

Trading on Terror?

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ABSTRACT

Recent scholarship shows that informed traders increasingly disguise trades in economically linked securities such as exchange-traded funds (ETFs). Linking that work to longstanding literature on financial markets' reactions to military conflict, we document a significant spike in short selling in the principal Israeli-company ETF days before the October 7 Hamas attack. The short selling that day far exceeded the short selling that occurred during numerous other periods of crisis, including the recession following the financial crisis, the 2014 Israel-Gaza war, and the COVID-19 pandemic. Similarly, we identify increases in short selling before the attack in dozens of Israeli companies traded in Tel Aviv. For one Israeli company alone, 4.43 million new shares sold short over the September 14 to October 5 period yielded profits (or approximates avoided losses) of millions on that additional short selling for one out of hundreds of securities traded on the TASE. Although we see no aggregate increase in shorting of Israeli companies on U.S. exchanges, we do identify a sharp and unusual increase, just before the attacks, in trading in risky short-dated options on these companies expiring just after the attacks. We identify similar patterns in the Israeli ETF at times when it was reported that Hamas was planning to execute a similar attack as in October. Our findings suggest that traders informed about the coming attacks profited from these tragic events, and consistent with prior literature we show that trading of this kind occurs in gaps in U.S. and international enforcement of legal prohibitions on informed trading. We contribute to the growing literature on trading related to geopolitical events and offer suggestions for policymakers concerned about profitable trading on the basis of information about coming military conflict.

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I. INTRODUCTION

On October 7, 2023, Hamas launched a devastating terrorist attack on Israel, a tragedy with consequences we are only beginning to comprehend. But days before the attack, traders appeared to anticipate the events to come: on October 2, short interest in the MSCI Israel Exchange Traded Fund (ETF) suddenly, and significantly, spiked. And just before the attack, short selling of Israeli securities on the Tel Aviv Stock Exchange increased dramatically. While many investigating how the Hamas attack was financed have focused on cryptocurrency (Adayemo (2023)), to our knowledge little attention has been given to trading in securities markets in advance of October 7—an important omission given the relative sizes of the cryptocurrency and securities markets.¹

This Article addresses that gap by studying trading in the MSCI Israeli ETF and Israeli companies listed both in the United States and on the TASE in the days before the Hamas attack. We contribute three important findings to the longstanding literature on how financial markets respond to military conflict (Leigh, Wolfers & Zitzewitz (2003); Poteshman (2006)), as well as more recent work on how informed traders transact in shadow securities—that is, securities economically linked to firms affected by the information (Mehta, Reeb & Zhao (2021)), such as ETFs (Eglite, Staermans, Patel & Putnins (2023)).

¹ Levine (2023a) contends that cryptocurrency may be an ineffective medium for financing crime because crypto “payments are traceable.” Similarly, Verret (2023) argues that there is little “evidence that crypto is used more often or more effectively than the traditional banking system to finance terrorism.” Our evidence does not speak to the possibility that cryptocurrency is used to finance terrorism or other criminal activities more generally. We note only that (1) the possibility that terrorism is financed through cryptocurrency is not mutually exclusive to the possibility that such activity is also financed through other securities markets and (2) the relative size of securities markets suggests that, to the degree an informed trader hopes to avoid detection, securities markets are at least an equally attractive venue for transactions of this kind as cryptocurrency markets.

First, using data from the Financial Industry Regulatory Authority (FINRA), we document a significant spike in short selling in the MSCI Israel ETF five days before the attack. Using other recent developments that affected Israeli firms generally as a counterfactual (such as the enactment of a proposed judicial reform that produced nationwide protest in Israel (Lieber (2023))), we show that this increase in short selling is economically and statistically unusual. Indeed, we show that nearly 100% of the off-exchange trading volume in the MSCI Israel ETF on October 2 reported to FINRA consisted of short selling. We also document that the fraction of shares of this ETF lent to short sellers increased immediately before the attack. While we cannot say what the source of this unusual short selling was, the evidence we present is consistent with substantial block trades that occurred on October 2 rather than ordinary market-making activity.

To understand just how unusual these findings are, the short volume on October 2 in EIS, is at position #30 out of 3,570 trading days since 2009, which is above the upper 99%-quantile in rank order. When considering the short ratio, October 2 ranks at position #15, or above the 99.5%-quantile in rank-order. This indicates that it is extremely unlikely that the volume of short selling on October 2 occurred by random chance. Moreover, it indicates that the short selling that day far exceeded the short selling that occurred during numerous other periods of crisis, including the recession following the financial crisis, the 2014 Israel-Gaza war, and the COVID-19 pandemic.

In addition, we identify similar patterns in the Israeli ETF in April 2023, when it was reported that Hamas was planning to execute a similar attack as in October. Specifically, short volume in EIS peaked on April 3 at levels very similar to those observed on October 2, and was far higher (by an order of magnitude) than other days prior to April 3. Similar results obtain when looking at short ratios: the short ratio peaked at 94% on April 3, 2023, which was higher

than every other day over the period March 1 to April 3, 2023. Over that period, the average short ratio was 38.87%, so this ratio on April 3 was exceptionally high. Taken together, this evidence strengthens the interpretation that the trading observed in October and April was related to the Hamas attack rather than random noise.

Second, we study changes in short selling in Israeli companies immediately prior to the attack. Because Israeli companies trade both on U.S. exchanges and on the TASE, we examine trading on each venue separately. On both venues, we document an increase in short selling in several specific Israeli companies, although the aggregate effects vary depending on the venue. We document a substantial overall increase in short interest in the Tel Aviv Stock Exchange, which peaks just before the attack on October 7—an increase that was not present before the market decline following the enactment of the judicial reform on July 24, 2023. We do not identify an overall increase in short selling in Israeli companies traded on U.S. exchanges, and we explore a few possibilities as to why—such as that some of these companies in the defense sector may have benefitted from the attacks and others have a strong international, as opposed to Israeli, presence.

While the magnitude of additional trading in the Israeli ETF is abnormal, it is not large in absolute terms, likely owing to the limited trading volume and liquidity in that ETF. On the Tel Aviv Stock Exchange, however, we identify very large increases in short selling. For one company alone (Bank Leumi), 4.43 million new shares sold short over the September 14 to October 5 period yielded profits (or approximates avoided losses) of 30 million NIS millions on that additional short selling for one out of hundreds of securities traded on the TASE.

We also study trading in short-dated options contracts on the shares of Israeli firms traded on U.S. exchanges. Examining trading in options expiring on October 13, immediately after the

attacks, we show that open interest in these options, compared to options expiring later in the year, increased substantially immediately before the attacks. We show that this increase in short-dated options can be linked to several block trades in options written on Israeli companies in U.S. markets, suggesting that a small number of actors may have been behind this options trading. As before, we compare to placebo periods and show the increase is unusual.

Taken together, our evidence is consistent with informed traders anticipating and profiting from the Hamas attack. Thus, we consider the degree to which current law governing securities or illicit finance might apply to the trading we observe. We show that trading of this kind has long occupied a gap in domestic and international enforcement mechanisms related to prohibitions on informed trading. Normatively, we identify considerations lawmakers should consider when evaluating policy alternatives that might close that gap, and offer suggestions for policymakers concerned about the prospect of informed trading on coming terrorist attacks.

Before proceeding, we note the preliminary nature of our results. For example, in light of the limits of the data available to us, we are unable to link particular market participants to the pre-attack developments we see in securities markets—to say nothing of the underlying sources of information that produced the trades we study.² We also note, however, that both FINRA and the U.S. Securities and Exchange Commission (SEC) have access to nonpublic data that could be helpful for investigators interested in understanding why, and how, financial markets may have anticipated the events of October 7. In this way, we hope our work contributes not only to the literature on shadow trading but to those seeking to identify the sources of terrorist financing.

² As we explain in more detail in Part IV, it is far from clear that U.S. securities law prohibits, or even reaches, the transactions we study. For one thing, U.S. law’s prohibitions on informed trading emphasize insiders, those insiders improperly inform, and those who misappropriate information using deception (Ayres & Choi (2002)), and our evidence does not bear on whether such facts are present here. For another, the extraterritorial reach of those prohibitions is unclear in theory and limited in practice (Langevoort, 2000). And even traders who might be reached by U.S. securities regulators may be practically “law-proof” in the fashion described in Fried & Kamar (2023).

This Article proceeds as follows. Part II describes the previous literature on financial-market responses to armed conflicts and more recent work on how informed traders can and do disguise their trading in securities that are economically linked to information, such as ETFs. Part III examines the evidence on the spike in short interest on the MSCI Israel ETF immediately before October 7 and shows that this increase is likely attributable to significant block trades occurring just a few days before the attack. Part IV considers changes in short interest in Israeli companies traded both on U.S. exchanges and on the TASE, documenting specific companies for which short interest increased immediately before the attack and related conditions in the market for lending shares. Part V describes trading in short-dated option contracts expiring just before, and just after, the attacks on securities of Israeli companies listed on U.S. exchanges. Part VI concludes with potential paths for researchers and policymakers going forward.

II. BACKGROUND AND LITERATURE

Building on foundational scholarship on how traders incorporate information into security prices (Glosten and Milgrom (1985), Kyle (1985)), prior work documents that process for information about armed conflict. More recent scholarship shows that informed traders do so through what Mehta, Reeb & Zhao (2021) call “shadow” trading. Specifically, informed traders can and do minimize risk of detection by regulators and market participants by trading not in the security about which they have information but in securities economically linked to firms affected by that information, such as ETFs (Eglite, Staermans, Patel & Putnins (2023)). In this Article we link these two literatures to prior work on the allocative-efficiency implications of trading motivated by private information about value-destroying activities, such as cybersecurity attacks (Mitts & Talley, 2018; SEC, 2023).

A long literature documents the economic effects of armed conflict and corresponding developments in financial markets. For example, Abadie & Gardeazabal (2003) study terrorist conflict in the Basque Country, showing that after the outbreak of terrorism in the late 1960s per-capita GDP in the affected region declined significantly. Using the subsequent truce as a natural experiment, they find that stocks of firms with significant activities in the Basque Country showed positive performance when truce became credible and negative performance at the end of the ceasefire. Closer to our study is Leigh, Wolfers & Zitzewitz (2003), who use prediction markets to produce an *ex ante* assessment of the economic consequences of war with Iraq. They show significant effects of changing probability of such a war in both stock and option markets, concluding that war reduces the value of U.S. equities by 10 percent and leads option markets to price in probabilities of scenarios in which equity prices fall further.³

Similarly, previous work examines the degree to which financial markets anticipate the prospect of armed conflict and incorporate that possibility into security prices. For example, Chesney, Crameri & Mancini (2015) document what they call “abnormal trades” in option markets (*i.e.*, trades not driven by liquidity motives), identifying such trades immediately prior to the terrorist attacks on the United States on September 11, 2001. Related to those attacks, Wong, Thompson & Teh (2011) identify, consistent with contemporaneous news reports (Bogdanowicz & Jackson, 2004), abnormal trading in options contracts immediately prior to September 11.⁴

³ As Leigh, Wolfers & Zitzewitz (2003) acknowledge, the magnitude of their results is in some tension with prior studies like Cutler, Poterba and Summers (1991), who estimate that first-order news events such as political and military developments explain only a small portion of market movements. By contrast, Leigh, Wolfers & Zitzewitz (2003) find, for example, that more than 30% of the variation in S&P 500 stock prices can be explained econometrically by changes in the probability of war in Iraq during the period they study.

⁴ On September 12, 2001, the SEC initiated an investigation into whether these market dynamics indeed reflected advance knowledge of the September 11 attacks, examining more than 9.5 million trades on U.S. exchanges involving more than 100 companies in six industry groups, including airlines. In 2004, the SEC reported that it was not able to “develop any evidence suggesting that anyone who had advance knowledge of the terrorist attacks . . . sought to profit from that knowledge by trading in United States securities markets” (SEC, 2004).

Their findings are consistent with those of Poteshman (2006), who identifies high levels of put buying in option markets in the period leading up to September 11.⁵

More recent work has considered whether informed traders seeking to evade detection are likely to transact not in the security that is the subject of the information but instead in “shadow” securities that are economically linked to firms affected by the information. For example, Mehta, Reeb & Zhao (2021) show that corporate insiders circumvent restrictions on their trading by using private information to trade in shares of firms that are economically linked to their own. Using two shocks to insider-trading enforcement intensity to rule out alternative explanations for their results, they contend that shadow trading is a poorly understood mechanism by which informed traders evade regulatory scrutiny. Extending that work to ETFs, Eglite, Staermans, Patel & Putnins (2023) provide evidence that some traders in possession of material nonpublic information about mergers trade ETFs that contain the target company’s stock; they document more than \$200 million in such trading annually.

The possibility of shadow trading through ETFs is especially important in light of recent work showing that ETF shares are among the most frequently traded securities in the world, with ETFs now holding more than \$5 trillion in assets (Hu & Morley (2018)). In light of the size of ETF markets and the ease with which ETF shares can be traded by informed counterparties, Eglite, Staermans, Patel & Putnins (2023) estimate the magnitude of informed shadow trading in ETF shares at more than \$2.75 billion between 2009 and 2021.

⁵ Similarly but separately, a long literature examines how stock prices and market participants respond after a terror attack (e.g. Chen & Siems (2004), Johnston & Nedelescu (2006), Coleman (2012)). Tragically, several papers are dedicated exclusively to the responses of the Israeli stock market following terrorist attacks over the past three decades (e.g. Eldor & Melnick (2004), Eldor, Hauser, Kroll & Shoukair (2012)).

Finally, while informed trading is widely understood to be a beneficial feature of securities markets (Grossman & Stiglitz (1980), Kornhauser & Gordon (1985)), more recent work has pointed to the distinct allocative effects of trading on information about socially counterproductive activity. Specifically, Mitts & Talley (2018) provide evidence of informed trading on cybersecurity breaches and contend that the efficiency implications of profits from such trading are distinguishable from those in other informational contexts. Relying on this evidence, policymakers (Jackson, 2018) called for enhanced disclosure and enforcement in this area, expressing concern that trading profits could finance illicit hacking. The SEC recently promulgated rules requiring more rapid corporate disclosure of cybersecurity incidents, in part to address concerns that asymmetric information about such events provides opportunities for informed trading that may finance socially counterproductive conduct (SEC, 2023).

III. DATA AND FINDINGS

A. MSCI Israel Exchange-Traded Fund (NYSE: EIS)

The MSCI Israel Exchange-Traded Fund (NYSE: EIS) is an exchange-traded fund that “seeks to track the investment results of a broad-based index composed of Israeli equities.” A list of the holdings of the EIS exchange-traded fund as of October 27, 2023 is given in Appendix A. On October 9, 2023, the price of EIS declined -7.11%. It subsequently declined even further, reaching a decline of -17.45% by October 27, 2023.

To evaluate whether EIS was subject to informed short or long selling in the days leading up to the Hamas attack, we examine daily short volume, short ratios, security lending utilization (a daily estimate of short interest), alongside other security lending metrics, such as the duration of open positions. While any single metric, standing alone, is imperfect, taken together they

allow for drawing reasonable inferences as to the magnitude of informed selling activity in EIS. we discuss each of these in turn. We also conduct a placebo test to evaluate how our results might appear in another period preceding a sharp decline in the price of EIS.

i. *Short Volume*

Short volume is the total share volume of reportable short sales on a given date. In colloquial terms, it measures “how much short selling occurred on a given day.” As FINRA and others have explained,⁶ short volume provides an imprecise measure of *directional* short selling activity because it consists solely of trades which *technically* constituted short sales (*i.e.*, the seller lacked inventory at the time of the sale) on the reportable side of a market transaction. This measure is imprecise because many short sales are effectuated by market makers supplying liquidity in response to *buying demand* in the market in the course of bona fide market making. However, because bona fide market making generally involves “purchases and sales in roughly comparable amounts to provide liquidity to customers or other broker-dealers while remaining roughly market neutral,”⁷ these technical short sales should be offset relatively quickly by purchases by market makers, ensuring that the ratio of short sales to purchases remains roughly equal. Thus, short volume data are useful when evaluated alongside a ratio of short volume to total volume.

