Echoes of Terrorism: How the Timing of Siren Alerts Shapes Voting*

Luiz Bines† Ricardo Dahis‡ Juliano Assunção§

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Abstract

This study documents how electoral behavior changes based on the salience of national security threats. Leveraging novel data on siren timing and location in Israel, we estimate a difference-in-differences design that compares localities brought into rocket range just before the 2015 election with otherwise similar areas. While almost all rockets from that period were intercepted by the Iron Dome defense system, the analysis shows that Red Alerts on the days immediately before the election boosted Likud's vote share by 2.6 percentage points, while earlier alerts had no effect. Polarization increases as the effects are larger where Likud support was already higher. Analysis of Google search data shows that alerts increased interest in security-related topics but not in politics or parties, consistent with a salience rather than ideological mechanism.

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†Department of Economics, PUC-Rio. Email: luizbines@gmail.com.

‡Department of Economics, Monash University. Email: ricardo.dahis@monash.edu.

§Department of Economics, PUC-Rio. Email: juliano@econ.puc-rio.br.

1 Introduction

Elections are meant to serve as mechanisms of democratic accountability, enabling voters to reward or punish politicians based on durable preferences and past performance (Ferejohn, 1986; Fearon, 1999). But how do citizens respond when faced with acute, immediate threats — especially those involving national security? Do voters remain anchored to long-standing evaluations, or do fleeting perceptions of danger reshape their voting behavior? Despite the importance of these questions for democratic functioning, credible evidence on how voters react to real-time security shocks remains scarce.

This paper provides new causal evidence on how the salience of terror threats in the days before an election can sway electoral outcomes, even in the absence of actual physical harm. Specifically, we exploit unique variation in perceived terror threats generated by the "Red Alerts" siren system in Israel, which warns local populations of incoming rockets launched from Gaza. While actual physical harm from rocket attacks has largely been mitigated by defense systems such as the Iron Dome, the high frequency and spatio-temporal variation of alerts provides an ideal setting to study voter responses to perceived threats without conflating them with material damages.

Using novel data on the timing and location of Red Alerts around Israeli elections, we implement a difference-in-differences design comparing localities newly exposed to rocket threats in the lead-up to the 2015 election to those that were not. We find that exposure to Red Alerts immediately before elections significantly increases support for the incumbent Likud party by approximately 2.6 percentage points, or about 16% of the average, at the expense of votes for other right-wing parties. The effects are concentrated in areas with historically strong support for Likud, suggesting that security threats deepen existing partisan divides. Moreover, we find that voter turnout did not change.

The evidence is broadly consistent with an interpretation that Red Alerts increased the salience of security threats to the Israeli population. It does not support an alternative mechanism where alerts changed deeper preferences and beliefs about security. We find that similar missile attacks and Red Alerts about five months before the election caused no analogous change in voting behavior towards Likud. They had similar impacts on right-wing vote share and turnout.

We corroborate this interpretation with data from Google Trends. We analyze search trends for terms related to security and politics following Red Alerts and find that alerts increase searches for words such as *peace*, *war*, *siren*, *terrorism*, and *Hamas*, while we estimate no significant changes for words such as *elections*, *Likud*, *Netanyahu*,

or *government*. This suggests an increase in public interest for security-related topics, and not an ideological shift toward the right or toward Likud specifically.

This paper contributes to two strands of literature. First, it relates to a growing literature in behavioral political economy about the role of transient and contextual factors on voting behavior (Schnellenbach and Schubert, 2015; Bordalo et al., 2020, 2022; Webster and Albertson, 2022). The literature so far has shown that seemingly irrelevant facts, such as candidate name placement on ballots, have important effects on voting behavior (Miller and Krosnick, 1998; Koppell and Steen, 2004; Shue and Luttmer, 2009; Marcinkiewicz, 2014). Another set of papers documents that *where* people vote shapes decisions – in particular, voting-booth location can prime voters (Berger et al., 2008) and induce updates to beliefs about the incumbent's performance (Ajzenman and Durante, 2023).[1] Our paper documents how security threats immediately prior to elections increase the number of votes for the incumbent party by making this issue more salient to voters.

Second, our paper relates to the large literature about the effects of terrorism in general and the Israel-Hamas conflict in particular. Studies examining the impact of terror attacks on voting patterns in Israel consistently find that physically targeted localities tend to shift politically to the right. Although that link is well documented, prior studies typically either include untargeted localities or exclude areas that suffered direct attacks. For instance, Getmansky and Zeitzoff (2014) use advancements in rocket technology to estimate the effect of being within rocket range on right-wing voting. However, Red Alert data shows that only about half of the localities within range in 2014 were actually targeted by the 2015 election, indicating that simply being within range may not fully capture the effect of the threat.

On the other hand, Elster (2019) exclusively assesses the impact of direct rocket fire, through property damage claims, finding that affected areas tend to favor right-wing parties. Yet, as 90% of rockets are intercepted by the Iron Dome, focusing on material damages excludes many localities that endure the psychological threat of Red Alerts without experiencing any physical harm. Likewise, Berrebi and Klor (2006, 2008) find that terrorist attacks increase support for right-wing parties, especially when incidents occur close to election dates or in right-leaning areas. Both studies prioritize actual attacks rather than the perceived threat or psychological impact of Red Alerts, an element central to our analysis.[2]

[1] For studies and reviews on the role of information on voters' choices, see Ferraz and Finan (2008), Pande (2011), and Kendall et al. (2015).

[2] Considering the psychological effects of terrorism, the potential impact of perceived threats is explored by Amarasinghe (2023), who highlights that even unsuccessful terror attacks can heighten public discontent. Notably, countries with higher counter-terrorism action, like Israel, demonstrate less voter

The remainder of this paper is structured as follows. Section 2 outlines the political context of Israel during the 2014 war and describes the country's defensive measures, including the operation of the Red Alert siren system. Section 3.1 introduces the dataset employed in this study. Section 3.2 details the empirical strategy. Section 3.3 presents descriptive statistics. Section 4 discusses the main findings and Section 5 discusses the findings on polarization. Section 6 reports how security threats increase searches for related terms online. Finally, Section 7 concludes with a summary of key results and their broader significance.

2 Context

Since Hamas assumed control of the Gaza Strip in 2007, Israel has imposed a blockade on the region.[3] The ongoing threat of rocket strikes from Gaza has led Israel to heavily invest in defense, including the Iron Dome, an advanced aerial defense system with an intercept success rate around 90% (Kattan, 2018).[4]

Israel also employs a siren system, hereafter referred to as "Red Alerts", to warn localities of incoming rockets. These alerts lead residents to seek shelter while the Iron Dome attempts to intercept the rockets.[5] A single alert can cover multiple localities, and multiple rockets can trigger one alert, so alerts do not always correlate with the number of rockets fired.

The 2014 Israel-Hamas war, known as Operation Protective Edge, marked a significant escalation in hostilities between Israel and Hamas. The escalation began with the abduction and killing of three Israeli teenagers by Hamas members, followed by a period of intense rocket fire from Gaza into Israel. In response, Israel launched airstrikes

backlash, underscoring the importance of perceived government effectiveness in mitigating voter discontent, a concept that aligns with our focus on how Red Alerts influence electoral behavior through perceived threats. Balcells and Torrats-Espinosa (2018) demonstrate that both lethal and nonlethal terrorist attacks have a significant impact on voter behavior. In a related context, Hintson and Vaishnav (2023) examine how national security crises impact elections in India, revealing complex effects on nationalist parties.

[3]The broader Israel-Hamas conflict has significantly impacted Palestinian society, particularly in Gaza and the West Bank. During the Second Intifada (2000-2006), adverse effects included increased child labor, reduced school attendance (Di Maio and Nandi, 2013; Di Maio and Nisticò, 2019), lower birth weight (Mansour and Rees, 2012), labor market challenges (Di Maio and Sciabolazza, 2023), and deteriorating health indicators (Di Maio and Leone Sciabolazza, 2021).

[4]Israel's current defense infrastructure includes advanced missile defense systems like David's Sling, designed for medium-range threats, and the Arrow System, which targets long-range ballistic missiles. However, during the 2013-2015 period, David's Sling was not yet operational, and the Arrow System was not required for the types of threats Israel faced. The Iron Dome was the only one used in this context.

[5]"Locality" refers to any municipal unit recognized by the Israeli Ministry of Interior, including urban, rural, and local councils.

targeting Hamas infrastructure, which eventually escalated into a full-scale ground operation aimed at dismantling Hamas' military capabilities.

During the 2014 Israel-Hamas war, the range of rockets fired from Gaza expanded from 75 km to 150 km, endangering Israeli localities previously considered out of reach. Localities within 75 km of the Gaza Strip were already within Hamas' rocket range before 2014, while those beyond 150 km remained out of reach during the 2014 conflict. As a result, only localities situated between 75-150 km were newly exposed to rocket fire - and Red Alerts - for the first time during the 2014 war.

Figure 1 illustrates Hamas' rocket range evolution. The area shaded in red could be targeted by rockets fired from the Gaza Strip for the first time during the 2014 war. Our analysis focuses on localities situated within the 75-150 km range, concentrating on those newly exposed to rocket fire during this period. We assume that all rocket fire directed at those localities originated from Gaza. To the best of our knowledge there are no reports of attacks from other regions within this range, indicating that Red Alerts within this area were exclusively triggered by rockets from Gaza.[6][7]

On the political front, the right-wing Likud party, led by Benjamin Netanyahu, held power from 2009 to 2021 and regained it in December 2022. During the 2014 conflict, Netanyahu's popularity surged, with his approval rating climbing from below 50% to nearly 80% (Feinstein, 2018).

A coalition of 61 seats out of 120 to form a government in the Israeli parliament.[8] In the 2013 elections, Likud's coalition was formed with 68 seats, which included a centrist party with 19 chairs. Likud's coalition held exactly 61 chairs in the 2015 election. With such a narrow margin, even a slight shift in voter preferences could have prevented Likud from forming a government. In that case, alternative coalitions involving other parties would have been possible, potentially changing the direction of

[6]While Hamas is the primary group launching rockets from Gaza, other organizations like Islamic Jihad also contribute to these attacks. Although Hezbollah (operating from Lebanon) and Iran have played roles in regional conflicts, our focus is solely on rockets fired from Gaza. There is no evidence to suggest that rockets from Lebanon, the West Bank, or other regions reached the 75-150 km range between 2013 and 2015. A thorough review of Israeli news reports revealed no incidents of rocket fire from these areas affecting localities within this range during this period. For example, Hezbollah typically targets northern Israel, beyond the 150 km distance from Gaza. While it is possible, though unlikely, that localities within the 75-150 km range could have been targeted before 2014, the available data does not support this. Even if such events occurred, civilians would have experienced the same Red Alert warnings, making the impact consistent.

