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Terrorist Attacks, Investor Sentiment, and the Pricing of Initial Public Offerings

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Terrorist Attacks, Investor Sentiment, and the Pricing of Initial Public Offerings

Abstract

Using terrorist attacks as exogenous shocks to investor sentiment, we study the impact of investor sentiment on initial public offering (IPO) pricing. IPOs listed within the 30-day period following terrorist attacks, on average, experience lower first-day returns. The documented impact of terrorist attacks is magnified when there is greater IPO valuation uncertainty and when the terrorist attacks are more salient to investors, while mitigated for IPOs "certified" by reputable intermediaries. We also show that the affected IPOs, on average, have more pessimistic media tone in the post-attack/pre-listing day period. The affected IPOs also tend to have lower levels of price revisions, subscriptions, primary share revisions, and total proceeds. Collectively, our findings underscore the salience of investor sentiment in shaping IPO outcomes.

Keywords: Terrorist attacks; investor sentiment; IPO pricing

JEL Classification: G10; G11; G14

1. Introduction

The initial public offering (IPO) underpricing phenomenon—the tendency of IPO share prices to experience a substantial upward jump on the first day of trading—has received ongoing attention from finance scholars, practitioners, and regulators. The striking empirical regularity of IPO underpricing has given rise to several theoretical models of its potential mechanisms.[1] Within this literature, a growing stream of research has been advancing investor sentiment as a salient factor in shaping the pricing of new issues (Derrien 2005; Cornelli et al. 2006; Ljungqvist et al. 2006). Sentiment-based IPO pricing theories assume two types of investors: informed institutional investors and sentiment-driven bullish retail investors. The investment banker partially adjusts the offer price to reflect the bullish sentiment of retail investors, allowing the issuer to benefit from a higher valuation than appropriate, given the intrinsic value of the issue. In turn, institutional investors benefit from selling their allocations to retail investors, who have higher valuations. With the rise (fall) in retail investor bullishness, the difference between the offer price and the early aftermarket price increases (decreases). Therefore, sentiment-based theories of IPO pricing predict a positive relation between investor sentiment and IPO first-day returns.

The absence of stock price history and the informational opacity of new issues create a fertile setting for investor sentiment to influence IPO valuations (Ljungqvist 2007). Yet, there is a lack of consensus in the empirical literature on the role of investor sentiment in shaping IPO outcomes and the dynamics of the IPO market (Lowry et al. 2017), reflecting major empirical challenges associated with measuring investor sentiment. First, the vast majority of sentiment proxies are output based; that is, these proxies include measures of financial performance (the outputs of sentiment) to capture sentiment (Qui and Welch 2006).[2] This

[1] For extensive reviews of the literature, see Ljungqvist (2007), Ritter (2011) and Lowry et al. (2017).
[2] An alternative approach for gauging investor sentiment is to use investor surveys. However, the available data are very limited in terms of both scope and frequency and depend heavily on how the survey is designed (Zhou

"circularity" issue is particularly salient in the IPO setting, since IPO performance indicators (e.g., first-day returns, "grey market" prices and proxies for retail investor demand)—the outputs of investor sentiment—are commonly used as inputs in constructing investor sentiment proxies (e.g., Baker and Wurgler 2006, 2007; Derrien 2005; Cornelli et al. 2006; McLean and Zhao 2014; Huang et al. 2015). Second, prior research shows that investor sentiment proxies are strongly correlated with changes in economy-wide conditions and risk factors (Cherkes et al. 2009; Sibley et al. 2016), raising concerns regarding the information content and endogeneity of these proxies.[3] Third, prior studies (e.g., Lee et al. 1991; Loughran et al. 1994) provide evidence consistent with issuers strategically timing IPOs to coincide with periods of excessive optimism on the market, which could lead to substantial self-selection issues.

With the above caveats in mind, we study the impact of investor sentiment on IPO pricing using a research setting in which sentiment is exogenously induced ("primed"). We use the incidences of terrorist attacks in the pre-IPO period as exogenous shocks to investor sentiment. Edmans et al. (2007) note that a sentiment-priming construct should satisfy three key characteristics: (1) it must drive sentiment in a substantial and unambiguous manner, (2) it must impact the sentiment of a large proportion of the population, and (3) its effect must be correlated across the majority of individuals within a country.[4] We argue that terrorist attacks meet these three criteria. With regard to the first criterion, an extensive body of the psychology literature provides compelling evidence that terrorist attacks exert a strong negative impact on individuals' emotions, eliciting heightened perceptions of threat, anxiety, and depression (e.g., Galea et al. 2002; Hughes et al. 2011). As negative events provoke stronger behavioral and

2018). Furthermore, survey data can suffer from self-selection and response biases: informed investors can choose to not respond, and those who respond might not have an incentive to reveal the truth (Zhou 2018).

