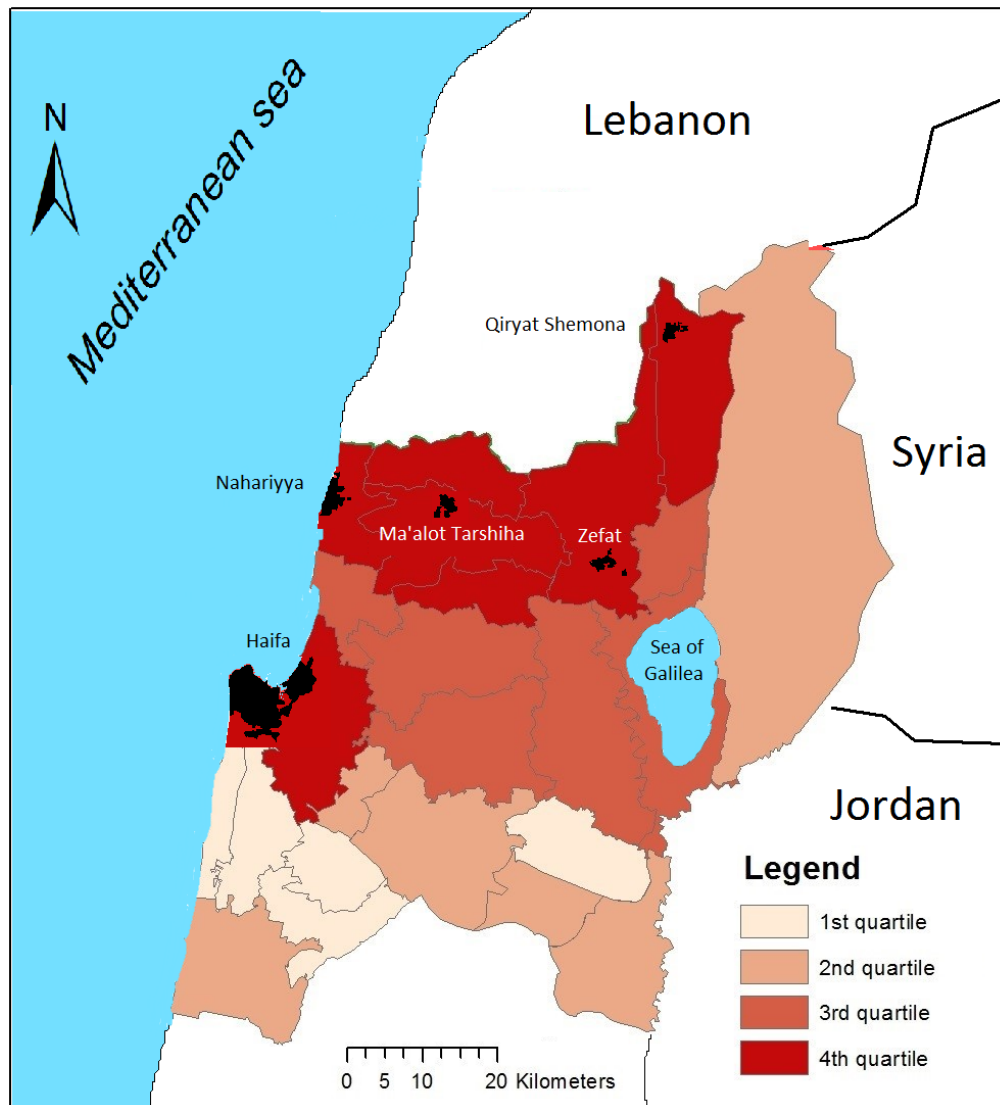
<i>Dependent variable: number of private construction starts (in logs)</i>		
	<i>Top5 vs. other</i> localities within rocket range (1)	Number of hits per locality (2)
2000 x Treatment	0.117 (0.259)	0.029 (-0.094)
2001 x Treatment	-0.097 (0.259)	-0.069 (-0.097)
2002 x Treatment	0.117 (0.332)	0.101 (-0.135)
2003 x Treatment	-0.335 (0.293)	-0.045 (-0.100)
2004 x Treatment	0.295 (0.277)	0.154 (-0.092)
2005 x Treatment	-0.388 (0.302)	-0.116 (-0.089)
2006-2 x Treatment	-0.416 (0.457)	-0.238* (-0.136)
2007 x Treatment	-0.550 (0.322)	-0.144 (-0.132)
2008 x Treatment	-0.850** (0.350)	-0.283** (-0.117)
2009 x Treatment	-0.836* (0.461)	-0.273** (-0.126)
2010 x Treatment	-0.137 (0.311)	0.013 (-0.114)
2011 x Treatment	0.096 (0.369)	0.130 (-0.136)
2012 x Treatment	-0.617 (0.372)	-0.181 (-0.151)
Locality FEs	Yes	Yes
Year FEs	Yes	Yes
Observations	1,326	1,326
R-squared	0.551	0.551

Sources. Data on construction starts are from the Israeli Central Bureau of Statistics. Data on rocket hits are from the Home Front Command of the Israeli Defense Forces.

Notes. The dependent variable is the log of (per locality quarterly number of private construction starts in terms of units *plus one*). We add one because in some cases the original number of starts is zero. In column (1) “treatment” is an indicator for the five most severely hit localities. In column (2) “treatment” is the number of hits per locality (divided by 100). To reduce volatility we limit the analysis to cities (population of 20,000 or more). “2006-2” is the last quarter of 2006. Estimated by OLS. Standard errors, clustered by locality, in parentheses.

*, **, *** represent statistical significance at the 10, 5, and 1 percent levels.

Figure A1
Rocket Range in Northern Israel
 (number of hits by natural area)



Sources: Home Front Command of the Israeli Defense Forces; GIS Lab, Department of Geography, The Hebrew University of Jerusalem.