[7]Despite extensive rocket attacks, only two Israeli civilians were killed during the 2014 war. This low Israeli casualty count is largely attributed to the success of the Iron Dome and Red Alert systems (Kurz and Brom, 2014).

[8]In Israel's parliamentary system, municipal elections are held separately from national legislative elections. While legislative elections took place in 2013 and 2015, local elections were held in 2013 and 2018. As a result, the analysis focuses solely on legislative elections, as local elections were not concurrent.

Israeli policy.

3 Empirical Framework

3.1 Data

We build a rich panel with information on voting outcomes, Red Alerts, and covariates from a variety of sources. We detail each one below.

Red Alerts. We construct a novel dataset of Red Alert warnings issued by Israel's military authority responsible for civil protection, the Home Front Command. When a rocket threat is detected, the Home Front Command not only activates sirens in the targeted areas, but also issues an online alert on their official website.[9] We scraped all such alerts and compiled a comprehensive dataset spanning from July 2014 (the earliest available records) to 2022. Each entry in the dataset contains the date of the alert and the location or the cluster of localities targeted. Alerts that are not rocket-related, such as test alarms, were filtered out to focus solely on actual rocket warnings. We manually assigned a geographic point to each location affected by a Red Alert. To geolocate alerts, we used a shapefile of Israeli municipalities and identified the polygon in which each Red Alert occurred, assigning it to the corresponding locality. We were able to geolocate all but 95 out of 20,159 alerts (approximately 0.47%), which we exclude from the analysis.

Range of Rockets from Gaza. Information on the evolving range of rockets fired from the Gaza Strip was obtained from the Israeli Ministry of Foreign Affairs.[10]

Electoral outcomes. We source the number of votes per party for each locality from the records of the Israeli Central Elections Committee from the 17th to the 25th parliament (Knesset). We retrieve the data directly from the official election websites for each year.[11] The dataset thus covers all national elections from 2006 to 2022. Electoral

[9] Source: https://www.oref.org.il. The website is only available for those located in Israel or via Virtual Private Networks (VPN).

[10] Source: https://www.gov.il/en/pages/range-of-fire-from-gaza.

[11] For prior elections, some data are no longer available on the official websites. In these cases, we rely on archived versions from the Internet Archive's Wayback Machine — specifically for the 19th (https://web.archive.org/web/20141228152856/http://www.votes-19.gov.il/ballotresults) and 20th (https://web.archive.org/web/20220415160738/http://www.votes20.gov.il/) Knesset elections. The results for the 18th Knesset (2009) are available as a downloadable Excel file (`https://bechirot24.bechirot.gov.il/election/Documents/results_18.xls`), and for the 17th Knesset (2006) through an

results were matched to geographic units using municipality codes, allowing precise alignment with the shapefile and other spatial data. We were able to geolocate all but 30 out of the 1183 localities (approximately 2.5%), which we exclude from the analysis.

Geographic data and distance to Gaza. Using municipality polygons from the Israeli statistical areas, obtained from the Israeli Central Bureau of Statistics, we computed the shortest distance from each electoral locality's polygon to the Gaza boundary. This procedure allowed us to assign a precise distance-to-Gaza measure not only to electoral outcomes but also to each Red Alert observation, ensuring that all spatial analyses accurately reflect geographic proximity.

Demographic information. Locality-level demographic information was sourced from the Israeli Central Bureau of Statistics, capturing variables such as total area, population size and primary religion. Additionally, we use harmonized nighttime luminosity as a proxy to the level of economic development (Henderson et al., 2012; Li et al., 2020).

Internet searches. We utilize data scraped from Google Trends concerning the evolution of specific keywords from 2014 to 2022. For each keyword, we collected monthly search interest at the national level in Israel. The search interest is normalized on a 0–100 scale, where 100 represents the peak popularity for the term in the selected period and geography. As a result, this metric captures relative changes in search frequency over time for each keyword individually. We do not compare absolute search volumes between different keywords.

Sample selection. We exclude Arab localities from the main analysis. These areas are rarely targeted, resulting in the virtual absence of Red Alerts. Furthermore, their voting patterns differ significantly from those of other localities, making them unsuitable for inclusion in the control group. These localities account for 14% of the areas located between 75-150 km from the Gaza Strip.[12]

online governmental archive (`https://www.gov.il/apps/elections/elections-knesset-17/heb/results/Main_Results.html`).

[12]We analyze results without excluding Arab localities in the Appendix. Results are similar in both magnitude and statistical significance.

3.2 Empirical Strategy

We classify Israeli localities between 75-150 km from the Gaza Strip into categories: a control group and two treatment groups.[13] The control group consists of localities that did not experience Red Alerts between the 2013 and 2015 legislative elections. The first treatment group includes localities exposed to Red Alerts 149-250 days before the 2015 election, while the second treatment group consists of localities last exposed to Red Alerts within the six days leading up to the election. It should be noted that no alerts were issued in this range during the period between these two time windows. Figure 2 maps this classification.

Using a *difference-in-differences* approach, we analyze voting patterns in the Israeli Legislative Election in treated and control localities across multiple election cycles: 2006, 2009, and 2013 serve as the pre-treatment periods, occurring before these localities entered the range of rocket attacks from Gaza, while the 2015 election represents the post-treatment period, when they were within range.[14]

We exclude elections held after 2015 to maintain the clarity and consistency of the definition of treatment. In subsequent elections, both treated and control localities may experience additional Red Alerts at varying intervals, which would complicate the classification of the status and timing of treatment. For example, localities initially classified as control may become exposed to attacks closer to subsequent elections, thereby introducing new treatment instances that differ in timing. Similarly, previously treated localities may experience additional rounds of Red Alerts, with varying temporal proximity to each election. This variation in exposure over time makes it challenging to isolate a single treatment effect, as the influence of these alerts would likely differ according to how close to each election they occurred. By focusing exclusively on elections up to 2015, we ensure a consistent and interpretable comparison between the baseline (never having experienced Red Alerts) and the initial exposure to rocket alerts, allowing for a clearer assessment of their impact on voting behavior.[15]

We estimate a difference-in-differences strategy using a two-way fixed effects ap-

[13] In Table A.1 we conduct the same analysis using only localities located between 85 and 140 km from the Gaza Strip. This restriction aims to control for potential spillover effects from localities that may have been targeted prior to 2014.

[14] Since Israel is a parliamentary state, the Prime Minister is the head of state, and is indirectly decided as a result of the legislative election.

[15] In the Appendix we perform the analysis including all elections from 2006 to 2022. Results are qualitatively unchanged.

proach, formulated as follows:

$$Likud_{i,t} = \sum_{k \neq 2013} \beta_k \cdot RedAlert_i \cdot \mathbb{1}(Election_t = k) + \gamma_i + \delta_t + \mathbf{X}_{i,t} + \varepsilon_{i,t}$$

where $Likud_{i,t}$ represents the Likud vote share in locality i during election t; $RedAlert_i$ is a categorical variable indicating whether locality i didn't experience Red Alerts, experienced Red Alerts more than 149 days prior to the 2015 election, or experienced Red Alerts 6 days before the 2015 election; β_k represents the coefficients associated with the interaction between the Red Alert variable and election years (excluding 2013, which is treated as the baseline period); γ_i represents the locality-level fixed-effects; δ_t is the election fixed-effects; $X_{i,t}$ is a vector containing control variables for locality i during election t; and $\epsilon_{i,t}$ is the standard error term. The adopted control variables are demographic density, population size, and nighttime luminosity level (as a proxy of economic development).

Each β_k quantifies the effect of experiencing a Red Alert during election year k relative to the voting behavior observed in 2013. Specifically, we want to examine whether β_{2015} is statistically significant: a significant difference for β_{2015} would imply that localities experiencing Red Alerts between 2013 and 2015 voted in a manner that was markedly different from the remaining localities only in the 2015 election. At the same time, β_{2006} and β_{2009} must not be significantly different from zero: this would indicate parallel trends in voting behavior prior to the treatment, suggesting that localities with Red Alerts did not exhibit distinct voting patterns prior to 2015.

In addition to using Likud's vote share as a dependent variable, we extend the analysis to include the combined vote share of all Israeli right-wing parties excluding Likud.[16] This broader measure allows us to test whether the effect of Red Alerts reflects a specific boost to Likud or a broader rightward shift in electoral preferences.

We also analyze voter turnout as a dependent variable to determine whether Red Alerts not only shape voter preferences but also influence electoral participation.[17] This is key to understanding the broader political implications of security threats. An increase in turnout could suggest that Red Alerts not only shift the preferences of existing voters, but also mobilize previously disengaged individuals, particularly those who feel more compelled to vote due to heightened security concerns. Conversely, if

[16] We follow established classifications in the literature (Arian and Shamir, 2008; Getmansky and Zeitzoff, 2014) to determine which parties are considered right-wing, applying consistent criteria to newer parties as well.

[17] Due to the unavailability of the number of registered voters by locality for the 2006 elections we estimate this figure using the median percentage of registered voters from the elections held between 2009 and 2013.

there is no effect on turnout but a change in vote shares, it would indicate that Red Alerts primarily sway the choices of those already inclined to vote, rather than expanding the pool of voters. By examining both vote shares and turnout, our aim is to provide a more complete understanding of how security threats shape electoral outcomes.

3.3 Descriptive Statistics

Following the empirical strategy detailed in Section 3.2, we are able to examine the voting pattern evolution for each group, as well as their demographic variables. Table 1 presents the relevant descriptive statistics for each group.

It is clear that the three groups presented similar voting patterns in 2013, especially concerning Likud's vote share, and the population turnout, while the right-wing bloc's vote share was slightly lower for the localities targeted more than 149 days before the 2015 election. In addition, all groups are typically small in terms of area, and, although the mean distance to the Gaza Strip varies between groups, the average time to seek shelter after a Red Alert is virtually the same for all localities.