[3] For example, Sibley et al. (2016) show that the predictive power of Baker and Wurgler's (2006) sentiment index—the most widely used sentiment measure (Zhou 2018)—is predominantly driven by the business cycle and risk components. Relatedly, Cherkes et al. (2009) demonstrate that closed-end fund discounts—another common measure of investor sentiment—can be generated in a rational, liquidity-based model.

[4] Finance scholars tend to use the terms *sentiment* and *mood* interchangeably. In the interest of maintaining consistency with prior literature (Derrien 2005; Cornelli et al. 2006; Ljungqvist et al. 2006), we use the term *sentiment* throughout the paper.

cognitive reactions than positive events (Baumeister et al. 2001), using terrorist attacks as a sentiment-priming construct enhances the power of our tests. Moreover, prior research demonstrates that pessimism induced by salient negative events influences decision making in unrelated domains, including financial investment decisions (e.g., Kaplanski and Levy 2010; Wang and Young 2020). With regard to the second and third criteria outlined by Edmans et al. (2007), prior research shows that intense media coverage facilitates the dissemination of news about terrorist attacks, causing negative sentiment induced by these attacks to become widespread and naturally synchronized among the population (Slone 2000; Nellis and Savage 2012). Further, since terrorist attacks are unanticipated by investors (Wang and Young 2020), the use of terrorist attacks as a prime of investor sentiment alleviates potential endogeneity and self-selection issues.[5]

Insights from prior literature offer competing predictions for the impact of pre-IPO terrorist attacks on IPO pricing. On the one hand, sentiment-based theories of IPO pricing stipulate that underwriters partially adjust the final offer price to reflect bullish valuations of retail (i.e., sentiment-driven) investors in early aftermarket trading, implying that IPO first-day return should be positively related to retail investor sentiment (Derrien 2005; Ljungqvist et al. 2006). Buidling on prior literature showing that terrorist attacks negatively impact individuals' emotions, we reason that incidences of terrorist attacks in the pre-IPO period could cause retail investors to become less bullish on the new issues. The foregoing discussion suggests that IPOs

[5] A clarification of our research design is warranted. In our setting, it is important to delineate between the following two distinct questions: (1) What is the plausible empirical construct for capturing investor sentiment? and (2) Does investor sentiment impact the pricing of IPOs? Having identified a theoretically grounded investor sentiment construct (i.e., incidences of terrorist attacks), we use it to examine whether investor sentiment affects IPO pricing. It is imperative to stress that identifying an appropriate sentiment construct does not imply that it would affect IPO pricing in the manner predicted by investor sentiment models—if at all. To rule out potential confounding non-sentiment channels, we draw upon investor sentiment literature (Ljungqvist et al. 2006; Baker and Wurgler 2006, 2007) to derive a set of testable predictions for the terrorist attack-IPO underpricing relationship. Our approach is consistent with prior studies (e.g., Edmans et al. 2007; Wang and Young 2020) that utilize exogenous events as shocks to investor emotions to examine the impact of investor emotions on financial market outcomes.

with incidences of terrorist attacks in the pre-IPO period, on average, should experience lower first-day returns.

On the other hand, several conflating factors could bias against finding supportive evidence for this conjecture. First, recent studies provide evidence that institutional investors—who are cast as informed and rational IPO market participants by sentiment-based IPO pricing theories—are also susceptible to cognitive biases (Fang et al. 2014; Goetzmann et al. 2015). By eliciting feelings of fear and heightened perceptions of threat, pre-IPO terrorist attacks could cause institutional investors to perceive higher levels of uncertainty regarding the offering's value, resulting in the higher underpricing of the new issue and, consequently, higher first-day return (Beatty and Ritter 1986). Second, by inducing negative sentiment among executives of the issuing firm, pre-IPO terrorist attacks could cause management to become more risk-averse and adopt a more cautious, conservative approach in setting the final offer price, driving up the underpricing discount of the new issue. Third, underwriters could intensify their efforts to market the new issue (Cook et al. 2006) in an attempt to offset the negative shock to investor sentiment induced by the attacks. Given confounding effects of these factors, ultimately, it is an empirical question as to whether incidences of terrorist attacks in the pre-IPO period result in lower or higher first-day returns.