A similar but slightly different limitation to short volume data is that *reportable* short sales (*i.e.*, on the public markets) may have been effectuated by a market maker in anticipation of purchasing from another party in a *non-reportable* transaction. In that case, the transaction is

⁶ <https://www.finra.org/investors/insights/short-interest>; <https://blog.otcmartets.com/2023/05/08/what-investors-should-know-about-finra-daily-short-sale-volume-data/>

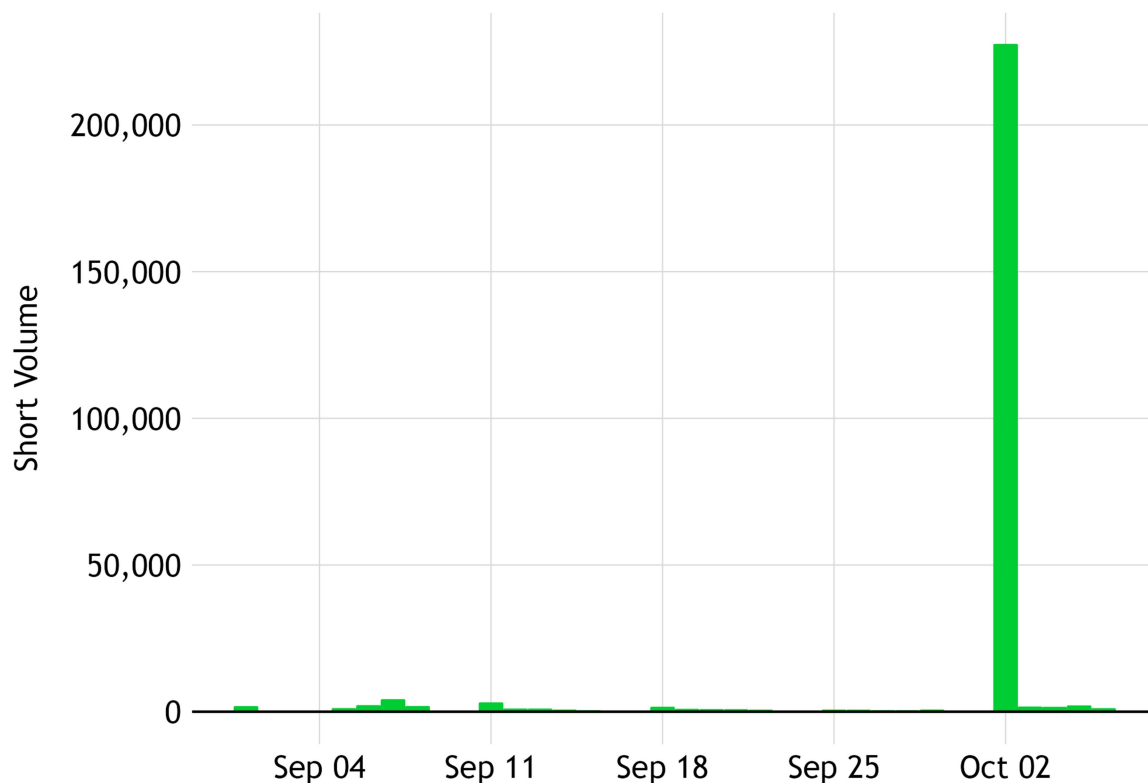
⁷ Amendments to Regulation SHO (Interim Final Temporary Rule), 73 Fed. Reg. 61706, 61699 (Oct. 14, 2008).

economically equivalent to a one where the market maker first acquired the inventory from the counterparty and proceeded to sell that inventory on the public market in a long sale. When the sequence is reversed, the trade is a “short sale” in name only. While it is impossible to know whether that is the case when utilizing publicly available data, this possibility means that conclusions should be qualified to acknowledge the possibility that some or all of the observed sales are actually long sales in economic substance, and the observed short selling serves merely to facilitate these long sales. That possibility is equally consistent with the inference that some market participants were informed prior to the Hamas terrorist attack. Distinguishing between these possibilities requires considering conclusions based on short volume data in light of other measures of open short positions (as described below).

Under Regulation SHO, each exchange must publish daily short volume data for short sales on that exchange, but every exchange now charges a substantial fee to obtain these data. By contrast, FINRA makes these data available for free for trades reported to its trade reporting facilities, which collect trades on off-exchange venues such as dark pools and other alternative trading systems, as well as over-the-counter transactions in listed securities. In this preliminary analysis, we employ the FINRA short volume data, but are in the process of acquiring short volume data from other venues. The following figure plots short volume in EIS from September 1 to October 6, 2023:

Figure 1: Short Volume in EIS, September 1 to October 6, 2023

This figure plots the total share volume of off-exchange short sales in EIS reported to FINRA on a “consolidated NMS” basis, i.e., the FINRA/Nasdaq Chicago TRF, FINRA/Nasdaq Carteret TRF, the FINRA/NYSE TRF and the Alternative Display Facility (ADF), from September 1 to October 6, 2023.



As Figure 1 shows, short volume peaks on Tuesday, October 2, just days before the attack. The peak is so high—over 200,000 shares—that it is difficult to see the other values in the chart, which rarely exceed the single digit thousands. A natural question is whether this peak was offset by other purchase volume by market makers that same day. The following figure plots short volume as a percentage of total volume reported to FINRA (the “Short Ratio”):

Figure 2: Short Volume in EIS Divided by Total Volume, September 1 to October 6, 2023

This figure plots the total share volume of short sales in EIS divided by the total share volume of off-exchange trades reported to FINRA’s trade reporting systems on a “consolidated NMS” basis, i.e., the FINRA/Nasdaq Chicago TRF, FINRA/Nasdaq Carteret TRF, the FINRA/NYSE TRF and the Alternative Display Facility (ADF), over the period September 1 to October 6, 2023.

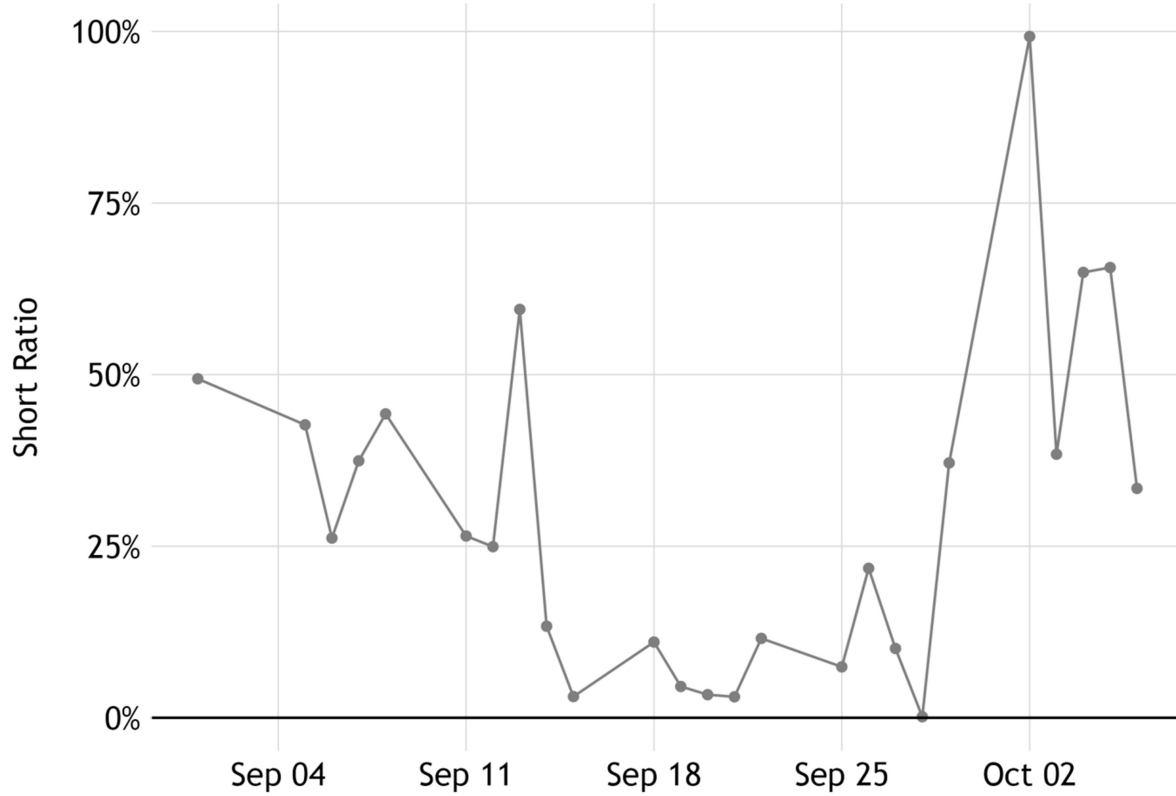


Figure 2 shows that nearly 100% of the trading volume in EIS on October 2, 2023 reported to FINRA consisted of short selling. Importantly, while the absolute volume of short selling fell in the following days, the short ratio remained extraordinarily elevated—twice returning to levels that had never before been reached during the period shown in the figure.

Taken together, this evidence indicates that the volume of short selling observed over the days immediately prior to the Hamas attack was extraordinarily high and unlikely to have been explained by *bona fide* market making, because that should have been accompanied by high volumes of purchases to offset those short sales—if not on the same day, certainly very quickly. Otherwise, the market maker would be exposed to directional movements in the stock price. As two market makers wrote in a comment letter to the SEC:

If the Commission wishes to distinguish between legitimate market-making transactions and other transactions that are for proprietary, speculative purposes, one way may be to look at how the broker-dealer in fact behaves. A market-maker, as is well known, tends to stay “flat” whenever possible because it makes its money by profiting from spreads, not from taking a directionally biased position at market risk.⁸

ii. *Securities Lending Utilization (Daily Short Interest)*

A second measure of short selling activity looks not at individual short sales but rather on the volume of open short positions. This can be difficult to measure directly, in part because the SEC has not yet mandated public reporting of short positions in U.S. equities at this time (though the SEC has just enacted a final rule which would provide substantial regulatory reporting and

⁸ Comment Letter re: Proposed Regulation SHO; File No. S7-23-03 by J.P. Morgan Securities Inc. and UBS Securities LLC (Jan. 30, 2004), available at <https://www.sec.gov/rul.es/proposed/s72303/jpmorgan013004.htm>. (last visited July 25, 2023).

some public transparency into open short positions). However, short positions can be measured *indirectly* by considering the securities lending market.⁹

There are two ways that short selling is related to securities lending. First, Regulation SHO requires that short sellers locate available inventory to borrow shares from a securities lending before effectuating a short sale—the so-called “locate” requirement.¹⁰ Second, a short sale is generally *settled* (*i.e.*, shares are delivered from the short seller to the purchaser from the short seller) by borrowing shares from that lender. When a securities loan is opened to facilitate a short sale, lenders and borrowers report the volume of shares on loan to market data intermediaries, who collect and republish this information.¹¹

A commonly used measure of the volume of open short positions is the securities lending utilization rate, which is the volume of shares on loan to short sellers divided by the volume of shares available for lending. A second measure is the average duration of open securities loans; the greater it is, the longer short sellers are holding a position. Because short selling is risky and entails paying various borrowing and margin costs to securities lenders,¹² the longer a position is held open, the more confidence a short seller must have that a large decline in the price is forthcoming. The following figure plots the utilization rate and average duration of open loans over the period September 1 to October 10, 2023. Because securities loans are generally settled at the time of the underlying short sales, in contrast to previous figures these dates reflect trading activity that occurred two trading days before, *i.e.*, through October 6, 2023.

⁹ One of us has employed this method to examine short selling activity in connection with the events of GameStop (Mitts et al., 2022).

¹⁰ SEC (2015) describes the “locate” requirement of regulation SHO in detail.

¹¹ We use securities lending data provided by ORBISA Securities Lending Analytics through Interactive Brokers.

¹² Mitts et al. (2022).

Figure 3: Utilization and Average Duration for EIS

This figure plots the daily utilization rate and average duration of open securities loans in EIS from September 1 to October 10, 2023. Because securities loans are generally settled at the time of the underlying short sales, in contrast to previous figures these dates reflect trading activity that occurred two trading days before.



Figure 3 shows that utilization jumped sharply on October 4, 2023, the settlement date for the short sales on October 2. This evidence is a further indication that the short sales identified in the prior section did not reflect market making in response to buying demand—because market makers likely would have offset their short exposure by purchasing shares that same day.

To be sure, while utilization remained elevated relative to preceding levels after October 5 (*i.e.*, reflecting trading on October 3), it fell sharply from October 4 to 5. The sharp decline in utilization suggests that the short selling on October 2 occurred in order to facilitate block sales by existing shareholders—*i.e.*, the short seller closed their position (“covered”) by purchasing shares from those selling shareholders. We can further conclude that these block sales were non-

reportable, *i.e.*, did not occur through arms-length trading on exchanges or alternative trading systems, because if that were the case, there would have been a far larger volume of non-short sales in Figure 1 after October 2 to account for these offsetting transactions.

Direct evidence of the reportable portion of these block sales is obtained by examining the trading and quotes (TAQ) data, which contain a complete stream of executed transactions. On October 2, 2023, we observe two dark pool transactions reported to FINRA at 2:46:43pm and 3:21:11pm, for 50,733 and 174,869 shares respectively, at share prices of \$54.46 and \$54.61, respectively. These appear to be the short sales identified previously. On these two transactions alone, the trader made several million dollars in profit (or in losses avoided).

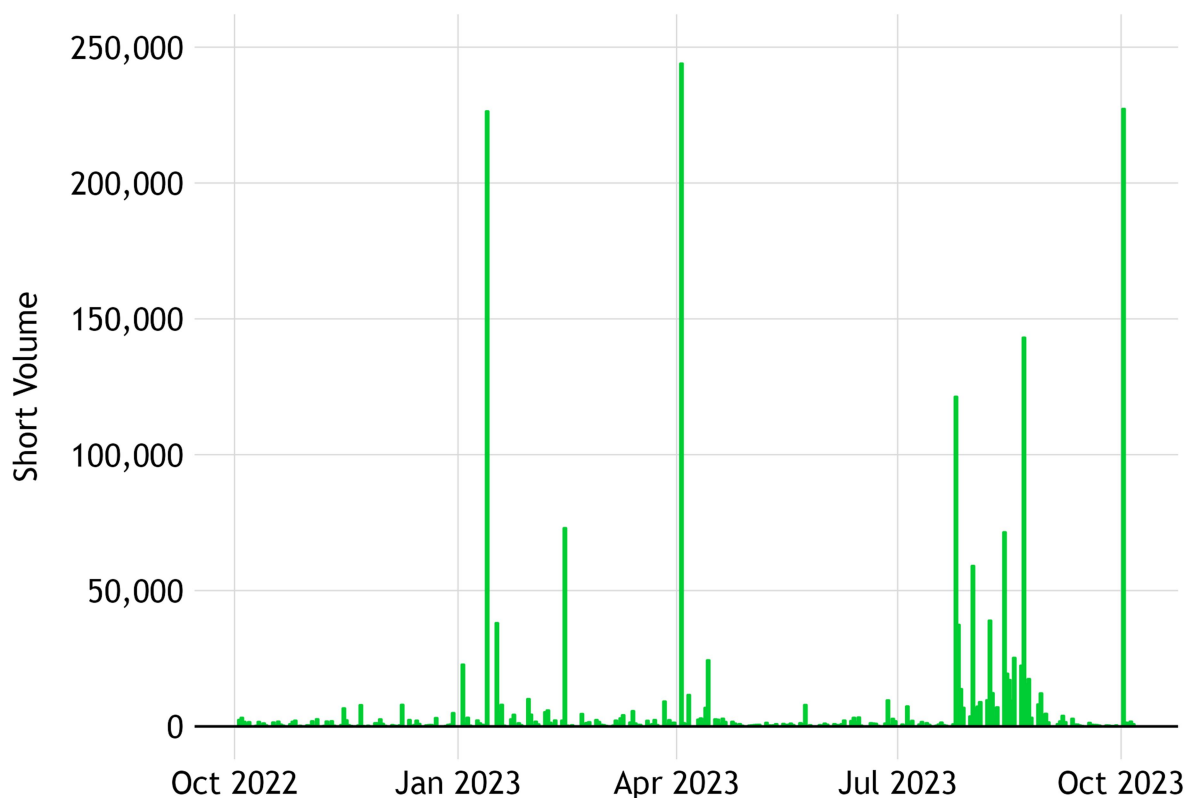
In addition, the average duration of short positions was sharply increasing in the weeks leading up to the Hamas attack. This evidence indicates that short sellers were taking on greater risk by holding their positions open for longer in the days leading up to the attack, which would be consistent with expecting a sharp decline. While the average duration drops when new positions were entered into on October 2 (settlement date of October 4), the duration quickly reverts to an elevated level thereafter, indicating that the old short positions remained open in the following days.

iii. *Placebo Test: 52-Week Period*

We next consider how this short selling compares to the preceding 52-week period, which was marked by substantial market volatility and a decline in the Israeli currency in connection with substantial controversies over the Israeli judicial reform. The following figures shows FINRA short volume in EIS over the preceding 52 weeks, from October 2022 to October 2023:

Figure 4: Short Volume in EIS, 52-Week Period (October 2022 – October 2023)

The following figure shows off-exchange short volume in EIS as reported to FINRA from October 1, 2022 to October 26, 2023. The y-axis is aligned to the y-axis in Figure 1 for comparability.