Notably, the group of localities experiencing Red Alerts 6 days before the 2015 election differs significantly from the other two groups in population size, night-lights, and density. These localities tend to be smaller, less densely populated, and exhibit lower night light intensity, indicating a lower level of economic development.

The characteristics in Table 1 support the argument for the exogeneity of Red Alerts in this context. Smaller, less densely populated localities are not particularly attractive targets if Hamas sought to maximize impact or casualties, as more densely populated areas would present more significant opportunities for damage.

Additionally, Likud voting patterns were nearly identical across groups in 2013, indicating no systematic pre-existing political differences among these localities in relation to the incumbent party. This suggests that Red Alerts are unlikely to be strategically directed based on local socioeconomic or political factors. If Hamas were targeting specific areas with the aim of influencing electoral outcomes, we would expect to see a pattern in which more politically pivotal or demographically sensitive localities were disproportionately affected. This implies that the rocket attacks, and thus the Red Alerts, are largely indiscriminate rather than strategically calibrated, reinforcing the interpretation of these alerts as plausibly exogenous shocks in the analysis of voting behavior.[18]

[18]We delve further into this issue in Appendix Section B, where we explicitly estimate a Cox Proportional Hazards model to test whether localities that experience alerts in the past were more likely to

Moreover, until 2019, the Red Alert system operated in a way that, when a rocket was fired toward a specific locality, sirens were activated across an entire cluster of nearby localities. As a result, many of the alerted areas were not actually being targeted at that moment. This means that, to a large extent, the exposure of a given locality to Red Alerts was quasi-random, as it depended not only on whether it was the actual target but also on the broader alert system's design. Because sirens were triggered in clusters rather than in direct response to a precise threat, the alerts introduced exogenous variation in exposure to security threats. This feature strengthens the causal interpretation of the impact of Red Alerts, as individuals in many alerted localities experienced heightened salience of insecurity without necessarily facing an actual attack.

4 Results

Figure 3 compares the share of Likud votes between the three groups over time. Before the 2015 election, the three groups presented statistically parallel trends. However, in 2015, the localities that experienced Red Alerts 6 days before the election presented, on average, a significantly higher average vote share for Likud.[19] Figure A.1 presents the same plot, but for the right wing's vote share, and Figure A.2 for turnout.

We present the regression results of the difference-in-differences estimator in Table 2. The first line measures the effect of Red Alerts occurring six days before the 2015 election, while the second line assesses the impact of alerts issued more than 149 days before the election.

Columns (1) and (2) analyze Likud's vote share, columns (3) and (4) focus on the right-wing vote share, and columns (5) and (6) evaluate voter turnout. The analysis reveals that Red Alerts occurring six days before the election have a statistically significant positive effect on Likud's vote share in the post-election period, with coefficients of 2.6% in columns (1) and (2), both significant at the 1% level. Experiencing a Red Alert 6 days before the 2015 election led to an additional 2.6 pp. for Likud, on average. For localities treated 6 days before the election, where Likud's average vote share in 2013 was 16.17%, the impact of Red Alerts reflects a relative increase of around 16% in vote share. Since the Israeli parliament has 120 chairs, an additional 2.6 pp. would translate to about 3.12 seats if linearly extrapolated, ignoring party-list surplus-vote

be targeted again in the future. The evidence indicates that Hamas might even redirect fire away from repeatedly hit areas.

[19] In the Appendix, we present similar figures that compare the share of Right Wing parties' (excluding Likud) vote share and turnout between these groups.

agreements.

In contrast, Red Alerts occurring more than 149 days before the 2015 election do not significantly affect Likud's vote share. The results in Table 2 suggest that the impact of Red Alerts on the incumbent's vote share is short-term. The significant effect of alerts just six days before the election on Likud's vote share indicates that these alerts raise security concerns and push voters to favor Likud. As we discuss in Section 7, we cannot directly distinguish if this effect is driven by an incumbency effect or by Likud being uniquely perceived as strong in matters of national security. We also cannot determine the origin of Likud's new votes, i.e., whether they came from voters that previously supported right-wing or left-wing parties.

Finally, the results in Table 2 also indicate that there is no significant impact of Red Alerts on voter turnout at the 5% significance level. Despite the increased security concerns following the alerts, there is no evidence to suggest that these events motivated more voters to participate in the election. This absence of a turnout effect underscores that Red Alerts shape voter preferences rather than mobilize new voters. This reinforces the idea that the shift towards Likud is more about concerns over security and leadership than broader ideological or political realignment across the electorate.

The possibility of an alternative hypothesis concerning the turnout cannot be entirely dismissed, namely that Red Alerts might lead to an increase in voter turnout among right-wing voters while simultaneously discouraging turnout among left-wing voters. In this scenario, heightened security concerns could motivate right-leaning individuals to cast their ballots in support of Likud, perceiving it as better equipped to handle national security threats. Conversely, left-leaning voters could be less inclined to participate. This dynamic could contribute to the observed shift in election outcomes without necessarily reflecting a broad change in ideological preferences, but rather a turnout imbalance driven by divergent reactions to the perceived threat of terrorism.

Robustness. Our results are robust to varying samples and specifications. First, our conclusions do not change if we restrict our sample of localities to just those within a 85-140 km radius from Gaza (see Table A.1). This restriction aims to control for potential spillover effects from localities that may have been targeted prior to 2014. Second, our results do not change qualitatively if we include all arab cities in the sample (see Table A.2). Third, our results hold even when we extend our difference-in-differences post periods to 2022, as we show for Likud vote share in Figure A.3a, for right-wing vote share in Figure A.3b, and for turnout in Figure A.3c. As we explain in previous Sections, Red Alerts continue to happen in years after 2015 so there is no a priori

reason to expect results would extend to later periods.

5 Polarization

In this Section we explore the heterogeneous impact of Red Alerts on Likud's vote share, support for other Right-Wing parties (excluding Likud), and voter turnout across localities grouped by quintiles of their baseline Likud support in the 2013 election. Our goal is to understand whether the results in Section 4 are driven by any particular part of the distribution of votes in 2013.

Table 3 displays difference-in-differences estimates of the impact of Red Alerts occurring either 6 days or more than 149 days before the 2015 election, broken down by quintiles (Q1–Q5) of prior Likud support. Panel A shows that Red Alerts within 6 days of the election have a negligible impact in lower-support areas (Q1–Q4), while in the highest quintile (Q5), a Red Alert 6 days before the 2015 election increased Likud's vote share by 12.4 percentage points.

In contrast, Panel B reveals a negative effect of Red Alerts on support for other right-wing parties. Again, the effect is only substantial and statistically significant in the highest quintile (Q5), for both Red Alerts close and distant to the 2015 election date. Panel C shows no significant effects of Red Alerts on turnout in all quintiles. This indicates that, while Red Alerts may shift vote shares among parties, they do not meaningfully change overall turnout levels, regardless of previous Likud support.

Taken together, these results suggest that Red Alerts do not affect all voters equally. In localities with the highest baseline support for Likud, these alerts significantly boost Likud's vote share. This pattern points to increasing polarization: security threats do not broaden Likud's appeal but deepen its support in areas already favorable to the party.

6 Salience in Internet Searches

To probe the psychological mechanism through which Red Alerts affect voting, in this Section we analyze Google Trends data from 2014 to 2022 at the district level in Israel.[20] Specifically, we examine monthly search intensity for keywords related to either

[20]Ideally we would have collected Google Trends data from 2006 to 2022. However, a significant change in Google's geographical assignment methodology in 2011 fundamentally altered data collection, making trends from earlier years incompatible. Additionally, before 2014, some localities near the Gaza Strip were already equipped with the siren system, but there is no record of which ones, and no available data on Red Alerts prior to that year.

security or politics to determine whether Red Alerts heighten the salience of security concerns in the short term or lead to an ideological shift.[21]

The Google Trends index ranges from 0 to 100, where 0 indicates an absence of significant search activity, and 100 represents the peak search volume for that keyword within the specified time frame. Figure 4 presents the search trend for the keyword "siren" for each Israeli district. From Figure 4, it is clear that the 2014 war had a deep impact on all districts, regardless of the proportion of the population that was targeted.

We estimate the following regression for each keyword:

$$\text{keyword}_{dt} = \beta_1 \text{Red Alert}_{dt} + \beta_2 \text{Red Alert}_{dt-1} + \beta_3 \text{Red Alert}_{dt-2} + \gamma_d + \lambda_t + \epsilon_{dt}$$

where keyword_{dt} represents the Google search index for a given keyword in district d and month t. The variable Red Alert_{dt} equals the proportion of the entire district that was affected by a Red Alert in month t. This allows us to approximate district-level exposure, ensuring that the estimated effects reflect actual information salience within the district.[22] Red Alert_{dt-1} and Red Alert_{dt-2} capture the persistence of the effect over the following two months. We include district fixed effects (γ_d) and year fixed effects (λ_t) to control for time-invariant district characteristics and national trends.

Table 4 presents the regression results while Figure A.4 and Figure A.5 display the data visually. The key finding is that Red Alerts significantly increase search intensity for all war-related keywords that were tested (*War*, *Siren*, *Terrorism*, *Ceasefire*, *Hamas*), but not for politics-related keywords (*Elections*, *Likud*, *Netanyahu*, *Government*). This translates to a sharp increase in Google searches for these terms within the same month. In contrast, searches for politics-related keywords remain unaffected by Red Alerts. Furthermore, the effect is short-lived: while contemporaneous Red Alerts (β_1) exhibit strong positive coefficients, the lagged effects (β_2, β_3) are small and, in general, statistically insignificant.

These results suggest that Red Alerts temporarily increase the salience of security concerns but do not have neither a short- nor a long-term ideological effect. This aligns with our main findings on voting behavior: the impact of Red Alerts on electoral outcomes is concentrated when alerts occur shortly before elections. Voters exposed to alerts in the election period are more likely to prioritize security, terrorism preven-

[21] We also attempted to use Google Trends to track searches of terms and chants commonly associated with far-right extremist sentiment in Israel — such as "burn the villages," "death to Arabs," and "Kahane was right." However, most of these terms did not generate sufficient search volume to appear in the Google Trends data.

[22] Google Trends data for Israel is not available at the locality level. Therefore, we simply calculate the portion of the population from each district that was affected by each Red Alert (by adding each affected locality from the same district) in relation to the district's total population.

tion, and border protection when casting their vote, rather than experiencing a lasting ideological shift toward right-wing positions.