To address this question, we utilize a comprehensive sample of U.S. IPOs spanning the period 1994–2016. To identify IPOs with incidences of terrorist attacks in the pre-IPO period, we merge this sample with data from the Global Terrorism Database (GTD), which contains systematic and detailed records of terrorist events. We find that IPOs listed within 30-day period following terrorist attacks, on average, experience significantly lower first-day returns compared to nonaffected IPOs (i.e., IPOs with no incidences of terrorist attacks in the pre-IPO period). The documented effect is economically meaningful: controlling for known determinants of IPO underpricing, the average IPO first-day return for the issuing firms with

pre-IPO terrorist attacks is 10.77 percentage points lower compared to nonaffected IPOs, a reduction of 36.5% compared to the sample mean.

To assess the robustness of our baseline results, we conduct an array of sensitivity tests. We consider the possibility that pre-IPO terrorist attacks result in lower pre-IPO media coverage, diverting retail investor attention away from IPO firms. In turn, a reduction in IPO firm visibility can result in lower first-day returns (Cook et al. 2006). To examine this issue, we control for an array of visibility proxies suggested by prior literature in our analysis. We further verify that our results are not driven by IPOs in the tourism or transportation industry, namely, IPO firms whose economic output could be directly affected by terrorist attacks. We also verify that our results hold when we use a propensity score–matched sample, alleviating concerns regarding potential self-selection. Finally, we perform a series of placebo tests to show that our findings are unlikely to be driven by artifacts of the underlying data.

Since investor sentiment is "a belief about future cash flows and investment risks that is not justified by the facts at hand" (Baker and Wurgler 2007, p.129), the stipulated investor sentiment channel implies that terrorist attacks negatively influence investors' subjective beliefs about IPO firms' prospects, but not IPO firms' fundamentals. It follows that we should observe the following two patterns in our sample: (1) a positive association between incidences of pre-IPO terrorist attacks and the degree of pessimism in investors' beliefs and (2) no association between incidences of pre-IPO terrorist attacks and post-IPO operating performance.[6] Building on prior literature (Tetlock 2007; Gentzkow and Shapiro 2010; Garcia 2013), we use the tone of media articles discussing an IPO firm to gauge prevailing IPO firm-related beliefs among investors. Using a propensity score matching design, we find that IPOs with incidences of terrorist attacks in the pre-IPO period have a more pessimistic media tone

[6] The investor sentiment channel implies that terrorist attacks in the pre-IPO period should have no *direct* effect on the operating performance of issuing firms in the post-IPO period. However, negative investor sentiment induced by terrorist attacks could impact post-IPO operating performance indirectly by adversely affecting IPO proceeds of issuing firms. We revisit this issue in Section 6.2.

in the post-attack/pre-IPO date time window compared to nonaffected IPOs. At the same time, we find no significant association between pre-IPO terrorist attacks and post-IPO operating performance. Taken together, these results provide corroborating evidence for investor sentiment as the mechanism driving our findings.

We next explore cross-sectional variation in the documented relation between terrorist attacks and IPO first-day returns. If the investor sentiment channel is indeed the mechanism driving our findings, the negative association between pre-IPO terrorist attacks and IPO first-day returns should be amplified (mitigated) in settings in which the role of investor sentiment is expected to be more (less) salient. We begin by examining whether the documented effect of pre-IPO terrorist attacks is amplified for IPO firms that are difficult to value. Baker and Wurgler (2006, 2007) assert that the stocks of firms with higher levels of information uncertainty—such as young firms, firms with low profitability, and firms with a high proportion of intangible assets—are more difficult to value, making biases more insidious and valuation mistakes more likely. Consequently, such stocks are expected to be more sensitive to investor sentiment (Baker and Wurgler 2006, 2007). Building on these insights, we conjecture that the documented effect of terrorist attacks should be amplified for IPO firms with these characteristics. Our results are consistent with this expectation.

We further explore the impact of IPO certification on the documented effect of terrorist attacks. Prior research suggests that the presence of prestigious intermediaries (e.g., underwriters with a strong reputation and Big 4 auditing firms) and venture capitalist investors plays an important "certification" role for a new issue, reducing information uncertainty faced by the market (Booth and Smith 1986; Carter and Manaster 1990; Megginson and Weiss 1991; Menon and Williams 1991; Michaely and Shaw 1994; Bajo et al. 2016). Since the role of investor sentiment is more salient when information uncertainty is high (Baker and Wurgler

2006, 2007), we reason that the effect of terrorist attacks should be mitigated for IPOs with such certification. Our results support this prediction.