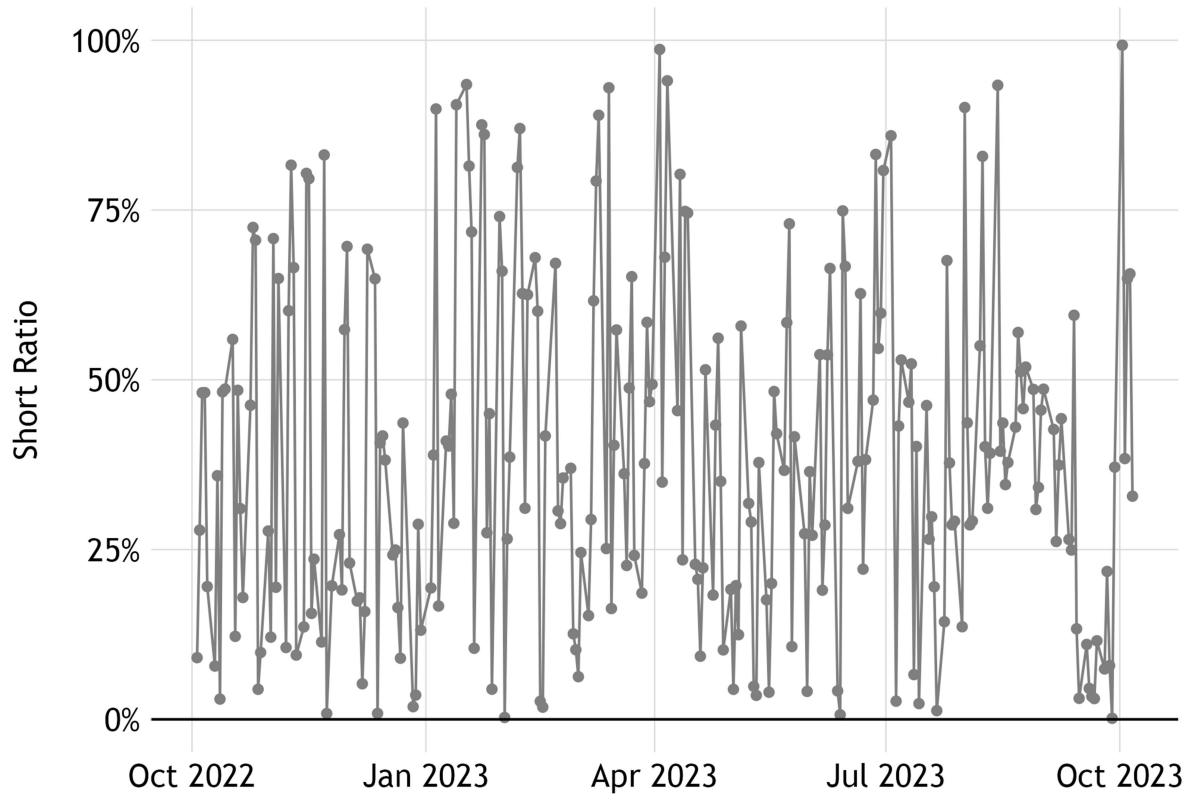


As Figure 4 shows, the short volume in EIS observed just before the attack in October 2023 is the second-highest over the preceding year, coming only behind April 3, 2023, which had another massive peak in short volume. We discuss April 3 in the following Section. The following figure plots the short ratio in EIS over this same 52-week period:

Figure 5: Short Ratio in EIS, October 2022 - October 2023

The following figure shows the total share volume of short sales in EIS divided by the total share volume of off-exchange trades reported to FINRA’s trade reporting systems on a “consolidated NMS” basis from October 2022 to October 2023. The y-axis is aligned to the y-axis in

Figure 2 for comparability.



As Figure 5 shows, October 2, 2023 had the highest short ratio in the 52-week period: 99.27%, which was above the short ratio on April 3 (98.64%). Finally, we plot EIS short utilization over the calendar year 2023, which is the longest data presently available in the data we have:

Figure 6: EIS Utilization, Calendar Year 2023

This figure plots utilization in EIS over the calendar year 2023. The spikes in early 2023 occurred during the period of turmoil accompanying the Israeli judicial reform, and the spike in July 2023 occurred after the reform was enacted.



Figure 6 shows that while short selling volume and ratios on October 2 were exceptionally high, there were other peaks in utilization that occurred above the level on October 2. It is worth noting that the spikes in early 2023 occurred during the period of turmoil accompanying the Israeli judicial reform, and the spike in July 2023 occurred after the reform was enacted. Either way, the utilization levels observed in early October 2023 were exceptional relative to the full historical time series of utilization.

iv. *April 2023 and Hamas' Planned Attacks*

It has been reported that Hamas had initially planned these attacks to occur on the eve of Passover, which was April 5, 2023. The *Times of Israel* reported that:

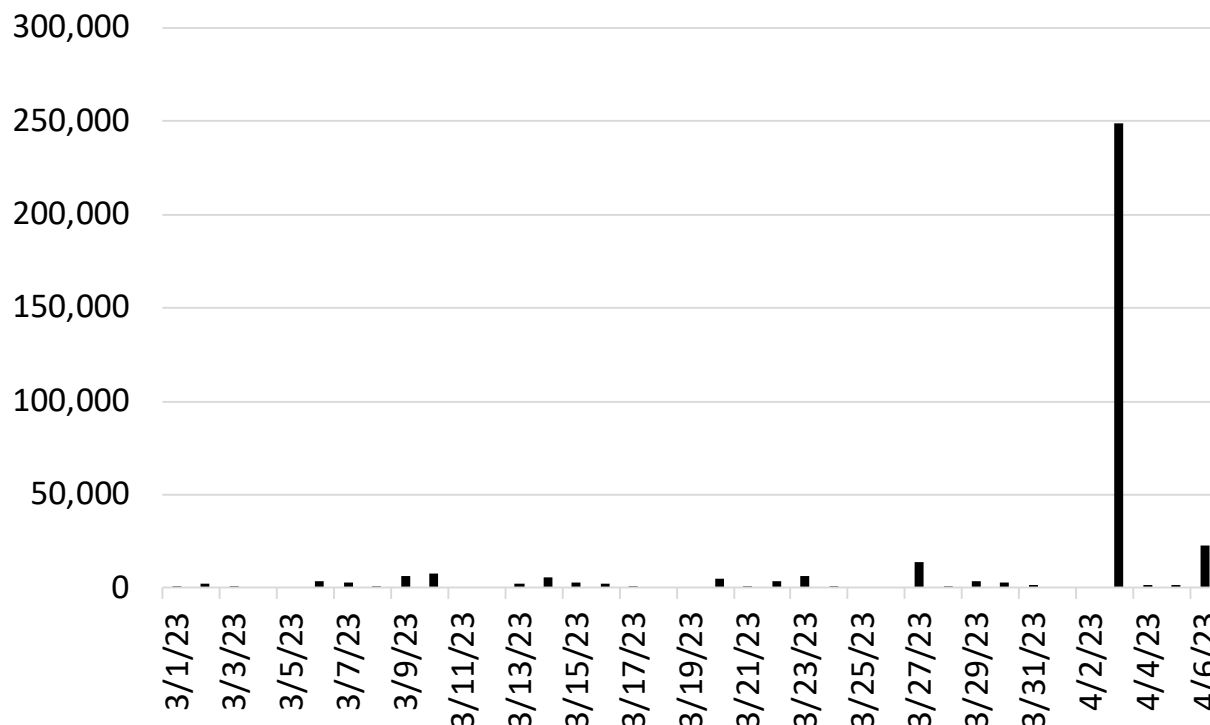
Hamas had initially planned its October 7 cross-border onslaught for the eve of Passover, but canceled the attack after Israel raised the alert level, according to a Saturday report. Military intelligence caught the early signs of an attack on Passover, which this year fell on April 5, and raised the alert, leading Hamas to cancel and the IDF to consider the incident a false alarm, Channel 12 reported, citing unnamed soldiers in the IDF's 8200 signal intelligence unit.¹³

As noted previously, short volume in EIS peaked on April 3 at levels very similar to those observed on October 2, and was far higher (by an order of magnitude) than other days prior to April 3:

Figure 7: EIS Short Volume, March-April 2023

This figure plots the total share volume of short sales in EIS reported to FINRA and the exchanges over the period March to April 2023.

¹³ *Hamas Onslaught Was Originally Planned For First Night Of Passover – Report*, TIMES OF ISRAEL, Nov. 26, 2023, <https://www.timesofisrael.com/hamas-onslaught-was-originally-planned-for-first-night-of-passover-report>



Similar results obtain when looking at short ratios: the short ratio peaked at 94% on April 3, 2023, which was higher than every other day over the period March 1 to April 3, 2023. Over that period, the average short ratio was 38.87%, so this ratio on April 3 was exceptionally high. Taken together, this evidence strengthens the interpretation that the trading observed in October and April was related to the Hamas attack rather than random noise.

v. ***Do Changes in Short Volume Predict Future Returns in EIS?***

One question might be whether the changes in short selling observed here systematically predict *future* changes in the price of EIS—and if so, how unusual these price changes were. To be sure, while short interest broadly predicts aggregate stock returns (Rapach, Ringgenberg & Zhou, 2016), in an efficient market prices should update rapidly to reflect publicly available information like additional short selling. Of course, it is not clear that *every* market participant can observe *every* aspect of short selling in the market, but there is little reason to predict that

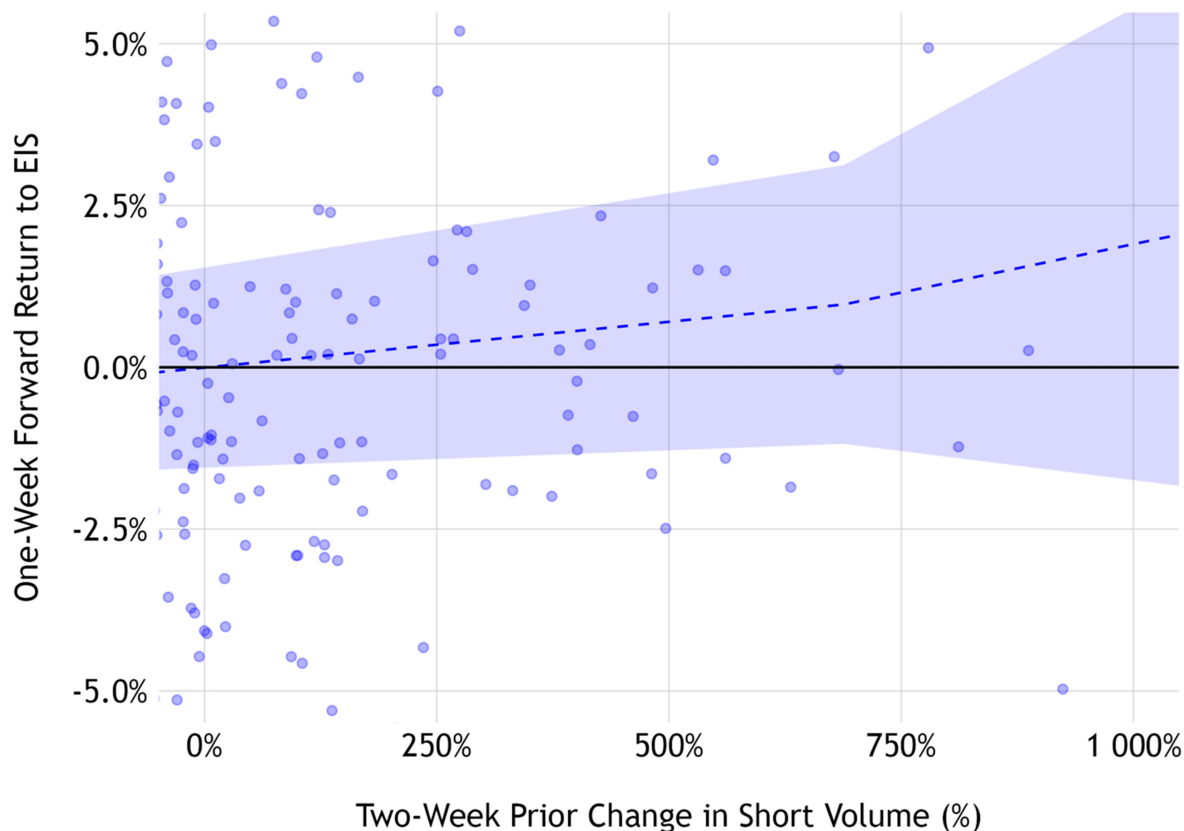
changes in short interest are likely to impound so slowly into the price as to yield profitable trading opportunities days ahead.¹⁴

To examine whether changes in short volumes predict price changes in the future, the following figure plots a one-week forward return to EIS (*i.e.*, the percentage change in the price of EIS five days into the *future* from the current price of EIS on any given day) on the *y*-axis, against a percentage change in short volume over the *prior* two weeks on the *x*-axis.

¹⁴ The degree to which one might make that prediction would depend on one's priors about the efficiency of the market for shares in EIS. [More detail on that point to come.]

Figure 8: The Predictive Power of Short Volume

This figure plots a one-week forward return to EIS (*i.e.*, the percentage change in the price of EIS five days into the future from the current price of EIS on any given day) on the y -axis, against a percentage change in short volume over the preceding two weeks on the x -axis. A local smoothing line is fitted to the data and presented in dashed line with 95% confidence intervals shaded.



As Figure 8 shows, there is no systematic relationship between the prior change in short volume and the one-week forward return to EIS. That makes the findings in early October, prior to the Hamas attacks, all the more surprising, because a trader would not rationally expect to profit merely by the presence of increased short volume in EIS.

vi. *More Placebo Tests*

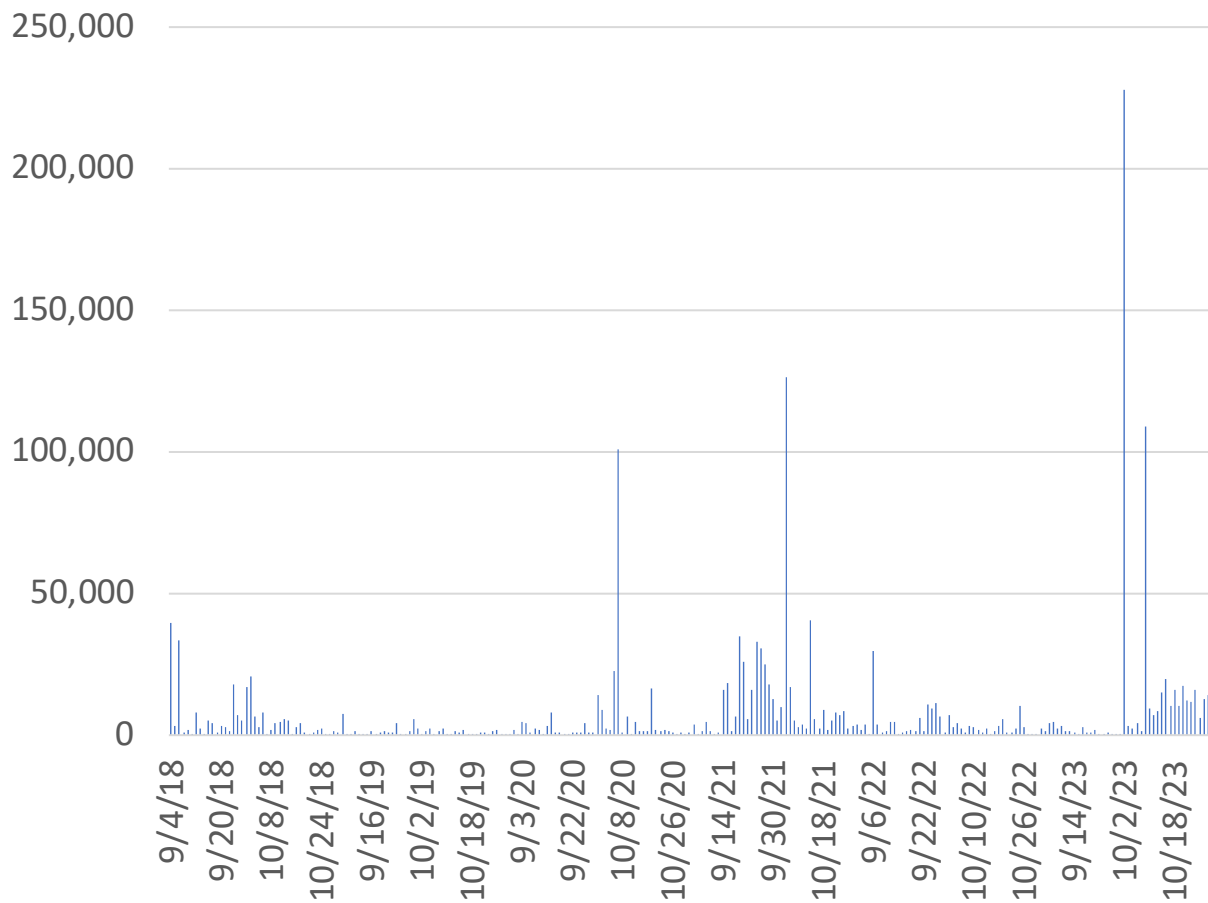
To evaluate how unusual these findings are, we examine short volume in EIS from 2009-2023, which encompasses 3,570 trading days. Among these, the short volume on October 2, 2023, is at position #30 out of 3,570, which is above the upper 99%-quantile in rank order.

When considering the short ratio, October 2 ranks at position #15, or above the 99.5%-quantile in rank-order. This indicates that it is extremely unlikely that the volume of short selling on October 2 occurred by random chance. Moreover, it indicates that the short selling that day far exceeded the short selling that occurred during numerous other periods of crisis, including the recession following the financial crisis, the 2014 Israel-Gaza war, and the COVID-19 pandemic.

To consider whether the result is seasonal in nature—*i.e.*, driven by something related to the Jewish holidays—we plot short volume over September and October over the past five years:

Figure 9: Short Volume in EIS (September - October, 2018-23)

This figure plots short volume in EIS during September and October over the past five years, which captures the Jewish holidays.



As the figure shows, the short volume just before the October 7 attacks were by far above the short volume during the months of September and October in the five years prior. Similar results obtain when considering the short ratio: no other date during that period had a short ratio as high.