7 Conclusion

This study illustrates the significant impact of immediate security threats on electoral outcomes in Israel, specifically through the lens of the siren alert system. Our findings indicate that exposure to Red Alerts prior to elections can influence voters to favor the incumbent party, which they associate with providing protection during periods of conflict. This relationship underscores the critical role that perceived security risks play in shaping political behavior.

Furthermore, the mainly short-term nature of the behavioral effect observed in our analysis suggests that voters are primarily influenced by recent experiences of threat rather than long-standing conditions. Localities that experienced alerts at a considerable temporal distance from the election did not demonstrate significant changes in voting behavior towards the incumbent party. The observed short-term effect of these alerts underscores that the impact on electoral outcomes is not merely a reflection of general security sentiments but rather a specific reaction to recent experiences of threat.

Ultimately, this study contributes to a broader understanding of how contextual factors, particularly salient security threats, influence electoral outcomes. Despite the progress made we still leave a few questions open for future research. In particular, we cannot separately test whether the increased vote share for Likud is driven by a *rally-around-the-flag* effect, where external threats induce the population to center around the incumbent (Mueller, 1970), or by Likud being uniquely perceived as strong in the security agenda. This question can potentially be studied with data on more localized security threats and cross-section variation in parties in power.

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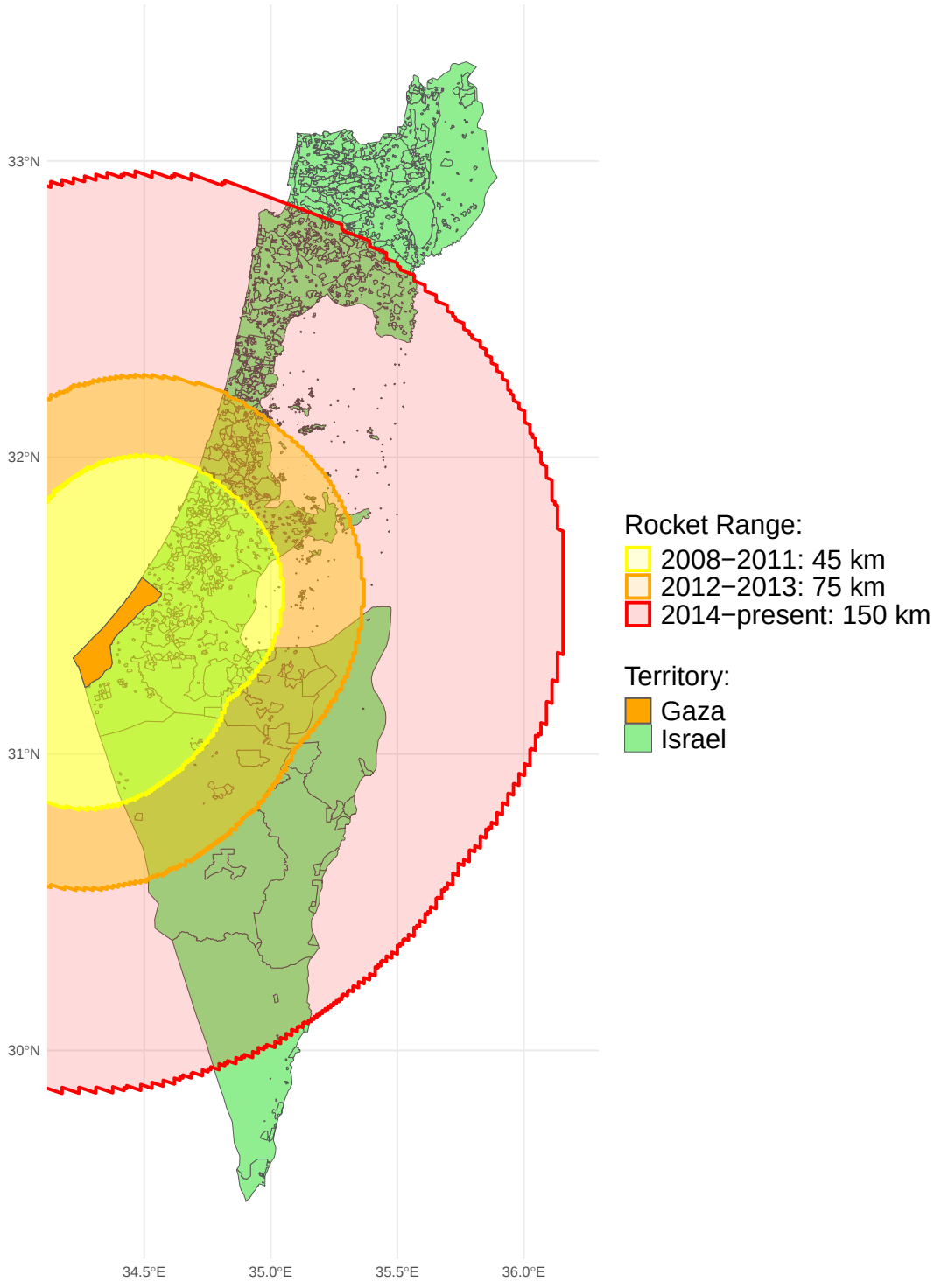
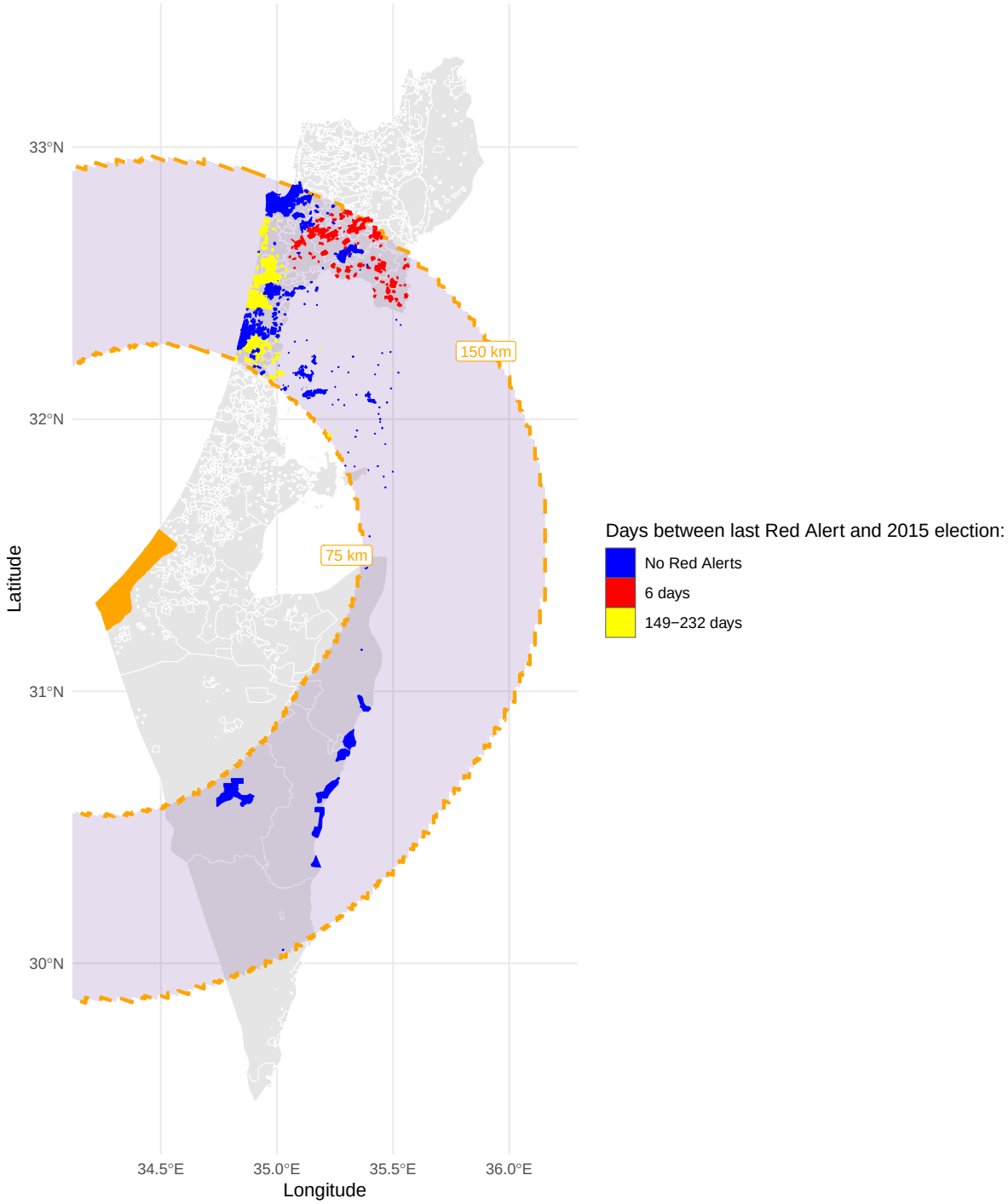
Figures and Tables

Figure 1: Rocket Range Evolution from the Gaza Strip: 2008-Present



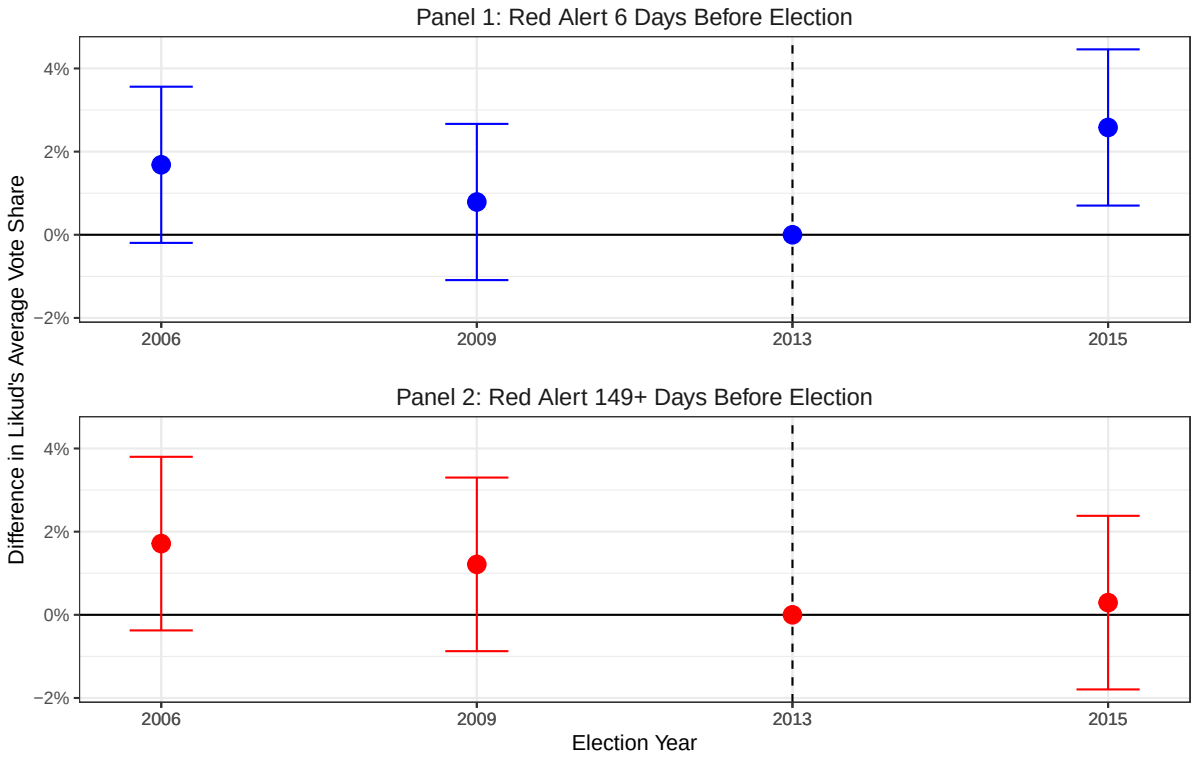
Source: Israeli Ministry of Foreign Affairs.

Figure 2: Red Alerts in Israel based on Distance to 2015's Election: 75-150km from the Gaza Strip



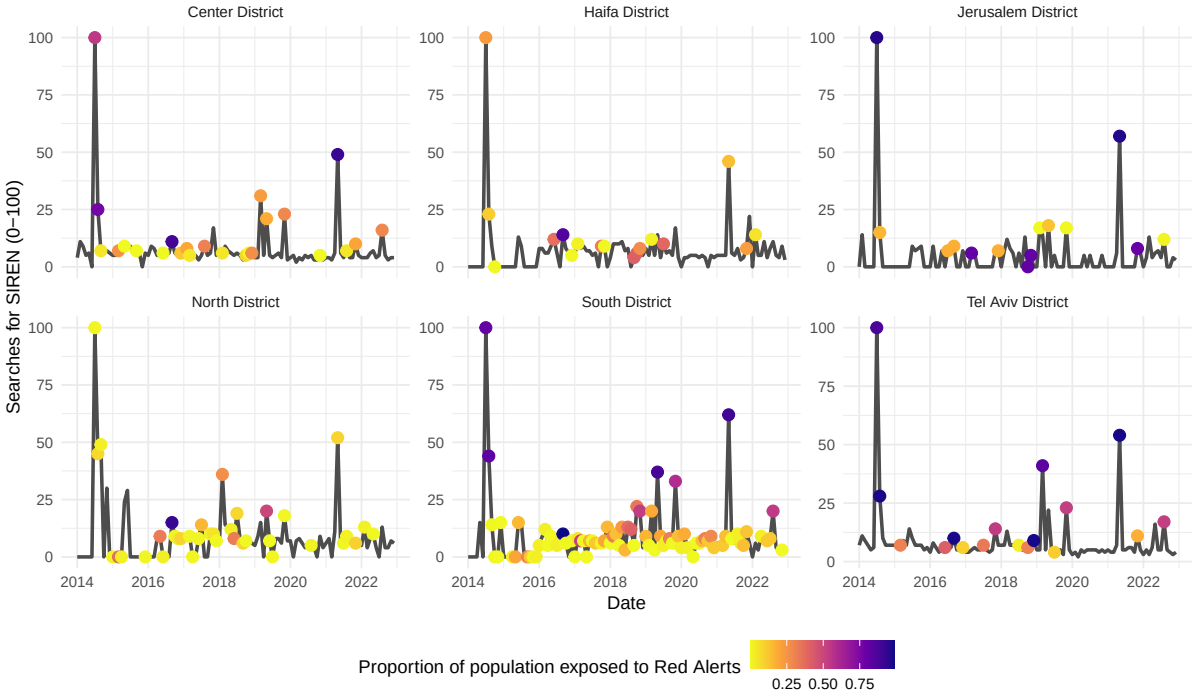
Notes: The map displays Red Alerts in Israel, highlighting only alerts occurring between 75-150 km from the Gaza Strip (shown in orange). The different colors indicate the temporal distance between the last Red Alert experienced by each locality and the 2015 Legislative Election. Gray areas within the 75-150 km range are either partially out of range, Arab localities, non-jurisdictional areas, localities whose administrative boundaries changed between 2013 and 2015. *Source*: Israel's Home Front Command.

Figure 3: Difference in Likud's Vote Share Over Time



Notes: Error bars represent 95% confidence intervals. Panel 1 compares Likud's average vote share between localities with a Red Alert 6 days before the 2015 election and those with no alerts leading up to the election. Panel 2 presents the differences in Likud's vote share between localities that experienced a Red Alert 149 days or more before the 2015 election and those with no alerts. For both panels, the 2013 election serves as the reference period, normalizing the differences in vote share to zero in 2013.

Figure 4: Trend Evolution of the Word "Siren" (2014-2022)



Notes: Each subfigure displays Google Trends monthly search volumes for each Israeli district. Each point represents a Red Alert event, and the color gradient indicates the proportion of the district's population affected by that alert.

Table 1: Descriptive Statistics by Groups of Interest for 2013

	No Red Alerts	**Last Red Alert 149+ Days Before**		**Last Red Alert 6 Days Before**	
	(1)	(2)	(3)	(4)	(5)
Statistic	2013	2013	Diff (vs No Red Alerts)	2013	Diff (vs No Red Alerts)
Likud's Vote Share (%)	17.59	15.83	-1.76	16.17	-1.42
	(13.11)	(10.21)	(1.56)	(13.42)	(1.70)
Right Wing Vote Share (%)	19.22	13.44	-5.78*	16.49	-2.74
	(22.04)	(17.91)	(2.69)	(20.03)	(2.65)
Turnout (%)	73.57	75.67	2.11+	72.67	-0.90
	(10.61)	(7.25)	(1.17)	(7.40)	(1.10)
Night Lights (0–63)	49.95	56.06	6.11***	43.50	-6.45**
	(17.33)	(10.77)	(1.82)	(14.73)	(2.00)
Population Size	5400.48	3876.96	-1523.53	1939.34	-3461.14+
	(25575.33)	(10886.03)	(2287.82)	(5544.87)	(1963.29)
Population Density (per km^2)	10350.37	11261.95	911.58	1040.85	-9309.52*
	(61076.17)	(75941.07)	(10180.16)	(914.93)	(4479.35)
Area (km^2)	3.05	3.02	-0.03	2.02	-1.03
	(8.82)	(7.68)	(1.13)	(4.02)	(0.77)
Distance to Gaza (km)	104.13	97.00	-7.13*	134.93	30.80**
	(20.38)	(19.55)	(2.79)	(6.56)	(1.65)
Observations	186	69		91	

Notes: Statistical significance is reported for columns (3) and (5), which represent the differences between each treatment group and the No Red Alerts control group. "No Red Alerts" comprises the localities that experienced no Red Alerts between the 2013 and 2015 Legislative Elections. "Last Red Alert 149+ Days Before" comprises the localities that experienced their last Red Alert 149+ days before the 2015 Legislative Election. "Last Red Alert 6 Days Before" comprises the localities that experienced their last Red Alerts 6 days before the 2015 Legislative Election. Standard errors are reported in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 2: Differences-in-Differences Estimates: Red Alert Impact on Likud's vote share, Right Wing's vote share and Turnout

	(1)	(2)	(3)	(4)	(5)	(6)
Red Alert 6 Days Before * 2015 Election	0.026**	0.026**	−0.019+	−0.018	0.000	−0.001
	(0.010)	(0.010)	(0.011)	(0.011)	(0.012)	(0.012)
Red Alert 149+ Days Before * 2015 Election	0.003	0.003	−0.019	−0.022+	0.002	0.002
	(0.011)	(0.011)	(0.012)	(0.012)	(0.014)	(0.014)
Red Alert 6 Days Before * 2009 Election	0.008	0.007	−0.030**	−0.028**	−0.001	−0.001
	(0.010)	(0.010)	(0.011)	(0.011)	(0.012)	(0.012)
Red Alert 149+ Days Before * 2009 Election	0.012	0.012	−0.025*	−0.025*	0.006	0.006
	(0.011)	(0.011)	(0.012)	(0.012)	(0.014)	(0.014)
Red Alert 6 Days Before * 2006 Election	0.017+	0.016	−0.029**	−0.030**	0.035**	0.036**
	(0.010)	(0.010)	(0.011)	(0.011)	(0.012)	(0.012)
Red Alert 149+ Days Before * 2006 Election	0.017	0.017	−0.015	−0.013	0.005	0.004
	(0.011)	(0.011)	(0.012)	(0.012)	(0.014)	(0.014)
Dependent Variable	Likud	Likud	Right Wing (excluding Likud)	Right Wing (excluding Likud)	Turnout	Turnout
Control Variables	No	Yes	No	Yes	No	Yes
Locality Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Control Group	NRA 2015	NRA 2015	NRA 2015	NRA 2015	NRA 2015	NRA 2015
Observations	1328	1328	1328	1328	1328	1328

Notes: NRA 2015 stands for No Red Alerts until the 2015 Election. Columns (1) and (2) estimate the impact of Red Alerts on Likud's vote share, columns (3) and (4) estimate the impact on Right-Wing parties' vote share (excluding Likud), and columns (5) and (6) estimate the impact on voter turnout. "Red Alert 6 Days Before" indicates localities that experienced their last Red Alert 6 days before the 2015 Legislative Election. "Red Alert 149+ Days Before" indicates localities that experienced their last Red Alert 149+ days before the 2015 Legislative Election. Control variables: demographic density, population size and nighttime luminosity level (as a proxy to economic development). Standard errors are reported in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3: Red Alert Effects by 2013 Likud Support Quintile