B. Israeli Public Companies Traded in Tel Aviv

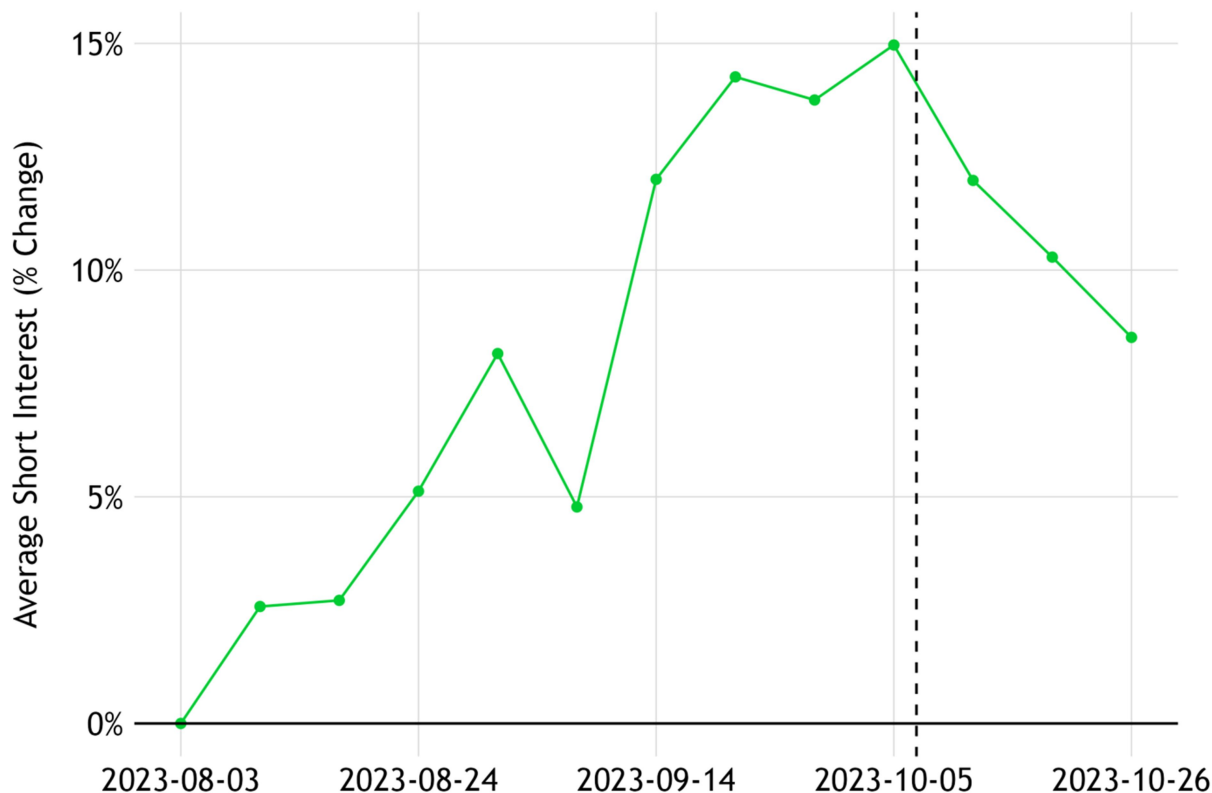
Most of the firms held by EIS, a U.S. exchange-traded fund, trade on the Tel Aviv Stock Exchange (see Appendix A). The TASE makes available detailed historical data on open short positions (short interest) on a weekly basis. We first evaluate whether Israeli-traded securities on the TASE experienced an increase in short positions in the week prior to the Hamas terrorist attacks in total, and then examine specific anecdotes, including firms held by EIS and other firms traded on the TASE. Next, we evaluate whether these changes predict returns on the day of the terrorist attack. Finally, we repeat this analysis before a different, but similarly substantial, decline in Israeli stock prices as a placebo test to consider whether these results are simply driven by ordinary trading patterns.

i. *Short Interest Before the October 7 Attack: Unconditional Averages*

An important preliminary question is whether TASE-traded securities, in the aggregate, experienced an increase in open short positions (short interest) leading up to the October 7 attack. The following figure plots the change in average short interest among TASE-traded securities from August 1 to October 26, 2023:

Figure 10: Average Short Interest in TASE-Listed Securities

This figure plots average short interest in TASE-listed securities over the period August 1 to October 26, 2023.



As Figure 10 shows, short interest in TASE-listed securities increased from the beginning of August and peaked on October 5, just two days before the attack. The sharpest increase occurred in the last two weeks of September, which was a time of relatively little activity in Israel due to the Jewish holidays, and thus cannot easily be explained by pointing to an external factor.

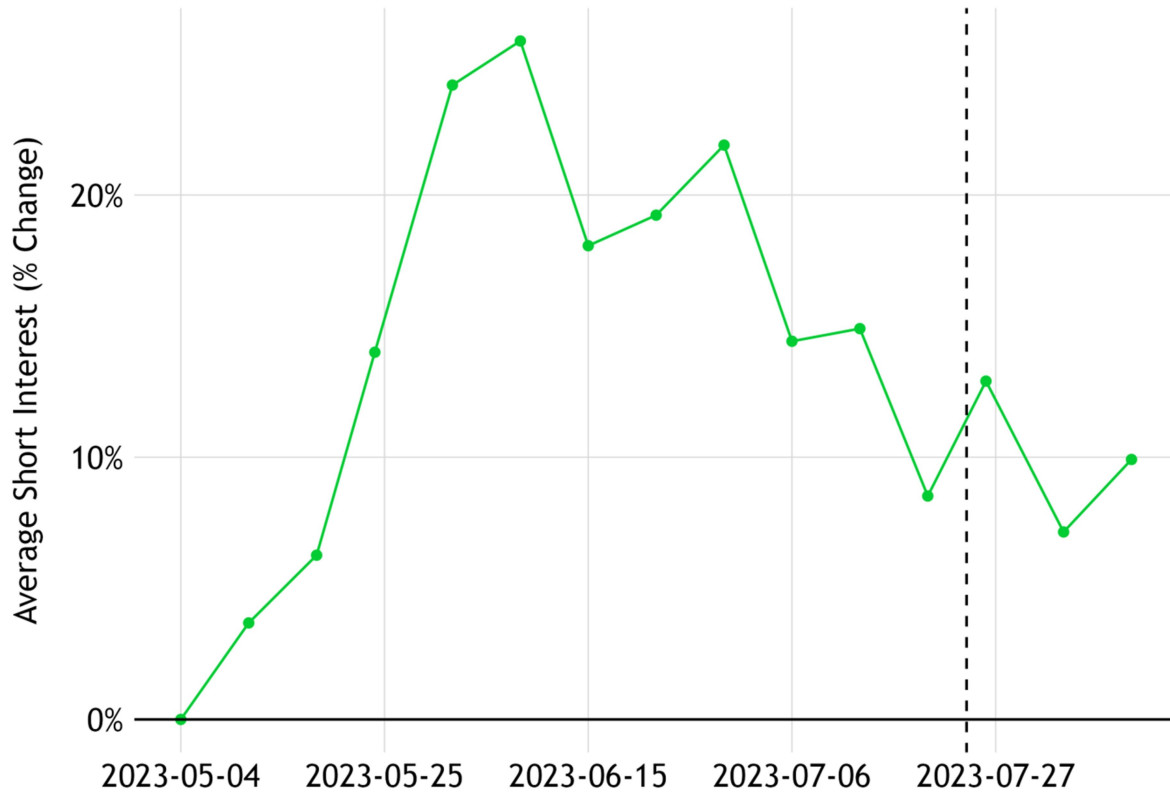
As anecdotal evidence that this increase was unusual, compare to July 24, 2023, the date when the Israeli parliament passed the first stage of Prime Minister Netanyahu’s controversial judicial reform. While this possibility had been anticipated by the market, the enactment was not entirely expected: from July 24 to July 25, the TA-35 index¹⁵ declined by 5.17% and the TA-125

¹⁵ The TA-35 index is an index of the largest 35 Israeli companies traded on the Tel Aviv Stock Exchange.

index by 5.30%. If the increase in short interest before the October 7 attack simply reflected negative market sentiment that occurred commonly, we might expect to see a similar decline before July 24. The following figure replicates the above calculation before July 24.

Figure 11: Average Short Interest Before July 24, 2023 (Placebo Test)

This figure plots average short interest in TASE-listed securities over the period May 4 to July 31, 2023.



As Figure 11 shows, short interest was largely decreasing over this period. It thus does not follow that increases in short interest are a typical predictor of major declines in the TASE.

ii. *Short Interest Before the October 7 Attack: Specific Companies*

The following table lists those securities on the TASE which experienced an increase in short interest from the week ending September 14, 2023 to the week ending October 5, 2023.¹⁶ As the table shows, many of these securities had sharp increases in short interest just before the attack.

[Table 1]

In some of these cases, the increases in short interest were quite pronounced. For example, Bank Leumi, one of the largest banks in Israel and a large constituent in the EIS exchange-traded fund, saw an increase of nearly 50% in short interest from September 14 to October 5, from 8.9 million shares to nearly 13.4 million shares. On October 8, Bank Leumi's share price declined by 8.79%. Bank Leumi's share price has since declined from a high of 3,185 agorot per share on October 4, 2023 to a low of 2,451 agorot on October 23—a decline of 734 NIS per share per share, or 23%. Multiplying per-share losses of 734 agorot by the 4.43 million new shares sold short over the September 14 to October 5 period yields profits (or approximates avoided losses) of 30 million NIS on that additional short selling, and 98 billion NIS on the total volume of short positions as of October 5.

To be sure, short interest in other TASE-listed securities also increased substantially. And though short interest declined for some firms, as shown in Figure 8, on balance short interest in TASE-listed firms increased substantially immediately prior to the attacks.

¹⁶ Israeli markets end trading on Thursdays, rather than Fridays. After we posted an initial draft of this article, TASE officials pointed out that the draft described the magnitudes of our findings in units of NIS rather than agorot, the currency in which TASE trades occur. We have revised the draft accordingly. We appreciate TASE's engagement with our study and welcome further feedback.

C. Israeli Public Companies Traded on U.S. Exchanges: Short-Dated Options

Several Israeli public companies trade on U.S. exchanges, either with dual-listed common stock or through American Depository Receipts.¹⁷ For much of the latter group, data regarding short volume and short interest are readily available. Moreover, for many of the larger firms in that group, their publicly traded shares are *optionable*, *i.e.*, market participants can purchase and sell call and put options, highly speculative derivative contracts that can yield a large payoff (relative to the cost of entering into the position) under certain conditions. The share prices of these companies also declined sharply in the wake of the Hamas attack.¹⁸

A call option is a contract that gives the holder the right (but not the obligation) to purchase shares of stock at a given price (known as the “strike price”) by a given date (known as the “expiration” date). A put option is a contract that gives the holder the right (but not the obligation) to sell shares of stock at a given price (known as the “strike price”) by a given date (known as the “expiration” date).

Options are derivatives, high-risk, high-reward bets that yield an outsized payoff relative to the cost of establishing the position. A trader who expects a stock price to decline can profit by purchasing a put option or selling short a call option, both of which yield a position that profits—sometimes quite substantially—as the stock price declines. While the options market is often much smaller than the market for the underlying equity, the potential for lucrative payoffs makes it an attractive forum for informed trading. Indeed, many SEC enforcement actions and DOJ criminal prosecutions have been brought on the basis of trading in options markets.

¹⁷ For a broader discussion of the unique similarities between Israeli and US corporate governance and securities regulation, see Baum & Solomon (2022).

¹⁸ <https://seekingalpha.com/news/4019125-us-traded-israeli-stocks-come-into-focus-as-conflict-between-israel-and-hamas-erupts>

Options contracts have expirations. That is, after a certain date, if the stock price is too far away from the strike price of an option, the value of the option will decay rapidly. For this reason, it is particularly risky to purchase options with expiration dates that are rapidly approaching—so-called “short-dated” options. If a sharp change in the price does not occur by the expiration date, these options are highly likely to expire worthless. The purchase of short-dated options, in and of itself, is a highly risky trade.

To examine trading in those options which were most likely to yield a profit immediately after October 7, 2023, we compare the daily open interest in Israeli options expiring on October 13, 2023—the first expiration date following the Hamas terrorist attack—to the daily open interest in options expiring after that date. To be sure, October 13 is not the *only* short-dated options contract that would yield a substantial profit if stock prices were to decline on October 7. It is simply the one that would yield the *greatest* profit if an unexpected event were to occur on October 7. Open interest is simply the volume of open option contracts in the market.¹⁹ To be clear, one cannot infer directionality from open interest alone. It is possible that either put or call contracts could yield “bearish” or “bullish” exposure to the stock (*i.e.*, profits when the stock price goes up or down, respectively), depending on the direction of exposure to the contract. Unfortunately, directionality of exposure is not observable in publicly available data.

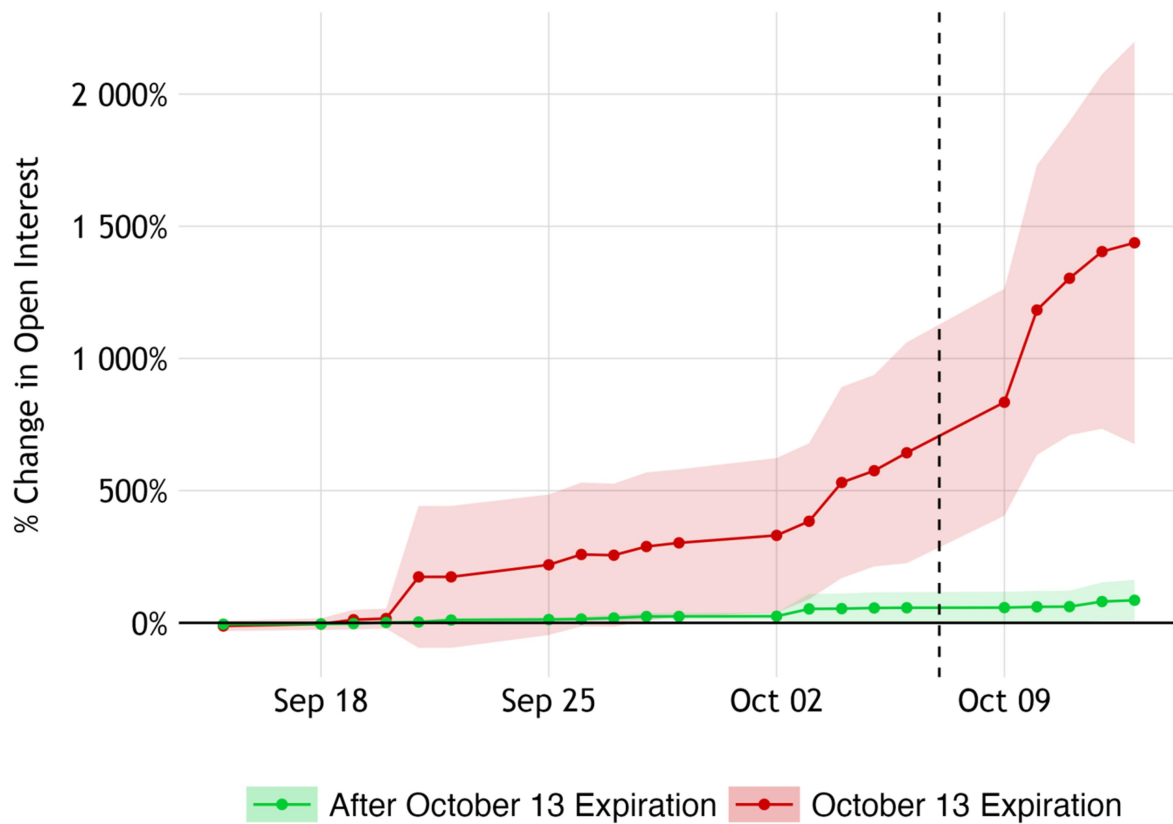
It is also the case that directionality is not the exclusive determinant of the value of an option because an unexpected increase in a stock price’s volatility option contract more valuable even when the directional exposure of the contract is inconsistent with a given realized price change. Nonetheless, all short-dated options—regardless of the directionality of the underlying

¹⁹ Because options are derivative contracts, they can be created by counterparties, who hedge their exposure to the opposite side of the contract through *delta-hedging*, which simply means buying and selling shares of stock in a manner that replicates the options exposure so as to eliminate their net exposure to the options contract. [cites]

exposure—will see a substantial decay in value as the expiration date of the option approaches. Thus, as a preliminary starting point, we examine open interest alone, with the important caveat that it is but a rough proxy for exposure that is tied to a given date. For each of these two groups (options expiring on October 13 and those expiring after October 13), we plot the percentage change in open interest from the beginning of the period through the attack and thereafter.

Figure 12: % Change in Open Interest, Israeli Companies Traded in the United States

This figure plots the average percentage change in the open interest of option contracts written on the common stock of Israeli companies traded in the United States. For both groups, to calculate the percentage change in open interest, we divided current open interest on each day by 1 plus the starting open interest, so that the denominator is nonzero.