	Q1	Q2	Q3	Q4	Q5
Panel A: Likud					
6 days before elections	0.006	-0.004	-0.017	0.017	0.124***
	(0.005)	(0.010)	(0.016)	(0.019)	(0.023)
149+ days before elections	0.005	0.003	-0.016	-0.023	0.044
	(0.006)	(0.013)	(0.015)	(0.017)	(0.031)
Num.Obs.	268	260	264	264	268
R2	0.743	0.725	0.755	0.809	0.858
Panel B: Right-Wing					
6 days before elections	0.015	0.003	0.013	-0.005	-0.119***
	(0.018)	(0.019)	(0.025)	(0.018)	(0.030)
149+ days before elections	0.004	-0.005	0.013	-0.001	-0.108**
	(0.021)	(0.025)	(0.024)	(0.017)	(0.039)
Num.Obs.	268	260	264	264	268
R2	0.931	0.976	0.973	0.944	0.829
Panel C: Turnout					
6 days before elections	0.000	-0.019	0.008	-0.013	0.023
	(0.022)	(0.034)	(0.029)	(0.026)	(0.022)
149+ days before elections	0.007	0.000	0.013	-0.010	-0.001
	(0.026)	(0.044)	(0.027)	(0.024)	(0.029)
Num.Obs.	268	260	264	264	268
R2	0.664	0.464	0.651	0.871	0.797

Notes: Standard errors are reported in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4: Impact of Red Alerts on Google Trends Keywords

	Peace	War	Siren	Terrorism	Ceasefire	Hamas	Elections	Likud	Netanyahu	Government
Red Alert	6.044***	21.336***	33.428***	19.826***	35.939***	27.592***	4.297	2.779	4.492	4.918
	(1.719)	(2.386)	(2.158)	(3.941)	(2.387)	(2.109)	(3.997)	(3.434)	(3.136)	(3.196)
Red Alert - lag 1	−2.640	3.063	−1.371	5.557	2.047	3.711+	−1.463	0.930	−0.700	6.384*
	(1.711)	(2.376)	(2.149)	(3.924)	(2.376)	(2.100)	(3.980)	(3.419)	(3.123)	(3.182)
Red Alert - lag 2	0.217	−3.786	−1.818	−0.423	0.501	−0.348	−2.983	−2.471	−0.632	−0.588
	(1.708)	(2.372)	(2.145)	(3.917)	(2.372)	(2.096)	(3.973)	(3.413)	(3.117)	(3.176)
Num.Obs.	648	648	648	648	648	648	648	648	648	648
R2	0.435	0.440	0.325	0.222	0.309	0.270	0.148	0.306	0.534	0.385

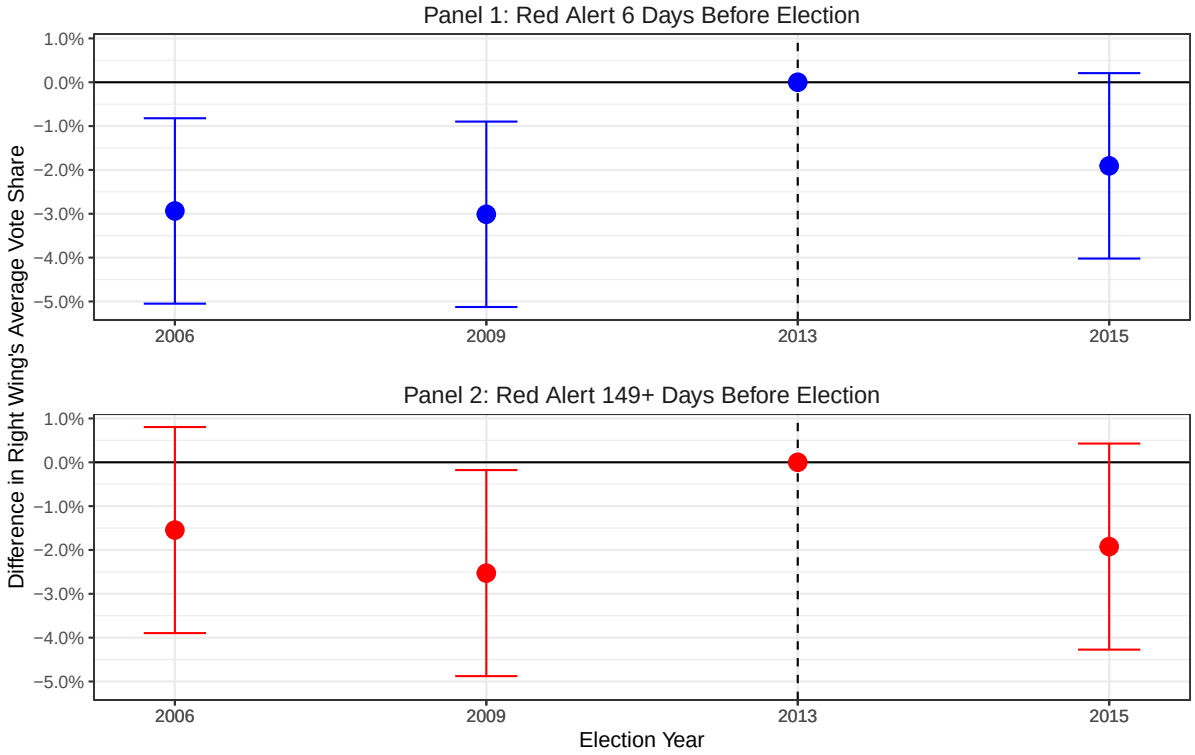
Notes: Each column represents a different keyword. Trends are measured on a monthly basis, where "lag 1" refers to Red Alerts that occurred in the previous month relative to the trend observation, and "lag 2" refers to Red Alerts that occurred two months prior. Standard errors are reported in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Supplemental Appendix
"Echoes of Terrorism: Examining the Effects of Siren Alerts Timing on Voter Preferences in Israel"

Luiz Bines, Ricardo Dahis, Juliano Assunção

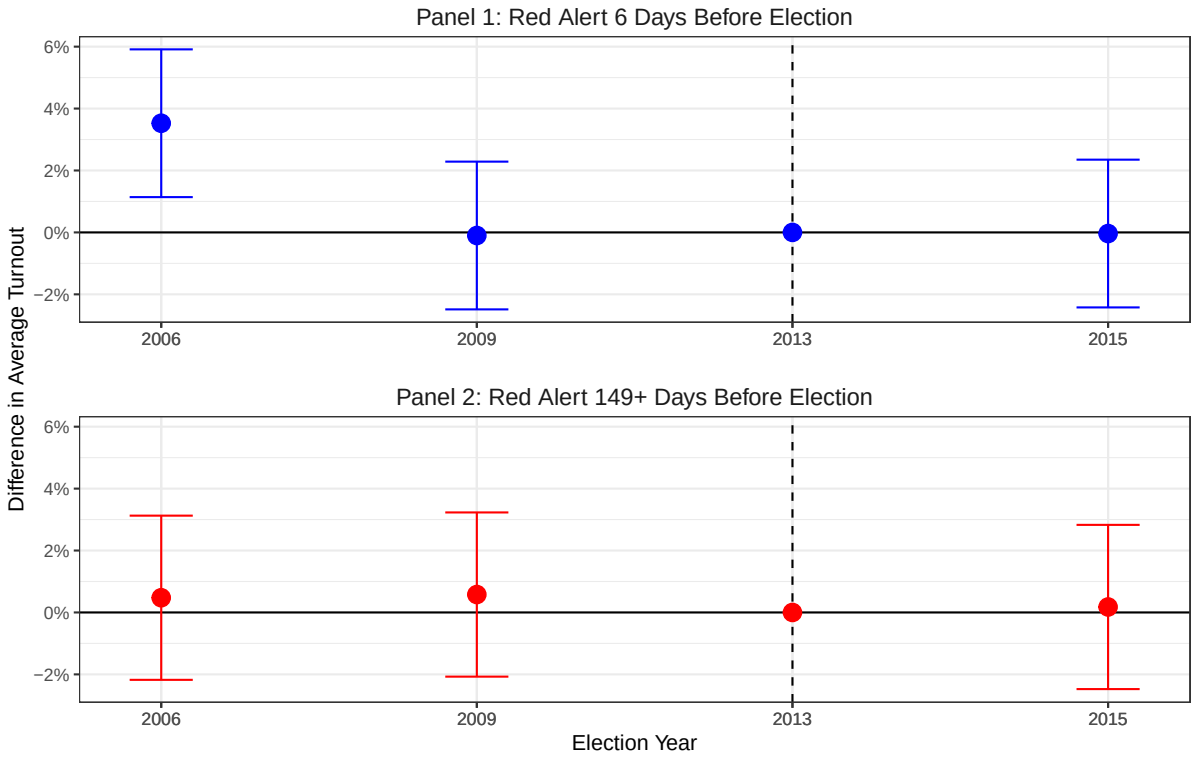
A Figures and Tables

Figure A.1: Difference in Right Wing bloc's Vote Share Over Time



Notes: Error bars represent 95% confidence intervals. Panel 1 compares the Right Wing Bloc's average vote share (excluding Likud) between localities with a Red Alert 6 days before the 2015 election and those with no alerts leading up to the election. Panel 2 presents the differences in the Right Wing Bloc's vote share (excluding Likud) between localities that experienced a Red Alert 149 days or more before the 2015 election and those with no alerts. For both panels, the 2013 election serves as the reference period, normalizing the differences in vote share to zero in 2013.