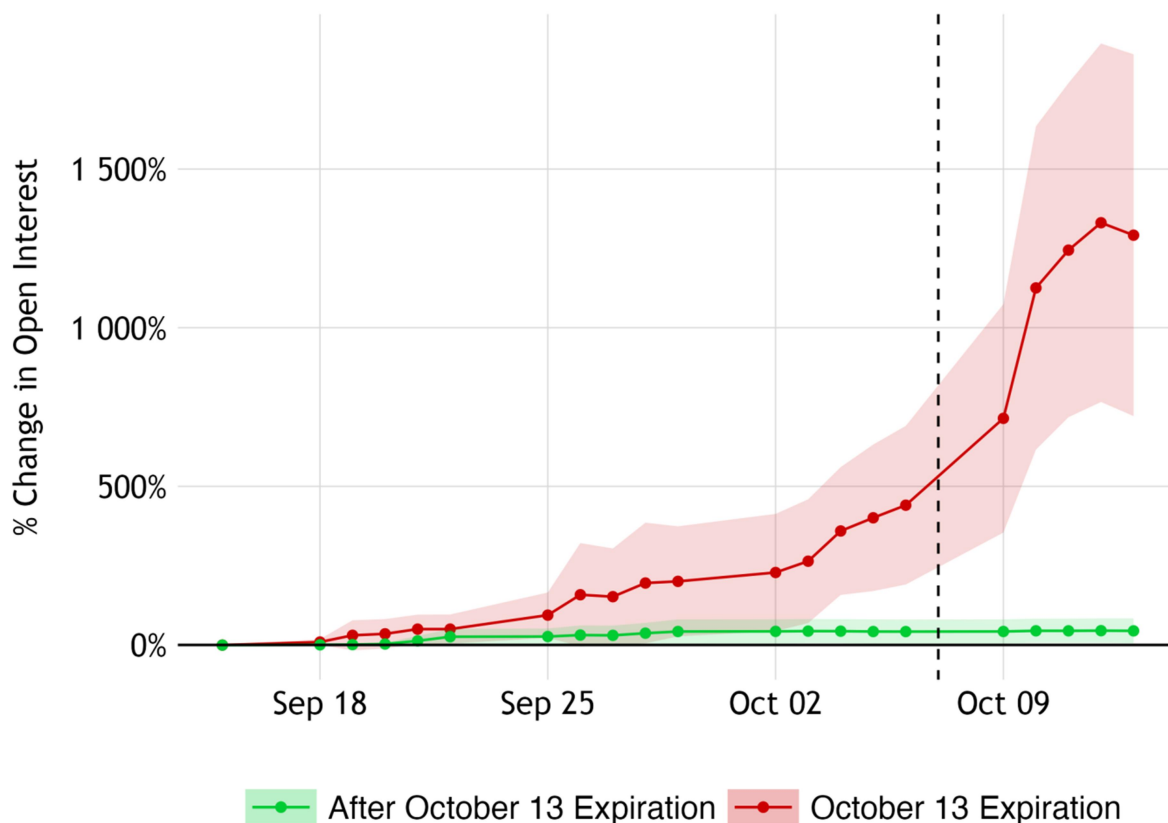
As Figure 12 shows, while the two groups show similar levels of open interest earlier in September, the two trends begin to diverge dramatically in the period leading up to the Hamas terrorist attack. The difference is economically meaningful in magnitude, though the confidence

intervals are wide because of the high variability in the percentage calculation. The use of a percentage eliminates one source of bias, because if we were to use simple linear differences, then firms with larger absolute volumes of open interest would dominate the comparison.

On the other hand, percentage calculations can be biased by base effects, whereby large differences against small baselines end up biasing the results. To examine whether that is driving these results, we re-estimate Figure 12 but limit only to those option contracts with initial open interest between 100 and 500 contracts (*i.e.*, to avoid those that are abnormally small—yielding a percentage gain that is large-skewed—as well as those that are abnormally large—yielding a percentage gain that is small-skewed). In this sample, the average open interest in the initial period (from which the percentage calculation is derived) is virtually the same—264 contracts for long-dated options and 276 for short-dated options, a difference that is not statistically significant.

Figure 13: % Change in Open Interest in Options on Israeli Companies Traded in the United States (Matched on Initial Open Interest)

This figure plots the average percentage change in the open interest of option contracts written on the common stock of Israeli companies traded in the United States, among a sample of options contracts that is matched on initial open interest to avoid introducing distortions arising from base effects. For both groups, to calculate the percentage change in open interest, we divided current open interest on each day by 1 plus the starting open interest, so that the denominator is nonzero. In this sample, the average open interest in the initial period (from which the percentage calculation is derived) is virtually the same—264 contracts for long-dated options and 276 for short-dated options, a difference that is not statistically significant.



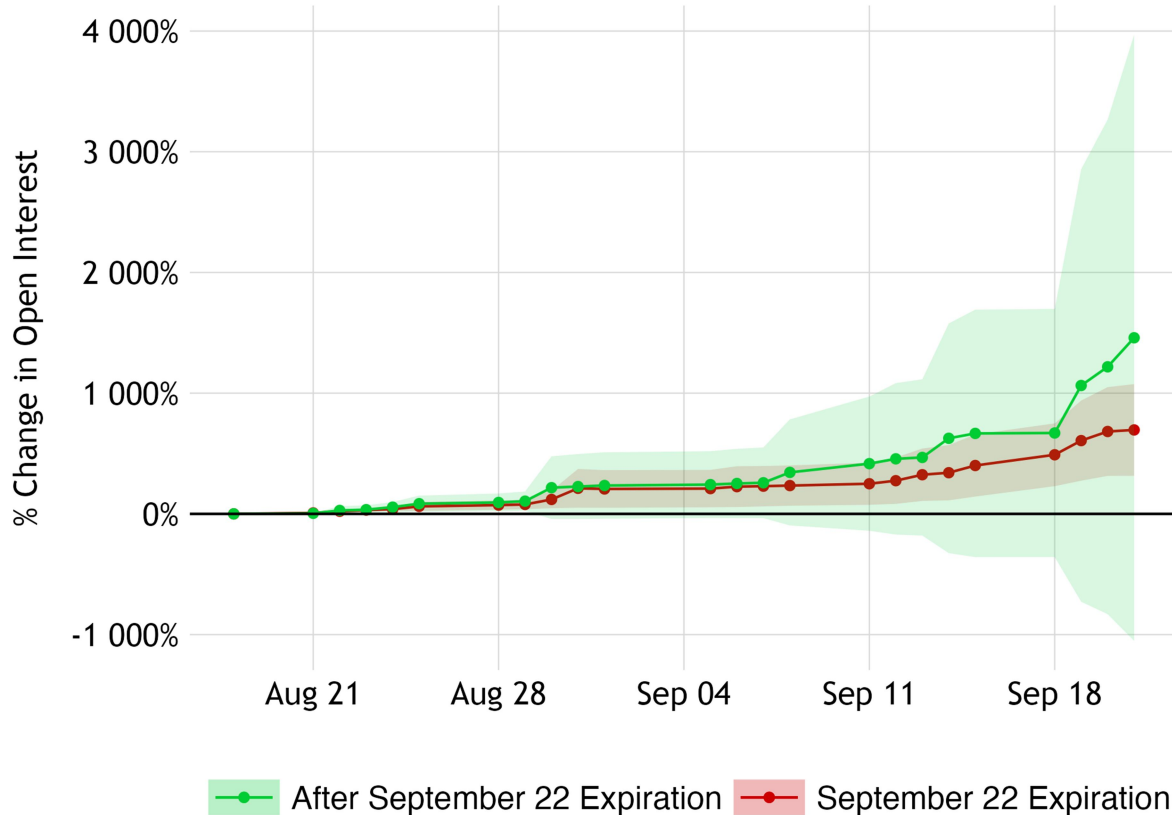
As Figure 13 shows, the pattern identified here only grows stronger and sharper when limiting to option contracts with similar levels of initial open interest.

Both figures show that open interest increases sharply after the October 7 attacks. That is likely because the attack itself indicates that prices will decline thereafter. That part of the graph is thus to be expected and not particularly indicative of informed trading.

It is useful at this juncture to compare these results to what might be obtained if we were to replicate this analysis for options expiring substantially in advance of the Hamas attack. To be sure, informed traders may not have been aware of the precise timing of the attack, thus potentially leading to the purchase of options expiring in just before the attack. Indeed, we find similar (albeit weaker) patterns for options expiring October 6 and to a lesser extent for those expiring on September 29. However, they would not make the same magnitude of a risky bet on options expiring after a non-event. As preliminary “placebo” evidence of this kind, we run the exact same analysis as above for options expiring on September 22—just three weeks earlier. The results are shown below.

Figure 14: Placebo Test on % Change in Open Interest, September 22, 2023

This figure replicates the analysis in Figure 12 for options expiring on September 22 instead of October 13, i.e., plots plotting the average percentage change in the open interest of option contracts written on the common stock of Israeli companies traded in the United States. For both groups, to calculate the percentage change in open interest, we divided current open interest on each day by 1 plus the starting open interest, so that the denominator is nonzero.



As Figure 14 shows, open interest increases over time for options expiring September 22 and those expiring after September 22. However, there is no systematic difference in the trend between the two groups, and in fact more contracts are opened for options expiring after September 22.

Next, we examine individual options transactions to determine whether the overall patterns identified in the prior Section were driven by block trades. While the literature on informed trading (e.g., Kyle (1985)) suggests that informed traders are likely to attempt to

disguise their trading in liquid markets, options markets are relatively illiquid, so it can be advantageous to arrange a large block trade with a market maker at a competitive price rather than crossing a large bid/ask spread.²⁰ Another benefit of examining block trades is that it helps to identify how many underlying market participants might have been driving the patterns identified in the prior Section, because each block trade is, by definition, performed by a single market participant. The following table shows large block trades in short-dated options written on Israeli companies in the U.S. markets over the period September 18 to October 5, 2023:

[Table 2]

As the table shows, there were some large block trades in short-dated put options on Israeli companies.

IV. DISCUSSION

Taken together, our findings offer strong evidence that informed traders profited by anticipating the events of October 7. In this Part, we discuss two implications of that evidence. First, we explain that—like prior work documenting informed trading prior to armed conflict—the trading we see occurs in a gap in the laws governing informed trading and illicit finance. since neither legal framework is designed to address such trading. Second, as a normative matter we consider whether law should regulate the kind of trading observed here. Although the normative basis for such regulation is contestable, we consider alternatives for lawmakers concerned about trading on the basis of nonpublic information about armed conflict.

20

A. U.S. Federal Securities Law

Federal securities law does not, of course, generally proscribe informed trading, favoring instead the information- and price-discovery enhancements such trading generates (Goshen & Parchimovsky (2006)). Instead, Section 10(b) of the Securities Exchange Act of 1934 and other federal statutes outlaw only informed trading accompanied by predicate indicia of fraud. The paradigmatic case is insider trading, where the information is obtained by breach of fiduciary obligation or deception of the information's source. But as its name suggests, the U.S. law of insider trading is a poor fit for trading patterns of the kind we document here.²¹

For one thing, its requirement of a predicate breach of fiduciary duty or deception, often by a corporate insider trading against her own company's investors, will often be unmet in cases involving information about coming military conflict. Certainly one can conceive circumstances in which the requirement could be met here, particularly if deception produced the information that led to the trades we study. But even if such deception was present here, the problems of proof related to showing deception are exacerbated by the context in which information about a coming attack could be obtained. These and other well-known features of insider-trading law,²²

²¹ To the degree that U.S. securities law prohibits “outsider” trading (Ayres & Choi, 2002)—for example, trading by “mere thieves” with no relationship to the company whose securities are being traded—circumstances where, for example, the trades we document were based on stolen information might be reached by federal securities law. But as many have pointed out, this is a “[f]ar more complex and challenging” theory of liability (Steinbuch, 2008) than the typical Section 10(b) case. Indeed, even those prepared to take a more expansive view of U.S. insider-trading law argue that the theft would need to involve “intentional deception” (Langevoort, 2022). Because not every theft involves such deception, even a view of federal securities law that prohibits certain “outsider” trading would not reach many of the possible factual circumstances that could have produced the trading we document.

²² Two recent securities-law developments are notable in this respect. First, to the degree that the trading we document reflects information obtained from the U.S. government, federal fraud statutes like 18 U.S.C. § 1348 can no longer be used to prosecute such cases in the view of the Department of Justice. *Compare United States v. Blaszcak*, 947 F.3d 19 (2d Cir. 2019) (government information is “property” for purposes of Section 1348) *with United States v. Blaszcak*, 56 F.4th 230 (2d Cir. 2022) (*Blaszcak II*) (noting the Department of Justice’s position, following *Kelly v. United States*, 140 S. Ct. 1565 (2020), that government information can no longer be considered “property” for purposes of a Section 1348 prosecution). After *Kelly* and *Blaszcak II*, prosecuting trading informed by government sources has become considerably more difficult.

we think, explain why the long literature documenting trading patterns anticipating military conflict has, to our knowledge, produced no enforcement actions under federal securities law.²³

For another, the kind of informed trading on future armed conflict we identify here is an especially elusive target for U.S. securities law because much of it, such as in the Israel ETF, occurs as “shadow” trading raising additional enforcement challenges. Previous literature identifies two kinds of shadow trading: first, trading in the shares of specific companies economically linked to the performance of a company about which the trader has information (Mehta, Reeb & Zhao (2021)), and second, trading in an ETF on the basis of information about one of the ETF’s constituent companies (Eglite, Staermans, Patel & Putnins (2023)). As to the first, although the SEC recently persuaded one federal judge that trading in securities comparable to those about which the trader has misappropriated information is actionable, the case is at an early stage and acknowledged to be relatively novel.²⁴ But the ETF trading we document falls into the second category, and although the literature documents substantial trading of this kind

Second, the extraterritorial scope of U.S. securities law, including Section 10(b), has become increasingly limited as a legal and practical matter. As a matter of law, the Supreme Court limited the reach of Section 10(b) to transactions taking place in U.S. territory or in securities listed on U.S. exchanges, *Morrison v. National Australia Bank*, 561 U.S. 247 (2010), although some courts have since held that the Dodd-Frank Act abrogated *Morrison* with respect to enforcement actions brought by the government, *SEC v. Scoville*, 913 F.3d 1204 (10th Cir. 2019). More importantly, as a practical matter those responsible for the trades we document may well reside in, and maintain their assets in, countries that shield defendants from extradition, prevent the seizure of personal assets, and hinder meaningful investigation of informed trading (Fried & Kamar (2023)).

²³ For example, as noted above Poteshman (2006), Thompson & Teh (2011) and Chesney, Crameri & Mancini (2015) document abnormal trades in option markets prior to the terrorist attacks on September 11, 2001. Although the SEC investigated those trades, it concluded that it was unable to “develop any evidence suggesting that anyone who had advance knowledge of the terrorist attacks . . . sought to profit from that knowledge by trading in United States securities markets” (SEC, 2004). Similarly, Aslam & Kang (2013) provide evidence that the Pakistani stock market contains information about future terrorist attacks. We are unaware of any securities-enforcement cases resulting from this evidence that markets anticipate future armed conflict.

²⁴ Moreover, in that case the SEC alleged that the trader misappropriated information from his employer—a fact that, although conceivably present here, would not describe myriad circumstances that could have led to the trading we document. In *SEC v. Panuwat*, No. 21-06322-WHO, 2022 WL 633306 (N.D. Cal. 2022), the SEC alleged that an employee of a public company used information about his employer’s acquisition to buy call options on the shares of a different, but economically similar, public company that predictably benefited from the acquisition’s announcement. Although the defendant described the SEC’s case as an “unprecedented expansion” of the U.S. securities laws, the trial judge denied his motion to dismiss in January 2022.

(Eglite, Staermans, Patel & Putnins (2023)), the SEC has brought very few insider-trading cases in the ETF context.²⁵ While some claim that the magnitude of such trading is overstated (Wigglesworth 2023) or that its illegality can be established (Levine 2023b), we note that such a case would still require the SEC to make the requisite predicate showing of fraud, a poor fit for addressing trading on anticipated terrorist attacks for the reasons described above.

In sum, federal securities law is generally ill-suited to regulating informed trading that anticipates future terrorist attacks. That is one reason why, despite literature documenting such trading, no securities-fraud cases featuring those allegations have been brought. And the trading we document in advance of the October 7 attacks occurred in a fashion especially unlikely to produce securities-law enforcement. In the next section, we consider whether the law governing illicit finance is better suited to regulating trading on terror.

B. The Law of Illicit Finance

Federal law endows the President, the Department of the Treasury, and its Office of Foreign Assets Control (OFAC) with significant authority to deprive terrorist organizations of funding (Baradarn, Findley, Nielson & Sharman (2014); Zarate (2013)). Recently, that authority has been exercised in a fashion that restricts investment in foreign capital markets. But because the principal purpose of the law in this area has long been to deprive adversaries of financial resources necessary to fund their activities, those restrictions only incidentally, if at all, address informed trading on future terrorist attacks.²⁶

²⁵ The SEC described as its “first” ETF insider-trading case a 2011 matter involving a Goldman, Sachs employee who learned about Goldman’s plans with respect to trading that particular ETF. *In re Spencer D. Mindlin and Alfred C. Mindlin, CPA*, Admin. Proc. 3-14557 (Sept. 21, 2011). That case involved misappropriation of information about shares of the ETF *itself* rather than its constituent companies.

²⁶ As explained in OFAC (2023a), today’s illicit-finance and sanctions regime is an outgrowth of Treasury’s “Office of Foreign Funds Control,” “established at the advent of World War II following the German invasion of Norway in

Consider, for example, OFAC's recent implementation of the President's Executive Orders prohibiting U.S. investment in the Russian Federation in light of the conflict in Ukraine. According to OFAC, these executive orders "prohibit U.S. persons from purchasing both new and existing debt and equity securities issued by an entity in the Russian Federation" (OFAC 2023b). But in light of OFAC's purpose to deprive such entities of further financing from American sources, rather than prescribing informed trading in the entities' securities, "the purchase of shares in a U.S. fund" holding such securities is "not considered a prohibited 'new investment' under OFAC's rules."²⁷ Moreover, U.S. financial institutions remain free to "clear and settle, or otherwise serve as market intermediaries in," transactions in these securities.