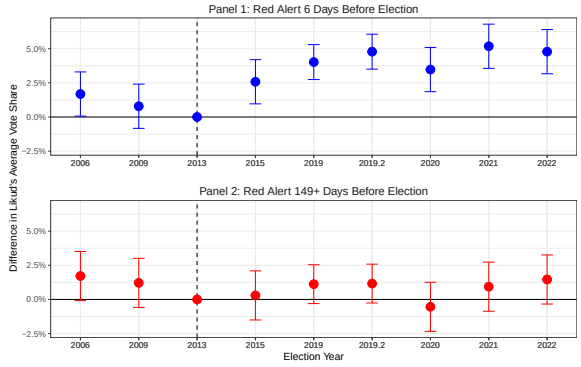
Figure A.2: Difference in Turnout Over Time



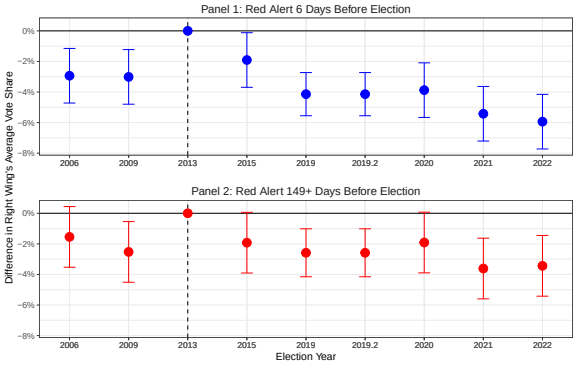
Notes: Error bars represent 95% confidence intervals. Panel 1 compares the average Turnout between localities with a Red Alert 6 days before the 2015 election and those with no alerts leading up to the election. Panel 2 presents the differences in Turnout between localities that experienced a Red Alert 149 days or more before the 2015 election and those with no alerts. For both panels, the 2013 election serves as the reference period, normalizing the differences in vote share to zero in 2013.

Figure A.3: Difference in Likud vote share, right-wing vote share, and voter turnout (2006-2022)

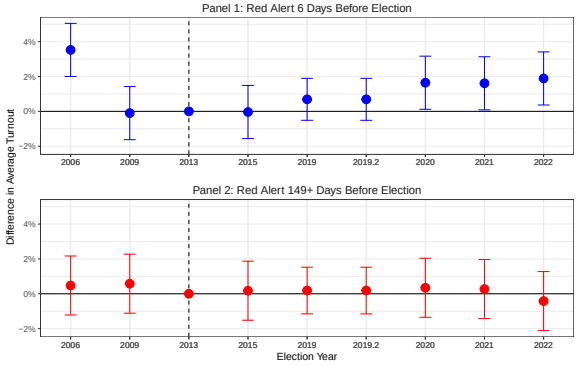
(a) Likud Vote Share



(b) Right-Wing Vote Share



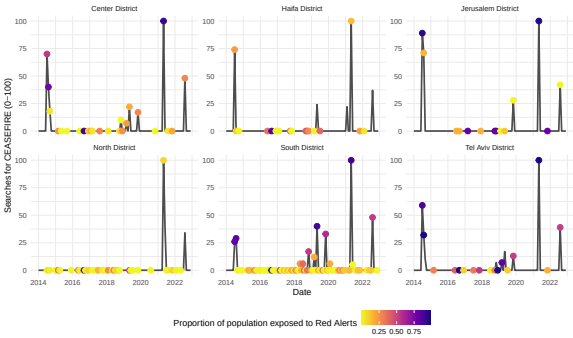
(c) Voter Turnout



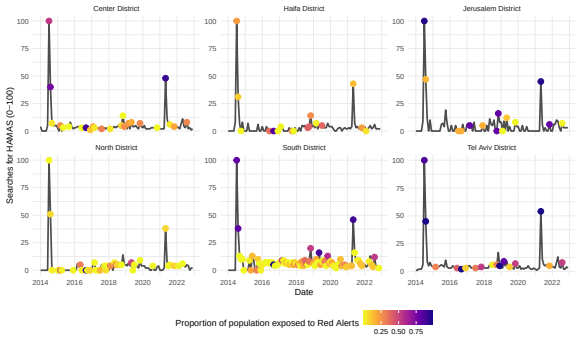
Notes: This figure shows the difference in Likud vote share, right-wing vote share, and voter turnout between municipalities exposed to Red Alerts and those not exposed, across Israeli elections from 2006 to 2022. Each subfigure contains two panels: Panel 1 compares outcomes between localities with a Red Alert 6 days before the 2015 election and those with no alerts leading up to the election. Panel 2 presents the differences in outcomes between localities that experienced a Red Alert 149 or more days before the 2015 election and those with no alerts. For both panels, the 2013 election serves as the reference period, normalizing the differences in vote share to zero in 2013. Error bars represent 95% confidence intervals.

Figure A.4: Google Trends search trends for selected keywords

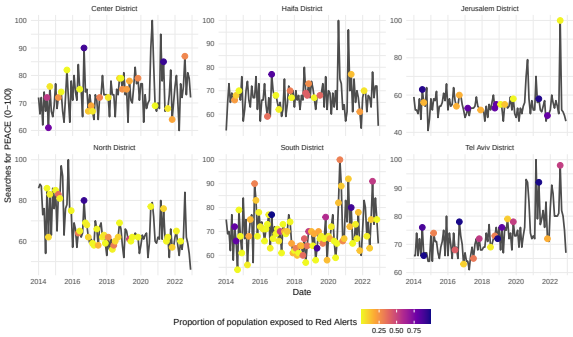
(a) "Ceasefire"



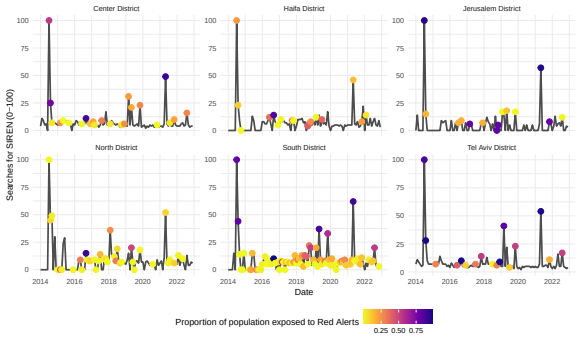
(b) "Hamas"



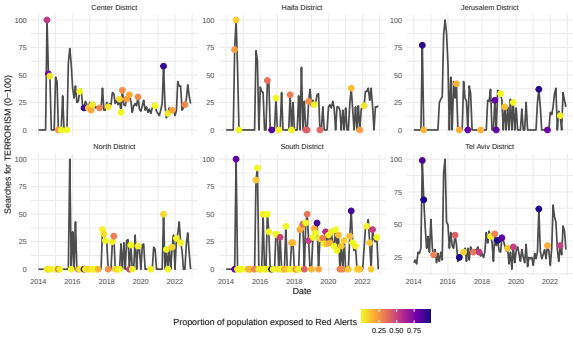
(c) "Peace"



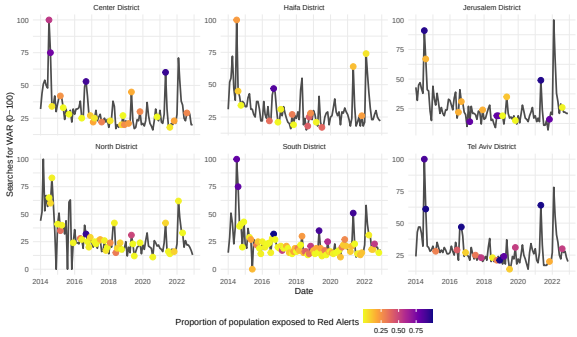
(d) "Siren"



(e) "Terrorism"



(f) "War"

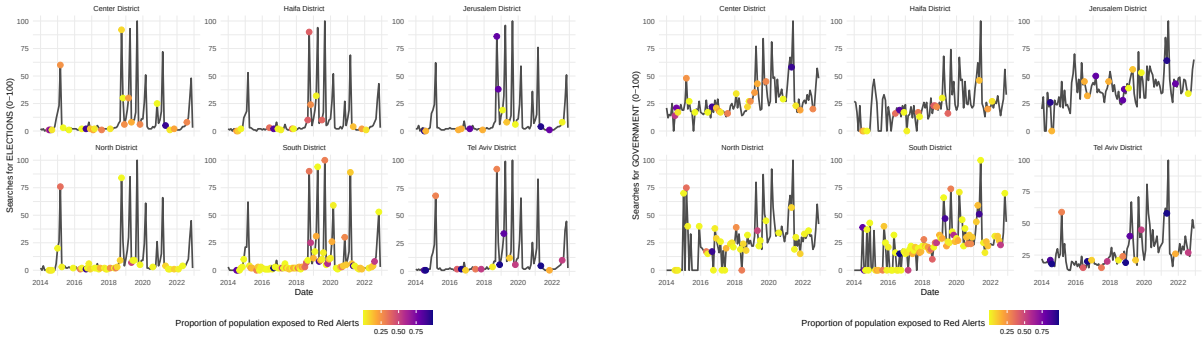


Notes: Each subfigure displays Google Trends monthly search volumes for a keyword related to security in Israel (2014-2022), for each Israeli district. Each point represents a Red Alert event, and the color gradient indicates the proportion of the district's population affected by that alert.

Figure A.5: Google Trends search trends for selected keywords

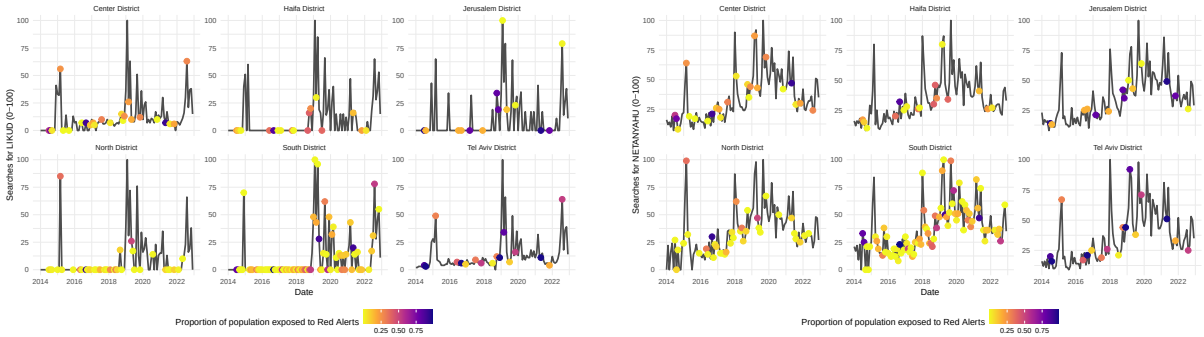
(a) "Elections"

(b) "Government"



(c) "Likud"

(d) "Netanyahu"



Notes: Each subfigure displays Google Trends monthly search volumes for a keyword related to politics in Israel (2014-2022), for each Israeli district. Each point represents a Red Alert event, and the color gradient indicates the proportion of the district's population affected by that alert.

Table A.1: Differences-in-Differences Estimates: Red Alert Impact on Likud's vote share, Right Wing's vote share and Turnout (only localities 85-140km from the Gaza Strip)

	(1)	(2)	(3)	(4)	(5)	(6)
Red Alert 6 Days Before * 2015 Election	0.031**	0.032**	−0.018	−0.021+	0.002	−0.003
	(0.011)	(0.011)	(0.013)	(0.013)	(0.015)	(0.014)
Red Alert 149+ Days Before * 2015 Election	0.008	0.008	−0.026	−0.031*	0.010	0.008
	(0.014)	(0.014)	(0.016)	(0.016)	(0.018)	(0.018)
Red Alert 6 Days Before * 2009 Election	0.013	0.012	−0.026+	−0.017	−0.002	0.004
	(0.011)	(0.011)	(0.013)	(0.013)	(0.015)	(0.014)
Red Alert 149+ Days Before * 2009 Election	0.006	0.007	−0.017	−0.012	0.002	0.007
	(0.014)	(0.014)	(0.016)	(0.016)	(0.018)	(0.018)
Red Alert 6 Days Before * 2006 Election	0.013	0.012	−0.021	−0.013	0.049***	0.059***
	(0.011)	(0.012)	(0.013)	(0.013)	(0.015)	(0.014)
Red Alert 149+ Days Before * 2006 Election	−0.008	−0.006	0.000	0.006	0.007	0.013
	(0.014)	(0.014)	(0.016)	(0.016)	(0.018)	(0.018)
Dependent Variable	Likud	Likud	Right Wing (excluding Likud)	Right Wing (excluding Likud)	Turnout	Turnout
Control Variables	No	Yes	No	Yes	No	Yes
Locality Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Control Group	NRA 2015	NRA 2015	NRA 2015	NRA 2015	NRA 2015	NRA 2015
Observations	976	976	976	976	976	976

Notes: NRA 2015 stands for No Red Alerts until the 2015 Election. Columns (1) and (2) estimate the impact of Red Alerts on Likud's vote share, columns (3) and (4) estimate the impact on Right-Wing parties' vote share (excluding Likud), and columns (5) and (6) estimate the impact on voter turnout. "Red Alert 6 Days Before" indicates localities that experienced their last Red Alert 6 days before the 2015 Legislative Election. "Red Alert 149+ Days Before" indicates localities that experienced their last Red Alert 149+ days before the 2015 Legislative Election. Control variables: demographic density, population size and nighttime luminosity level (as a proxy to economic development). Standard errors are reported in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.2: Differences-in-Differences Estimates: Red Alert Impact on Likud's vote share, Right Wing's vote share and Turnout (including Arab cities)

	(1)	(2)	(3)	(4)	(5)	(6)
Red Alert 6 Days Before * 2015 Election	0.022*	0.021*	−0.017+	−0.015	0.004	0.003
	(0.009)	(0.009)	(0.010)	(0.010)	(0.012)	(0.012)
Red Alert 149+ Days Before * 2015 Election	0.003	0.004	−0.013	−0.015	0.003	0.004
	(0.010)	(0.010)	(0.011)	(0.011)	(0.013)	(0.013)
Red Alert 6 Days Before * 2009 Election	0.006	0.006	−0.028**	−0.027**	−0.001	−0.001
	(0.009)	(0.009)	(0.010)	(0.010)	(0.012)	(0.012)
Red Alert 149+ Days Before * 2009 Election	0.011	0.011	−0.017	−0.017	0.004	0.004
	(0.010)	(0.010)	(0.011)	(0.011)	(0.013)	(0.013)
Red Alert 6 Days Before * 2006 Election	0.019*	0.020*	−0.025*	−0.027**	0.027*	0.029*
	(0.009)	(0.009)	(0.010)	(0.010)	(0.012)	(0.012)
Red Alert 149+ Days Before * 2006 Election	0.011	0.011	−0.012	−0.010	0.003	0.002
	(0.010)	(0.010)	(0.011)	(0.011)	(0.013)	(0.013)
Dependent Variable	Likud	Likud	Right Wing (excluding Likud)	Right Wing (excluding Likud)	Turnout	Turnout
Control Variables	No	Yes	No	Yes	No	Yes
Locality Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Control Group	NRA 2015	NRA 2015	NRA 2015	NRA 2015	NRA 2015	NRA 2015
Observations	1500	1500	1500	1500	1500	1500

Notes: NRA 2015 stands for No Red Alerts until the 2015 Election. Columns (1) and (2) estimate the impact of Red Alerts on Likud's vote share, columns (3) and (4) estimate the impact on Right-Wing parties' vote share (excluding Likud), and columns (5) and (6) estimate the impact on voter turnout. "Red Alert 6 Days Before" indicates localities that experienced their last Red Alert 6 days before the 2015 Legislative Election. "Red Alert 149+ Days Before" indicates localities that experienced their last Red Alert 149+ days before the 2015 Legislative Election. Control variables: demographic density, population size and nighttime luminosity level (as a proxy to economic development). Standard errors are reported in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A.3: Keywords used in Google Trends analysis

Keyword	**Related to**
Siren	Security
Hamas	Security
War	Security
Terrorism	Security
Ceasefire	Security
Peace	Security
Netanyahu	Politics
Likud	Politics
Elections	Politics
Government	Politics

B Exogeneity of Red Alerts

To further evaluate the exogeneity of Red Alerts, we test whether localities that experienced more alerts in the past were systematically more likely to be targeted again. If so, voters might update their preferences rationally, expecting continued exposure. To examine this, we estimate a Cox Proportional Hazards model, where the outcome is the time until a new alert in a given locality, and the main covariate is the cumulative number of past alerts.

To address that, we estimate a logit model where, for each day between 07-24-2014 (the first available Red Alert record) and 2022, the occurrence of a future Red Alert is regressed on the number of Red Alerts the locality has previously experienced, as follows. Specifically, for each locality, we know the number of Red Alerts it has experienced up to the current date, and whether the locality will experience at least one Red Alert in the future (up to 2022). The model allows us to assess how previous events influence the likelihood of future occurrences, as follows:

$$\text{logit}(P(\text{Future Red Alert} = 1)) = \beta_0 + \beta_1 \cdot \text{quantity of Red Alerts} + \epsilon$$

In this setup, the dependent variable is whether or not the locality will experience a future Red Alert (coded as 0 for no or 1 for yes), and the independent variable is the cumulative number of Red Alerts experienced by the locality up to the given date. The model thus helps estimate the effect of past exposure on the probability of future occurrences, accounting for the temporal structure of the data.

Given that our dataset is limited between 2014 and 2022, as time passes, there is less remaining time for new Red Alerts to occur, which naturally impacts the distribution of events. Essentially, in the later years of the dataset, the possibility of observing new Red Alerts decreases, not necessarily because Red Alerts are less likely to occur, but simply because the data has fewer opportunities to capture future events due to its time constraints. Additionally, for localities with a high number of past Red Alerts, the probability of observing a future Red Alert may approach zero, not because future alerts are impossible, but because there is simply not enough time remaining in the dataset to capture those events. This time limitation affects the model's ability to predict future Red Alerts for such localities, as the window for observation has already closed.

To address the time constraints in our dataset, we apply three alternative specifications. First, we filter the data to focus only on the years 2014-2021. By excluding the final year of the dataset (2022), we reduce the impact of the limited observation

window on the model's ability to predict future Red Alerts. This approach ensures that the model is not artificially constrained by the lack of future events in the later years of the data, allowing for a more accurate representation of how past Red Alerts influence future occurrences within the period when sufficient data is available.

Second, we introduce an interaction between yearly dummies and the quantity of past Red Alerts to account for time-varying effects. This specification allows the relationship between the number of past Red Alerts and the probability of future Red Alerts to change across different years. By interacting the year fixed effects with the number of Red Alerts, the model adjusts for the fact that the impact of past Red Alerts may not be constant over time, particularly as we approach the later years in the dataset. This interaction helps capture potential variations in the effect of past alerts due to the decreasing likelihood of observing future events as time progresses.

Third, we modify the dependent variable in the logit model to indicate whether a Red Alert occurs within one year after the observation, rather than at any point in the future. In this case we exclude observations from 2022, since we have no data concerning Red Alerts in the following year in 2023. This alternative specification ensures that the prediction window remains consistent across all periods, preventing bias from variations in data availability over time. By focusing on a fixed one-year horizon, the model better captures the short-term relationship between past and future Red Alerts while mitigating distortions caused by the dataset's limited temporal scope.

Table B.1 presents the logit estimates for all specifications. We see that the occurrence of Red Alerts in a specific locality does not increase the likelihood of that locality being targeted again in the future. In fact, the results from columns (1), (2), and (4) suggest that the more frequently a locality has experienced Red Alerts, the less likely it is to experience another one, while column (3) shows no significant effect. This finding implies that if being targeted by a Red Alert reduces the probability of future alerts, citizens should not alter their behavior based on anticipation of future events. Therefore, we can isolate the immediate salience of Red Alerts on electoral behavior.

Table B.1: Logit Estimates: Quantity of Past Red Alerts Impact on Future Red Alerts

	(1)	(2)	(3)	(4)
Quantity of Previous Red Alerts	−0.574***	−0.509***	15.414	−0.031***
	(0.002)	(0.002)	(34.470)	(0.003)
Quantity of Previous Red Alerts * 2015			0.434	
			(37.827)	
Quantity of Previous Red Alerts * 2016			−15.395	
			(34.470)	
Quantity of Previous Red Alerts * 2017			−15.147	
			(34.470)	
Quantity of Previous Red Alerts * 2018			−15.343	
			(34.470)	
Quantity of Previous Red Alerts * 2019			−14.890	
			(34.470)	
Quantity of Previous Red Alerts * 2020			−14.757	
			(34.470)	
Quantity of Previous Red Alerts * 2021			−15.116	
			(34.470)	
Quantity of Previous Red Alerts * 2022			−15.413	
			(34.470)	
Period	2014-2022	2014-2021	2014-2022	2014-2021
Year Fixed Effects	No	No	Yes	Yes
Observations	1220868	1076328	1220868	1076328

Notes: Column (1) estimates the probability of a future Red Alert using only the quantity of previous red alerts. Column (2) excludes data from 2022. Column (3) introduces interaction terms with year to explore whether the effect of previous red alerts varies across years. Column (4) models the probability of a Red Alert within one year, again excluding 2022. Standard errors are reported in parentheses. + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.