Similarly, OFAC's sanctions against Chinese military companies prohibit "purchases or sales of publicly traded securities of" "entities listed on the . . . Chinese Military-Industrial Complex Companies List" (OFAC 2021). In this case, the prohibition extends further, "prohibit[ing] U.S. persons from investing in U.S. or foreign funds, such as exchange-traded funds (ETFs) or other mutual funds, that hold publicly traded securities of a Chinese Military-Industrial Complex Company." Again, however, reflecting OFAC's objective of restricting the flow of marginal investment funds into such firms rather than restricting informed trading, U.S. intermediaries are permitted to engage in "clearing, execution, settlement, custody," and related services so long as they do not facilitate prohibited transactions (OFAC 2021).²⁸ And like all OFAC restrictions, its Russian Federation and China Military Industrial Complex prohibitions

1940," with an "initial purpose [of] preventing Nazi use of the occupied countries' holdings of foreign exchange and securities."

²⁷ For similar reasons, OFAC does not consider conversion of American Depository Receipts reflecting the shares of Russian Federation companies into actual shares of those companies as a "prohibited 'new investment.'"

²⁸ Indeed, OFAC permits U.S. broker-dealers and securities exchanges to "rely upon the information available to them in the ordinary course of business" in determining whether a particular transaction would facilitate prohibited purchases and sales in Chinese Military Complex Companies (OFAC, 2021).

apply only to “U.S. persons,” that is, a U.S. citizen, permanent resident alien, or entity organized under U.S. law.²⁹ These restrictions thus have limited extraterritorial application.

Although there is reason to think that these restrictions have imposed financing costs on publicly traded companies in jurisdictions subject to OFAC restrictions (Lin, 2016), for four reasons such restrictions are unlikely to meaningfully limit informed trading on future terror attacks. First, as noted above these restrictions are designed to impose costs on marginal investment rather than the secondary-market activity through which informed trading often occurs. Second, in light of that purpose OFAC and similar financing restrictions do not apply on the basis of information a trader may possess but instead generally prohibit purchases of securities. Third, because its focus is on limiting financial resources to those engaged in military conflict, OFAC’s restrictions are generally targeted not at securities markets where the victims of terror attacks reside, but instead the attacker’s markets, such that its prohibitions would not address the kind of short-selling we document in advance of October 7.

Finally, even if OFAC were to prohibit U.S. persons from trading in the securities of firms likely to be affected by a coming terror attack, such a prohibition could instead have the effect of encouraging others traders to discover and trade on information about the attack. The reason is that securities prices in those markets might be less informationally efficient, and thus there would be more arbitrage profits available to informed traders (Grossman & Stiglitz (1980), Kornhauser & Gordon (1985)). In light of that fact, lawmakers in the U.S. and abroad might ask whether regulating informed trading on coming military conflict is normatively desirable (assuming for present purposes that it is feasible). We briefly turn to some of the normative considerations that might guide the answer to that question.

²⁹ See 31 Code of Federal Regulations § 560.314 (2023).

C. Normative Considerations and Trading on Terror

As noted in the Introduction, among the foundational insights of modern finance is that informed traders help ensure the accuracy of securities prices and hence enhance efficiency (Grossman & Stiglitz (1980), Kornhauser & Gordon (1985), Goshen & Parchimovsky (2006)). Like any informed trading, trading on knowledge of a coming terror attack in theory could advance those objectives, and as explained above such trading is not meaningfully regulated by existing law. In light of the profoundly tragic toll of such attacks, however, normative considerations obviously suggest that society should encourage disclosure of such information rather than trading—that is, prevention of tragedy rather than profit from it. In this section, we briefly identify three normative considerations that policymakers should consider when evaluating whether and how to regulate trading on terror.

First, lawmakers should examine whether trading profits motivate investment in discovery of information about coming attacks. Even if policymakers conclude that such investments are desirable, however, we do not think those considerations would be decisive, because traders who have discovered a coming attack may choose not to reveal what they know in order to preserve their profits. Instead, lawmakers could consider incentives for traders to report the information to authorities, replacing trading profits with different rewards (although those mechanisms create their own incentives that lawmakers should consider, as noted in Galle (2020)). While the design of such a mechanism is beyond our scope, policies of this kind are not without precedent, particularly with respect to information about risk of armed attack.

Second, policymakers should examine the degree to which market activity can provide national-security and intelligence authorities with information about the probability of an attack (Hanson (2006), Yeh (2006)). On the one hand, stock-market signals are likely to be a noisy

military-intelligence mechanism; indeed, one might worry that attackers will have incentives to use markets to send false signals to resource-constrained analysts (although Hanson & Oprea (2008) contend that in equilibrium such manipulation merely encourages further discovery of information). On the other hand, to the degree that securities prices serve a useful function for intelligence analysts, regulating informed trading on attacks may make those signals less reliable. Lawmakers would do well to begin with an understanding of the empirical premise—whether and how military analysts do, in fact, use securities markets as a source of information.

A third relevant consideration is the degree to which trading profits may be used to fund further terrorist attacks. As explained in Mitts & Talley (2018), the prospect that arbitrage profits will be used for socially destructive activity meaningfully distinguishes the trading we study from the “garden-variety” informed trading defended by Manne (1966) as a matter of allocative efficiency. In the case of trading on terror, such profits might both finance the destructive activity on the margin and result in the adoption of a socially undesirable level of precautions. Among the benefits of investigating the trading we have documented here would be to identify, in general terms, the probability that the trading profits were used in this way.

Several of these considerations are incommensurable, and we do not purport to resolve them. We do note, however, that these are debates U.S. lawmakers have had before. In 2001, the Information Awareness Office of the United States Defense Advanced Research Project Agency (DARPA) developed an online prediction market allowing trading of futures contracts based on political developments in the Middle East. The project was derided by several U.S. Senators as facilitating “betting on terrorism” and “trading in death” and shut down (Daschle, 2003). Academics who helped develop those markets have since lamented that political considerations led policymakers to deprive the intelligence community of an important tool to fight terrorism

(Weijers & Richardson (2014)). Efforts to revive that project were derided as insensitive to the human toll of terrorism and the moral hazard that could be created by trading on coming attacks.

But we have provided suggestive evidence that trading on terror occurs through informed trading in securities markets. To the degree that such trading is repugnant “betting on terrorism,” as lawmakers argued in 2003, our evidence indicates that it continues today in the form of unregulated trading informed by knowledge of coming attacks. As a functional matter, it is hard to distinguish between the trading patterns we observe and the project that so outraged lawmakers twenty years ago. We hope our study shines light on the continued existence of such trading and encourages lawmakers to engage with the difficult questions it raises.

TABLES

Table 1: TASE-Listed Securities With Increase in Short Interest

This table lists securities listed on the Tel Aviv Stock Exchange which experienced an increase in short interest from September 14, 2023 to October 5, 2023.

Symbol	Company	Index	Short Interest (Shares)		% Difference	Price Change on October 8
			As of October 5, 2023	As of September 14, 2023		
GNRS	GENERATION CAP	TA-90	22,964,230	14,460,466	58.81%	-9.84%
SLARL	SELLA REAL EST	TA-90	2,493,166	1,589,440	56.86%	-10.81%
LUMI	LEUMI	TA-35	13,387,467	8,958,077	49.45%	-8.79%
NVLG	NOVOLOG	TA-90	6,021,527	4,329,853	39.07%	-8.12%
ENRG	ENERGIX	TA-35	5,323,841	4,067,291	30.89%	-8.04%
PTBL	PROPERT & BUIL	TA-90	290,298	229,660	26.40%	-15.45%
AURA	AURA	TA-90	4,433,501	3,540,826	25.21%	-11.50%
MTRN	MAYTRONICS	TA-90	835,877	675,098	23.82%	-5.00%
ELCRE	ELECTRA REAL E.	TA-90	523,770	423,280	23.74%	-7.07%
INRM	INROM CONST	TA-90	1,200,762	975,024	23.15%	-11.84%
ARGO	ARGO PROP.	TA-90	566,815	462,204	22.63%	-9.87%
ISTA	ISSTA	TA-90	188,662	156,221	20.77%	-15.19%
HLAN	HILAN	TA-90	253,703	213,635	18.76%	-4.86%
RATI	RATIO PU	TA-90	6,811,180	5,867,305	16.09%	-6.96%
ORL	BAZAN	TA-90	31,470,011	27,398,221	14.86%	-8.72%
ECP	ELECTRA CO PR	TA-90	193,548	168,699	14.73%	-10.38%
TRPZ	TURPAZ	TA-90	1,873,561	1,647,601	13.71%	-6.30%
EQTL	EQUITAL	TA-90	159,481	140,568	13.45%	-14.42%
LAPD	LAPIDOTH CAP.	TA-90	578,972	514,267	12.58%	-12.30%
NOFR	NOFAR ENERGY	TA-90	399,455	359,932	10.98%	-13.48%
DIFI	DIRECT FINANCE	TA-90	31,431	28,565	10.03%	-10.43%

LPSN	LIVEPERSON	TA-90	813,668	753,301	8.01%	-8.09%
TASE	TASE	TA-90	911,925	849,271	7.38%	-8.04%
AZRM	AZORIM	TA-90	2,832,602	2,647,193	7.00%	-11.23%
MNRT	MENIVIM REIT	TA-90	8,089,961	7,568,199	6.89%	-4.94%
PRSK	PRASHKOVSKY	TA-90	138,118	130,047	6.21%	-9.99%
DNYA	DANYA CEBUS	TA-90	111,010	104,600	6.13%	-8.57%
RTLS	RETAILORS	TA-90	228,037	215,156	5.99%	-6.15%
YHNF	YOCHANANOF	TA-90	85,499	81,197	5.30%	-5.68%
OPCE	OPC ENERGY	TA-35	1,984,846	1,885,304	5.28%	-8.39%
MGDL	MIGDAL INSUR.	TA-90	4,617,887	4,387,421	5.25%	-10.88%
SBEN	SHIKN&BINUI ENE	TA-90	3,701,124	3,526,275	4.96%	-9.45%
CLIS	CLAL INSURANCE	TA-90	1,771,309	1,702,567	4.04%	-8.62%
MSKE	MESHEK ENERGY	TA-90	5,913,003	5,689,626	3.93%	-7.86%
NVPT	NAVITAS PTRO PU	TA-90	649,158	625,014	3.86%	-5.57%
ONE	ONE TECHNOLOGI	TA-90	681,925	657,561	3.71%	-5.70%
ISRA	ISRAMCO PU	TA-90	12,305,385	11,874,324	3.63%	-7.91%
VRDS	VERIDIS	TA-90	715,288	693,034	3.21%	-7.72%
PHOE	PHOENIX	TA-35	2,219,368	2,155,666	2.96%	-9.07%
ILCO	ISRAEL CORP	TA-35	48,797	47,497	2.74%	-4.43%
BIG	BIG	TA-35	229,397	223,485	2.65%	-10.03%
ELTR	ELECTRA	TA-35	36,436	35,553	2.48%	-12.00%
FTAL	FATTAL HOLD	TA-90	138,922	136,060	2.10%	-8.51%
ENOG	ENERGEAN	TA-35	1,695,839	1,661,654	2.06%	-8.12%
ESLT	ELBIT SYSTEMS	TA-35	296,306	290,369	2.04%	-3.20%
CEL	CELLCOM	TA-90	2,040,354	2,002,896	1.87%	-6.90%
DIMRI	DIMRI	TA-90	366,405	359,911	1.80%	-10.67%
AFRE	AFRICA RESIDENC	TA-90	186,813	183,546	1.78%	-10.77%
MZTF	MIZRAHI TEFAHOT	TA-35	6,485,800	6,377,245	1.70%	-8.78%

MVNE	MIVNE	TA-35	6,744,818	6,638,683	1.60%	-10.09%
MTRX	MATRIX	TA-90	327,800	322,652	1.60%	-5.48%
BLSR	BLUE SQ REAL ES	TA-90	82,207	80,944	1.56%	-8.58%
HARL	HAREL	TA-35	2,322,008	2,290,256	1.39%	-9.44%
MGOR	MEGA OR	TA-90	1,167,571	1,151,654	1.38%	-12.21%
ARPT	AIRPORT CITY	TA-35	1,698,544	1,677,033	1.28%	-9.64%
ACRO	ACRO KVUT	TA-90	759,554	750,629	1.19%	-12.00%
SPNS	SAPIENS	TA-90	266,842	264,645	0.83%	-3.81%
ICL	ICL	TA-35	13,685,465	13,588,367	0.71%	-2.58%
SPEN	SHAPIR ENG	TA-35	3,377,439	3,355,973	0.64%	-10.09%
DLEKG	DELEK GROUP	TA-35	123,559	122,805	0.61%	-13.00%
AZRG	AZRIELI GROUP	TA-35	1,267,780	1,261,315	0.51%	-10.53%
FIBI	FIBI BANK	TA-35	1,972,672	1,963,104	0.49%	-6.82%
NVMI	NOVA	TA-35	716,470	715,311	0.16%	-0.33%
ISCN	ISRAEL CANADA	TA-90	4,665,375	4,658,820	0.14%	-11.08%
SKBN	SHIKUN & BINUI	TA-35	6,393,504	6,390,776	0.04%	-12.58%

Table 2: Block Transactions in Israeli Company Short-Dated Options

This table shows selected block trades in options written on Israeli companies in the U.S. markets over the period September 18 to October 5, 2023 for contracts expiring on October 13, 2023.

Seq. No.	Symbol	Trade Time	Put/Call	Expiration Date	Strike Price	Quantity (x100)	Trade Price	Price on 10/9	P&L
343121427	SEDG	9/22/23 9:48:06 AM	P	10/13/23	135	125	\$5.60	\$15.85	\$128,125
340147895	SEDG	9/22/23 9:47:57 AM	P	10/13/23	135	124	\$5.60	\$15.85	\$127,100
671567943	SEDG	9/27/23 10:04:33 AM	P	10/13/23	130	200	\$5.00	\$11.10	\$122,000
4281704721	SEDG	9/25/23 3:08:26 PM	P	10/13/23	129	115	\$4.50	\$10.25	\$66,125
1162103899	SEDG	9/26/23 10:35:18 AM	P	10/13/23	129	131	\$5.60	\$10.25	\$60,915
1552893599	SEDG	9/27/23 11:04:35 AM	P	10/13/23	130	90	\$5.10	\$11.10	\$54,000
340147900	SEDG	9/22/23 9:47:57 AM	P	10/13/23	135	51	\$5.60	\$15.85	\$52,275
238170719	SEDG	9/28/23 9:41:03 AM	P	10/13/23	126	119	\$4.10	\$7.60	\$41,650
4281704722	SEDG	9/25/23 3:08:26 PM	P	10/13/23	129	67	\$4.50	\$10.25	\$38,525
1097834946	SEDG	9/26/23 10:31:06 AM	P	10/13/23	129	83	\$5.70	\$10.25	\$37,765
340143102	SEDG	9/22/23 9:47:57 AM	P	10/13/23	135	31	\$5.60	\$15.85	\$31,775
3030917000	TEVA	9/28/23 12:31:36 PM	P	10/13/23	10.5	100	\$ 0.40	\$ 2.05	\$ 16,450
1497901527	TEVA	10/3/23 3:44:38 PM	P	10/13/23	9.5	141	\$ 0.16	\$ 1.07	\$ 12,761
1497901532	TEVA	10/3/23 3:44:38 PM	P	10/13/23	9.5	139	\$ 0.16	\$ 1.07	\$ 12,580

APPENDIX A: EIS HOLDINGS AS OF OCTOBER 27, 2023

The following table lists the holdings of the iShares MSCI Israel ETF as of October 27, 2023. Data are provided by Blackrock and are made publicly available at the following website: <https://www.ishares.com/us/products/239663/ishares-msci-israel-capped-etf>.

Ticker	Name	Sector	Market Value	Weight (%)	Notional Value	Shares	Price	Exchange
CHKP	CHECK POINT SOFTWARE TECHNOLOGIES	Information Technology	9,367,263.36	8.68	9,367,263.36	70,707.00	132.48	NASDAQ
NICE	NICE LTD	Information Technology	7,396,256.49	6.85	7,396,256.49	47,798.00	154.74	Tel Aviv Stock Exchange
LUMI	BANK LEUMI LE ISRAEL	Financials	7,048,561.50	6.53	7,048,561.50	1,159,531.00	6.08	Tel Aviv Stock Exchange
TEVA	TEVA PHARMACEUTICAL INDUSTRIES ADR	Health Care	6,999,628.76	6.48	6,999,628.76	846,388.00	8.27	New York Stock Exchange Inc.
POLI	BANK HAPOALIM BM	Financials	6,615,008.15	6.13	6,615,008.15	959,729.00	6.89	Tel Aviv Stock Exchange
CYBR	CYBER ARK SOFTWARE LTD	Information Technology	4,970,071.04	4.6	4,970,071.04	31,552.00	157.52	NASDAQ
DSCT	ISRAEL DISCOUNT BANK LTD	Financials	3,944,397.27	3.65	3,944,397.27	934,504.00	4.22	Tel Aviv Stock Exchange
ESLT	ELBIT SYSTEMS LTD	Industrials	3,720,083.34	3.45	3,720,083.34	20,102.00	185.06	Tel Aviv Stock Exchange
MZTF	MIZRAHI TEFAHOT BANK LTD	Financials	3,385,809.03	3.14	3,385,809.03	116,666.00	29.02	Tel Aviv Stock Exchange
WIX	WIX.COM LTD	Information Technology	3,257,169.96	3.02	3,257,169.96	40,786.00	79.86	NASDAQ
ICL	ICL GROUP LTD	Materials	2,822,922.24	2.61	2,822,922.24	584,610.00	4.83	Tel Aviv Stock Exchange
GLBE	GLOBAL E ONLINE LTD	Consumer Discretionary	2,236,628.50	2.07	2,236,628.50	68,294.00	32.75	NASDAQ
MNDY	MONDAYCOM LTD	Information Technology	2,057,774.88	1.91	2,057,774.88	16,394.00	125.52	NASDAQ
NVMI	NOVA LTD	Information Technology	2,025,633.80	1.88	2,025,633.80	21,719.00	93.27	Tel Aviv Stock Exchange
TSEM	TOWER	Information	1,975,268.25	1.83	1,975,268.25	83,302.00	23.71	Tel Aviv Stock

	SEMICONDUCTOR LTD	Technology						Exchange
BEZQ	BEZEQ ISRAELI TELECOMMUNICATION CO	Communication	1,804,786.18	1.67	1,804,786.18	1,566,612.00	1.15	Tel Aviv Stock Exchange
FIBI	FIRST INTERNATIONAL BANK LTD	Financials	1,369,047.29	1.27	1,369,047.29	41,713.00	32.82	Tel Aviv Stock Exchange
AZRG	AZRIELI GROUP LTD	Real Estate	1,340,144.47	1.24	1,340,144.47	32,086.00	41.77	Tel Aviv Stock Exchange
CAMT	CAMTEK LTD	Information Technology	1,110,393.26	1.03	1,110,393.26	21,853.00	50.81	Tel Aviv Stock Exchange
ENLT	ENLIGHT RENEWABLE ENERGY LTD	Utilities	1,092,884.63	1.01	1,092,884.63	88,766.00	12.31	Tel Aviv Stock Exchange
INMD	INMODE LTD	Health Care	1,086,393.00	1.01	1,086,393.00	56,436.00	19.25	NASDAQ
PHOE	PHOENIX HOLDINGS LTD	Financials	1,054,837.60	0.98	1,054,837.60	133,898.00	7.88	Tel Aviv Stock Exchange
MLSR	MELISRON LTD	Real Estate	998,255.65	0.92	998,255.65	19,713.00	50.64	Tel Aviv Stock Exchange
MVNE	MIVNE REAL ESTATE LTD	Real Estate	986,445.94	0.91	986,445.94	484,232.00	2.04	Tel Aviv Stock Exchange
PERI	PERION NETWORK LTD	Communication	884,445.37	0.82	884,445.37	35,480.00	24.93	Tel Aviv Stock Exchange
SAE	SHUFERSAL LTD	Consumer Staples	824,539.83	0.76	824,539.83	200,711.00	4.11	Tel Aviv Stock Exchange
DLEKG	DELEK GROUP LTD	Energy	711,531.05	0.66	711,531.05	6,968.00	102.11	Tel Aviv Stock Exchange
AMOT	AMOT INVESTMENTS LTD	Real Estate	706,008.63	0.65	706,008.63	177,689.00	3.97	Tel Aviv Stock Exchange
STRS	STRAUSS GROUP LTD	Consumer Staples	699,431.09	0.65	699,431.09	39,632.00	17.65	Tel Aviv Stock Exchange
ARPT	AIRPORT CITY LTD	Real Estate	663,073.78	0.61	663,073.78	51,675.00	12.83	Tel Aviv Stock Exchange
ZIM	ZIM INTEGRATED SHIPPING SERVICES L	Industrials	635,275.64	0.59	635,275.64	72,686.00	8.74	New York Stock Exchange Inc.
ILCO	ISRAEL CORPORATION LTD	Materials	611,530.12	0.57	611,530.12	2,918.00	209.57	Tel Aviv Stock Exchange
BIG	BIG SHOPPING CENTERS LTD	Real Estate	602,911.26	0.56	602,911.26	9,289.00	64.91	Tel Aviv Stock Exchange
CLIS	CLAL INSURANCE ENTERPRISES LTD	Financials	576,108.52	0.53	576,108.52	50,819.00	11.34	Tel Aviv Stock Exchange

SPNS	SAPIENS INTERNATIONAL NV	Information Technology	570,269.53	0.53	570,269.53	22,967.00	24.83	Tel Aviv Stock Exchange
SPEN	SHAPIR ENGINEERING AND INDUSTRY LT	Industrials	544,840.08	0.5	544,840.08	108,166.00	5.04	Tel Aviv Stock Exchange
FVRR	FIVERR INTERNATIONAL LTD	Industrials	539,282.40	0.5	539,282.40	24,292.00	22.2	New York Stock Exchange Inc.
HARL	HAREL INSURANCE INVESTMENTS & FINA	Financials	532,948.07	0.49	532,948.07	87,532.00	6.09	Tel Aviv Stock Exchange
KRNT	KORNIT DIGITAL LTD	Industrials	524,480.18	0.49	524,480.18	37,814.00	13.87	NASDAQ
ALHE	ALONY-HETZ PROPERTIES AND INVESTME	Real Estate	522,661.56	0.48	522,661.56	115,261.00	4.53	Tel Aviv Stock Exchange
SKBN	SHIKUN AND BINUI LTD	Industrials	519,826.64	0.48	519,826.64	248,624.00	2.09	Tel Aviv Stock Exchange
NNDM	NANO DIMENSION SPONSORED ADR REPR	Information Technology	515,498.91	0.48	515,498.91	190,221.00	2.71	NASDAQ
PZOL	PAZ OIL CO LTD	Energy	502,540.28	0.47	502,540.28	7,653.00	65.67	Tel Aviv Stock Exchange
HLAN	HILAN LTD	Industrials	500,479.66	0.46	500,479.66	12,161.00	41.15	Tel Aviv Stock Exchange
ORL	OIL REFINERIES LTD	Energy	493,025.61	0.46	493,025.61	1,924,805.00	0.26	Tel Aviv Stock Exchange
RIT1	REIT REIT LTD	Real Estate	489,626.73	0.45	489,626.73	146,341.00	3.35	Tel Aviv Stock Exchange
ENRG	ENERGIX RENEWABLE ENERGIES LTD	Utilities	481,597.58	0.45	481,597.58	207,476.00	2.32	Tel Aviv Stock Exchange
ELTR	ELECTRA LTD	Industrials	460,261.68	0.43	460,261.68	1,597.00	288.2	Tel Aviv Stock Exchange
OPCE	OPC ENERGY LTD	Utilities	456,889.14	0.42	456,889.14	85,075.00	5.37	Tel Aviv Stock Exchange
FIBIH	FIBI BANK HOLDING LTD	Financials	445,128.79	0.41	445,128.79	13,442.00	33.11	Tel Aviv Stock Exchange
RDWR	RADWARE LTD	Information Technology	443,827.44	0.41	443,827.44	29,628.00	14.98	NASDAQ
FTAL	FATTAL HOLDINGS LTD	Consumer Discretionary	438,436.18	0.41	438,436.18	5,555.00	78.93	Tel Aviv Stock Exchange
ISCD	ISRACARD LTD	Financials	433,947.05	0.4	433,947.05	151,705.00	2.86	Tel Aviv Stock Exchange
MTRX	MATRIX IT LTD	Information	418,208.22	0.39	418,208.22	26,249.00	15.93	Tel Aviv Stock

		Technology						Exchange
FORTY	FORMULA SYSTEMS LTD	Information Technology	406,799.31	0.38	406,799.31	7,561.00	53.8	Tel Aviv Stock Exchange
EQTL	EQUITAL LTD	Energy	369,226.51	0.34	369,226.51	17,743.00	20.81	Tel Aviv Stock Exchange
RMLI	RAMI LEVI CHAIN STORES HASHIKMA MA	Consumer Staples	357,599.41	0.33	357,599.41	6,811.00	52.5	Tel Aviv Stock Exchange
TBLA	TABOOLA.COM LTD	Communication	347,133.84	0.32	347,133.84	100,911.00	3.44	NASDAQ
ONE	ONE SOFTWARE TECHNOLOGIES LTD	Information Technology	344,039.60	0.32	344,039.60	34,924.00	9.85	Tel Aviv Stock Exchange
PTNR	PARTNER COMMUNICATIONS LTD	Communication	341,796.09	0.32	341,796.09	106,446.00	3.21	Tel Aviv Stock Exchange
MTRN	MAYTRONICS LTD	Consumer Discretionary	335,592.84	0.31	335,592.84	37,562.00	8.93	Tel Aviv Stock Exchange
FOX	FOX WIZEL LTD	Consumer Discretionary	330,550.03	0.31	330,550.03	6,287.00	52.58	Tel Aviv Stock Exchange
ASHG	ASHTROM GROUP LTD	Industrials	329,435.81	0.31	329,435.81	34,225.00	9.63	Tel Aviv Stock Exchange
MMHD	MENORAH MIVTACHIM HOLDINGS LTD	Financials	314,369.46	0.29	314,369.46	16,276.00	19.31	Tel Aviv Stock Exchange
SMT	SUMMIT REAL ESTATE HOLDINGS LTD	Real Estate	296,156.13	0.27	296,156.13	30,933.00	9.57	Tel Aviv Stock Exchange
KEN	KENON HOLDINGS LTD	Utilities	291,603.57	0.27	291,603.57	16,197.00	18	Tel Aviv Stock Exchange
TASE	TEL AVIV STOCK EXCHANGE LTD	Financials	290,812.43	0.27	290,812.43	71,087.00	4.09	Tel Aviv Stock Exchange
ITRN	ITURAN LOCATION AND CONTROL LTD	Information Technology	288,959.16	0.27	288,959.16	11,494.00	25.14	NASDAQ
DIMRI	YH DIMRI CONSTRUCTION AND DEVELOPM	Real Estate	287,197.01	0.27	287,197.01	5,710.00	50.3	Tel Aviv Stock Exchange
MGDL	MIGDAL INSURANCE AND FINANCIAL HOL	Financials	286,166.28	0.27	286,166.28	321,091.00	0.89	Tel Aviv Stock Exchange
DANE	DANEL ADIR YEHOSHUA LTD	Industrials	276,852.04	0.26	276,852.04	4,151.00	66.7	Tel Aviv Stock Exchange
DELG	DELTA GALIL INDUSTRIES LTD	Consumer Discretionary	274,805.81	0.25	274,805.81	8,691.00	31.62	Tel Aviv Stock Exchange
SLARL	SELLA CAPTIAL REAL ESTATE LTD	Real Estate	270,449.86	0.25	270,449.86	164,854.00	1.64	Tel Aviv Stock Exchange

NGMS	NEOGAMES S A SA	Consumer Discretionary	257,248.60	0.24	257,248.60	10,108.00	25.45	NASDAQ
ARAD	ARAD INVESTMENT AND INDUSTRIAL LTD	Industrials	254,662.66	0.24	254,662.66	2,886.00	88.24	Tel Aviv Stock Exchange
CLBT	CELLEBRITE DI LTD	Information Technology	249,840.14	0.23	249,840.14	37,234.00	6.71	NASDAQ
RTLS	RETAILORS LTD	Consumer Discretionary	245,431.52	0.23	245,431.52	14,558.00	16.86	Tel Aviv Stock Exchange
RSKD	RISKIFIED LTD CLASS A	Information Technology	239,893.20	0.22	239,893.20	64,836.00	3.7	New York Stock Exchange Inc.
TARO	TARO PHARMACEUTICAL INDUSTRIES LTD	Health Care	236,758.86	0.22	236,758.86	7,059.00	33.54	New York Stock Exchange Inc.
NOFR	O.Y. NOFAR ENERGY LTD	Utilities	233,410.26	0.22	233,410.26	13,350.00	17.48	Tel Aviv Stock Exchange
MGOR	MEGA OR HOLDINGS LTD	Real Estate	222,826.15	0.21	222,826.15	17,825.00	12.5	Tel Aviv Stock Exchange
ISRS	ISRAS INVESTMENT COMPANY LTD	Real Estate	220,489.69	0.2	220,489.69	1,404.00	157.04	Tel Aviv Stock Exchange
ISCN	ISRAEL-CANADA LTD	Real Estate	218,611.97	0.2	218,611.97	113,659.00	1.92	Tel Aviv Stock Exchange
MGIC	MAGIC SOFTWARE ENTERPRISES LTD	Information Technology	192,837.76	0.18	192,837.76	20,287.00	9.51	Tel Aviv Stock Exchange
NNOX	NANO X IMAGING LTD	Health Care	187,760.18	0.17	187,760.18	37,291.00	5.04	NASDAQ
AURA	AURA INVESTMENTS LTD	Real Estate	187,234.16	0.17	187,234.16	96,290.00	1.94	Tel Aviv Stock Exchange
BLSR	BLUE SQUARE REAL ESTATE LTD	Real Estate	185,512.76	0.17	185,512.76	4,129.00	44.93	Tel Aviv Stock Exchange
DLEA	DELEK AUTOMOTIVE SYSTEMS LTD	Consumer Discretionary	184,295.80	0.17	184,295.80	43,714.00	4.22	Tel Aviv Stock Exchange
AFRE	AFRICA ISRAEL RESIDENCES LTD	Real Estate	184,228.79	0.17	184,228.79	4,754.00	38.75	Tel Aviv Stock Exchange
CEL	CELLCOM LTD	Communication	182,980.03	0.17	182,980.03	80,739.00	2.27	Tel Aviv Stock Exchange
AZRM	AZORIM INVESTMENT DEVELOPMENT AND	Consumer Discretionary	163,122.28	0.15	163,122.28	55,412.00	2.94	Tel Aviv Stock Exchange
ELCO	ELCO LTD	Industrials	159,259.76	0.15	159,259.76	7,140.00	22.31	Tel Aviv Stock Exchange
GCT	G CITY LTD	Real Estate	150,607.36	0.14	150,607.36	67,064.00	2.25	Tel Aviv Stock

								Exchange
WKME	WALKME LTD	Information Technology	148,014.75	0.14	148,014.75	16,575.00	8.93	NASDAQ
ARF	ASHDOD REFINERY LTD	Energy	141,987.18	0.13	141,987.18	7,621.00	18.63	Tel Aviv Stock Exchange
ELCRE	ELECTRA REAL ESTATE LTD	Real Estate	139,681.13	0.13	139,681.13	19,059.00	7.33	Tel Aviv Stock Exchange
INVZ	INNOVIZ TECHNOLOGIES LTD	Information Technology	134,514.12	0.12	134,514.12	97,474.00	1.38	NASDAQ
YHNF	YOCHANANOF LTD	Consumer Staples	134,514.12	0.12	134,514.12	3,811.00	35.3	Tel Aviv Stock Exchange
SCOP	SCOPE METALS GROUP LTD	Industrials	133,421.70	0.12	133,421.70	5,520.00	24.17	Tel Aviv Stock Exchange
DNYA	DANYA CEBUS LTD	Consumer Discretionary	130,984.56	0.12	130,984.56	5,873.00	22.3	Tel Aviv Stock Exchange
ACRO	KVUZAT ACRO LTD	Industrials	130,241.42	0.12	130,241.42	17,291.00	7.53	Tel Aviv Stock Exchange
ECP	ELECTRA CONSUMER PRODUCTS LTD	Consumer Discretionary	121,165.45	0.11	121,165.45	8,918.00	13.59	Tel Aviv Stock Exchange
NYAX	NAYAX LTD	Information Technology	118,545.33	0.11	118,545.33	6,194.00	19.14	Tel Aviv Stock Exchange
ILS	ILS CASH	Cash and/or Derivatives	118,150.08	0.11	118,150.08	482,023.00	24.51	-
TDRN	TADIRAN GROUP LTD	Consumer Discretionary	109,309.39	0.1	109,309.39	2,258.00	48.41	Tel Aviv Stock Exchange
SMWB	SIMILARWEB LTD	Information Technology	101,255.18	0.09	101,255.18	20,497.00	4.94	New York Stock Exchange Inc.
NFTA	NAPHTHA ISRAEL PETROLEUM CORP LTD	Energy	95,658.62	0.09	95,658.62	25,292.00	3.78	Tel Aviv Stock Exchange
PRSK	PRASHKOVSKY INVESTMENTS & CONSTRUC	Real Estate	90,440.87	0.08	90,440.87	5,503.00	16.43	Tel Aviv Stock Exchange
DORL	DORAL GROUP RENEWABLE ENERGY RESOU	Utilities	89,344.72	0.08	89,344.72	66,759.00	1.34	Tel Aviv Stock Exchange
NTML	NETO MALINDA TRADING LTD	Consumer Staples	80,030.85	0.07	80,030.85	8,858.00	9.03	Tel Aviv Stock Exchange
CRSM	CARASSO MOTORS LTD	Consumer Discretionary	71,493.57	0.07	71,493.57	24,490.00	2.92	Tel Aviv Stock Exchange

1696	SISRAM MEDICAL LTD	Health Care	68,730.04	0.06	68,730.04	105,200.00	0.65	Hong Kong Exchanges And Clearing Ltd
PTBL	PROPERTY & BLDG CORP LTD	Real Estate	65,451.09	0.06	65,451.09	2,261.00	28.95	Tel Aviv Stock Exchange
XTSLA	BLK CSH FND TREASURY SL AGENCY	Cash and/or Derivatives	60,000.00	0.06	60,000.00	60,000.00	1	-
ALTF	ALTSHULER SHAHAM FINANCIAL SERVICE	Financials	55,467.87	0.05	55,467.87	53,485.00	1.04	Tel Aviv Stock Exchange
EUR	EUR CASH	Cash and/or Derivatives	24,045.18	0.02	24,045.18	22,807.00	105.43	-
HKD	HKD CASH	Cash and/or Derivatives	10,050.59	0.01	10,050.59	78,611.00	12.79	-
SGAFT	CASH COLLATERAL EUR SGAFT	Cash and/or Derivatives	9,488.70	0.01	9,488.70	9,000.00	105.43	-
MEDN	MEHADRID LTD	Consumer Staples	18.41	0	18.41	1	30.69	Tel Aviv Stock Exchange
BCNV	BRACK CAPITAL NV	Real Estate	14.08	0	14.08	0	56.3	Tel Aviv Stock Exchange
AFPR	AFI PROPERTIES LTD	Real Estate	14.29	0	14.29	1	24.63	Tel Aviv Stock Exchange
GVYM	GAV-YAM LAND CORP LTD	Real Estate	0.47	0	0.47	0	5.23	Tel Aviv Stock Exchange
VGZ3	EURO STOXX 50 DEC 23	Cash and/or Derivatives	0	0	171,302.66	4	4,282.55	Eurex Deutschland
USD	USD CASH	Cash and/or Derivatives	-39,380.63	-0.04	-39,380.63	-39,381.00	100	-

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V. APPENDIX B: ADDITIONAL ANALYSIS

Figure 15: Short Volume in EIS, September 1 to October 6, 2023

This figure plots the total share volume of short sales in EIS reported to FINRA and the exchanges. We are grateful to Tom Ronk for providing comprehensive short volume data.

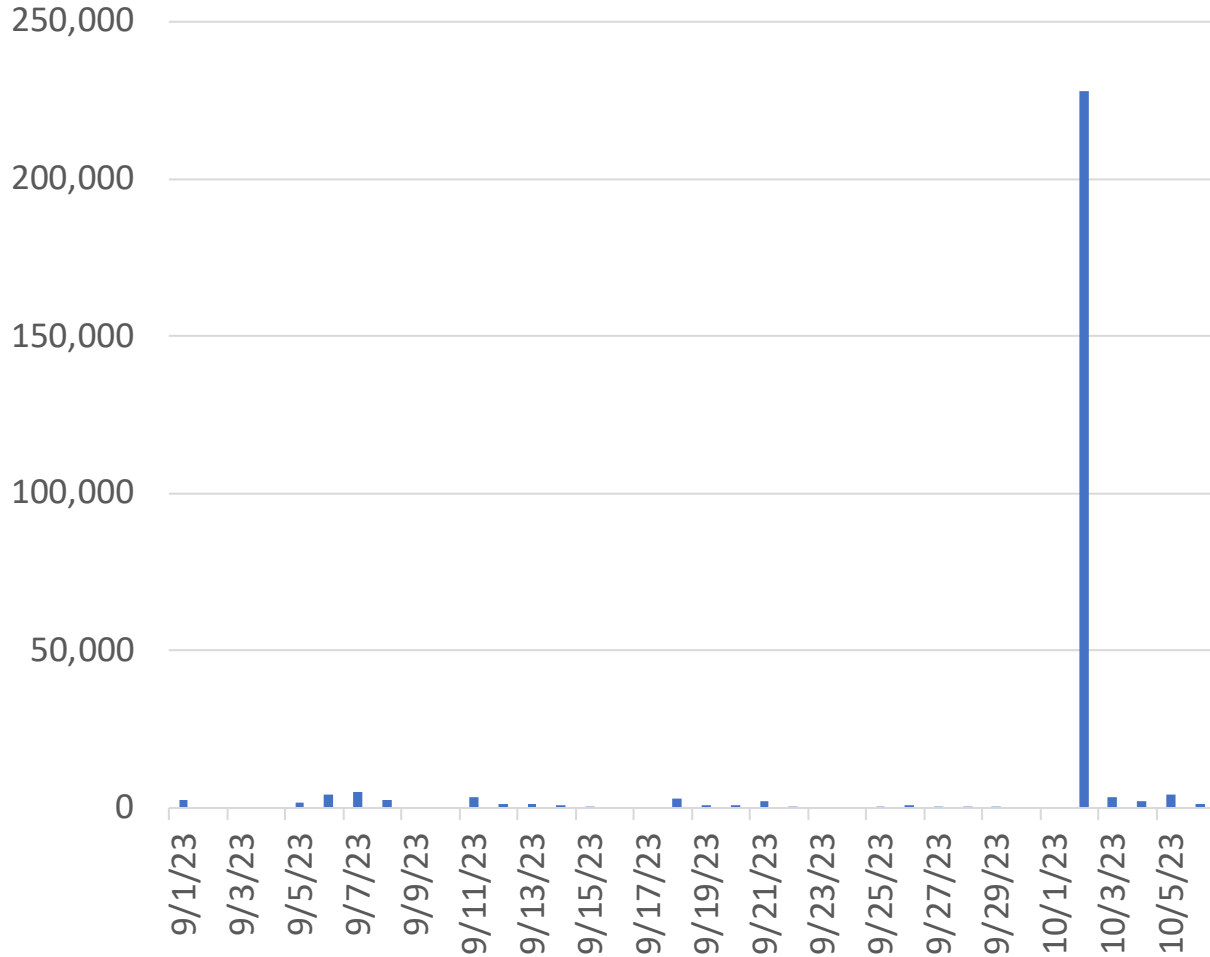
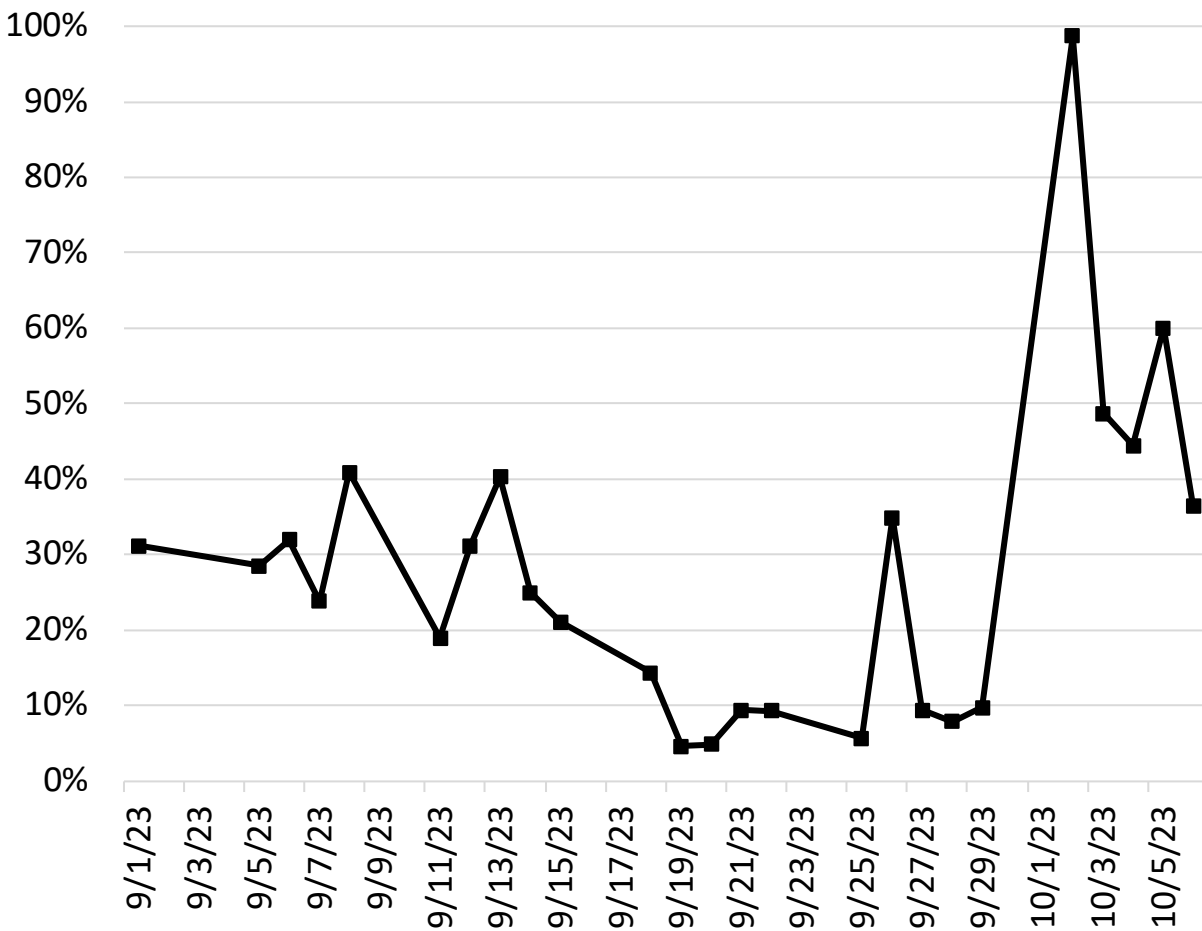


Figure 16: Short Volume in EIS Divided by Total Volume, September 1 to October 6, 2023

This figure plots the total share volume of short sales in EIS divided by the total share volume reported to FINRA and exchanges, over the period September 1 to October 6, 2023.



i. Placebo Test: July 24, 2023

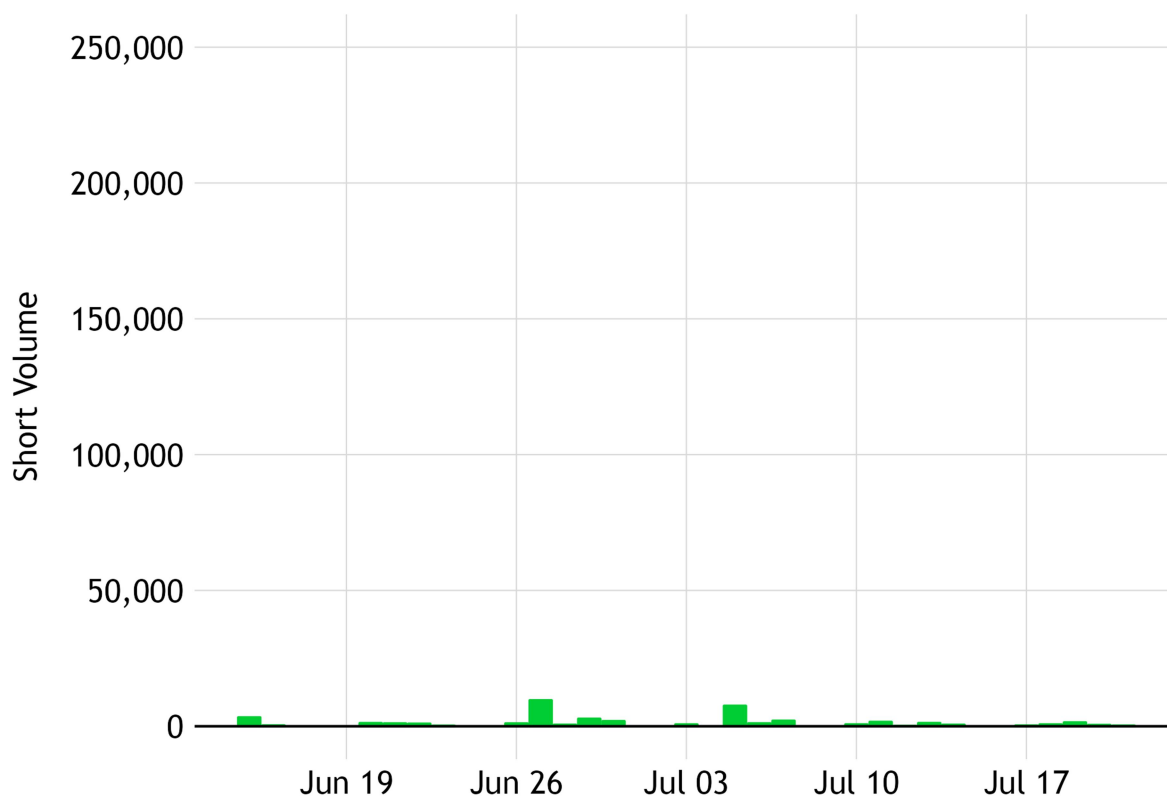
We examine the period leading up to July 24, 2023, the date when the Israeli parliament (somewhat unexpectedly) passed the first stage of Prime Minister Netanyahu’s controversial judicial reform. This was somewhat unexpected, as evidenced by the price reaction: from the peak on July 19 to the trough on July 25, EIS declined by 6.4%, a similar magnitude to the

decline on October 9. We first present the same analysis of short volume and short ratios leading up to the July 24 decision. We then consider securities lending utilization (short interest).

The following figure presents short volume leading up to July 24, 2023, with the y-axis aligned to the y-axis in Figure 1 for comparability.

Figure 17: Short Volume in EIS, June 15 – July 24, 2023 (Placebo Test)

The following figure shows off-exchange short volume in EIS as reported to FINRA from June 15 to July 24, 2023. The y-axis is aligned to the y-axis in Figure 1 for comparability.



As Figure 17 shows there was no peak in short volume preceding the July 24, 2023 decline in the share price. Similarly, there was no peak in the short ratio just before that decline, though it had previously reached levels above 75%—not as high as it reached just before the October 7 attack.

Figure 18: Short Ratio in EIS, June 15 - July 24, 2023 (Placebo Test)

The following figure shows the total share volume of short sales in EIS divided by the total share volume of off-exchange trades reported to FINRA’s trade reporting systems on a “consolidated NMS” basis from June 15 to July 24, 2023. The y-axis is aligned to the y-axis in

Figure 2 for comparability.

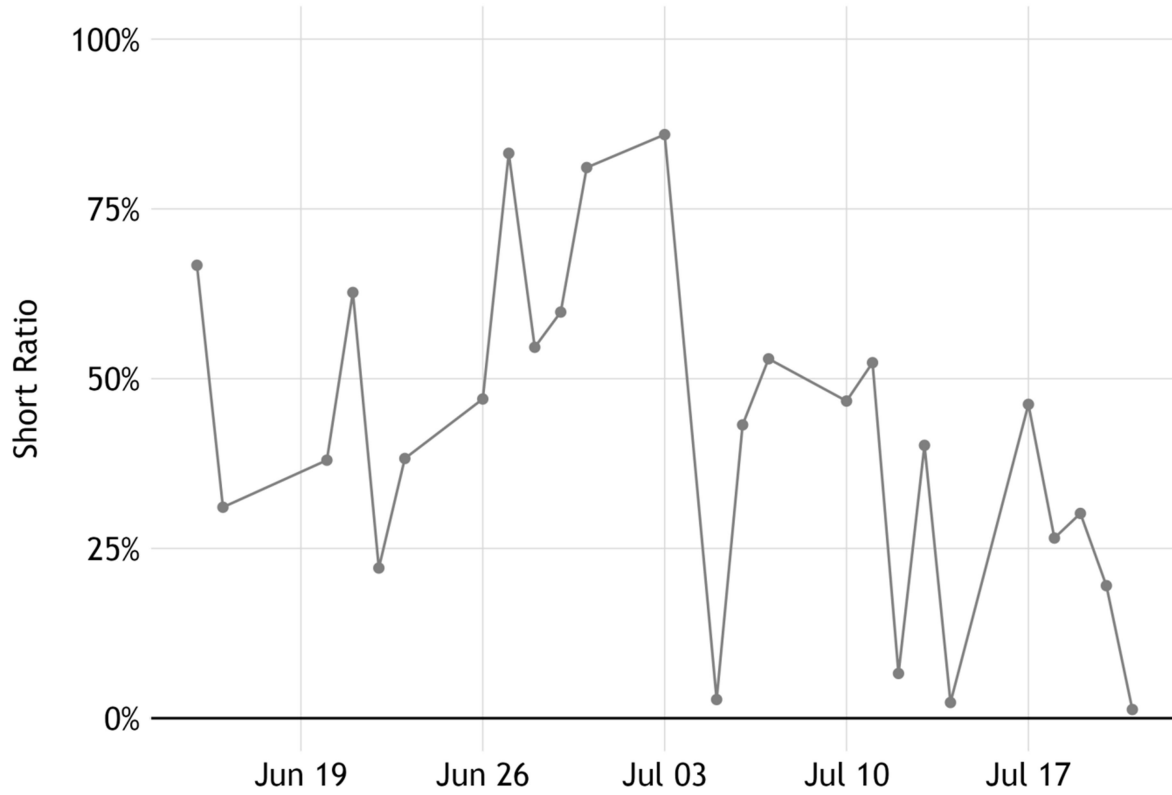


Figure 18 shows that even though the FINRA short ratio in EIS occasionally climbed above 75% before July 24, the short ratio observed on October 2 was exceptional. We next consider short interest as measured by securities lending utilization.

Figure 19: Utilization in EIS, June 15 - July 24, 2023 (Placebo Test)

This figure plots the daily utilization rate and average duration of open securities loans in EIS from June 15 to July 24, 2023. Because securities loans are generally settled at the time of the underlying short sales, in contrast to previous figures these dates reflect trading activity that occurred two trading days before.



As Figure 19 shows, there was no increase in utilization (short interest) immediately prior to the judicial reform on July 24, 2023. Both utilization and average short duration were basically flat from the end of June through the end of July.