We also explore how the strength of the documented relation varies with the salience of attacks for IPO investors. Prior research (e.g., Galea et al. 2002; Hughes et al. 2011) suggests that the impact of an event on individuals' beliefs and behaviors is amplified with the salience of an event. Therefore, we expect the documented effect of pre-IPO terrorist attacks to be amplified if there are more terrorist attacks prior to the IPO date and if these attacks lead to greater numbers of fatalities. In a similar vein, we reason that the documented effect should be amplified for attacks that occur at one of the financial centers and attacks that are closer to the IPO date. Further, since retail (i.e., sentiment-driven) investors tend to focus on the stocks of locally headquartered firms (Seasholes and Zhu 2010; Korniotis and Kumar 2013), we reason that the documented relation should be amplified for attacks that take place in locations closer to the IPO firms' headquarters. Our results corroborate these predictions.

To add further texture to our analysis, we undertake two sets of supplemental tests. First, we examine the association between pre-IPO terrorist attacks and post-listing day stock returns. Ljungqvist (2007) notes that sentiment-driven IPO first-day returns should revert in the post-listing day period. It follows that if the documented negative effect of terrorist attacks on IPO first-day returns reflects investor sentiment, such an effect should revert in the post-listing day period. Accordingly, we should observe a positive association between pre-IPO terrorist attacks and post-listing day stock returns. Our results are consistent with this expectation.

Second, we examine the relation between pre-IPO terrorist attacks and a set of alternative measures of IPO performance studied in prior literature (e.g., Benveniste and Wilhelm 1990; Ljungqvist and Wilhelm 2003; Cook et al. 2006; Wang and Yung 2015), which includes price revision, oversubscription, total proceeds, and primary share revision. Sentiment-based IPO pricing models stipulate that underwriters partially adjust the final offer price to reflect the

sentiment-driven valuation of the new issue by retail investors in early aftermarket trading, implying that investor sentiment should be positively associated with IPO price revisions (Cook et al. 2006). Accordingly, we conjecture that IPOs with terrorist attacks in the pre-IPO period, on average, undergo lower price revisions compared to nonaffected IPOs. Our results support this prediction. We also find that IPOs with terrorist attacks in the pre-IPO period, on average, are less likely to be oversubscribed and have lower total proceeds and primary share revisions. The entirety of the results is consistent with our argument that pre-IPO terrorist attacks adversely impact investor sentiment, resulting in lower demand for the IPO stock and less capital raised during the IPO.

Our study contributes to the literature along several dimensions. Our first contribution is to the emerging stream of research examining the role of investor sentiment in IPO pricing (Derrien 2005; Cornelli et al. 2006; Ljungqvist et al. 2006; Boulton et al. 2020). Cornelli et al. (2006) use prices from the grey market (the when-issued market that precedes European IPOs) to proxy for investor sentiment. They document that high grey market prices are positively associated with first-day aftermarket prices and increase the likelihood of subsequent long-run price reversals. Boulton et al. (2020) conclude that short-selling restrictions amplify the positive association between investor sentiment and IPO underpricing, using consumer confidence index as a proxy for investor sentiment. While these studies cast investor sentiment as a potentially important antecedent of IPO undepricing, circularity issues and inherent endogeneity of investor sentiment proxies (Qui and Welch 2006; Sibley et al. 2016) pose major challenges to establishing causal links in this relationship. We address these challenges by using incidences of terrorist attacks in the pre-IPO period as exogenous shocks to investor sentiment. Our results provide support for the sentiment-based theories of IPO pricing (Derrien 2005; Ljungqvist et al. 2006) and underscore the salience of investor sentiment in shaping IPO

outcomes. In this context, our study responds to Ljungqvist's (2007, p.380) call for "behavioral approaches to explain why the extent of underpricing varies so much over time."

Our second contribution is to the literature examining the impact of terrorism on financial market outcomes and corporate policies. Studies in this stream of research predominantly focus on the macroeconomic and market-wide effects of terrorism (Chen and Siems 2004; Eckstein and Tsiddon 2004; Chesney et al. 2011; Wang and Young 2020). Complementing these studies, an emerging stream of research explores the impact of terrorist attacks at the micro (firm) level by studying the influence of attacks on the corporate investment and compensation policies (Antoniou et al. 2017, Dai et al. 2020). We extend this literature by providing firm-level evidence of the role of terrorist attacks in shaping IPO outcomes.

Our findings also carry potential implications for investment practitioners and regulators. As Martin Feldstein notes in a keynote speech at the 2007 Annual Meeting of the American Economic Association, "the economics of security is one of the most important issues in our discipline, yet, the one least researched." In the United States, the ongoing threat of terrorism has changed everything from defense and immigration policy, to an awareness of homegrown terrorism and the heightened sense of personal safety in a crowd (Wang and Young 2020). While most studies consider the direct output costs of terrorist attacks to be relatively low and short-term (Llussa and Tavares 2011), terrorism has the capacity to erode the sense of community or national security, damage morale and cohesion, and open the ethnic, economic, and religious cracks in society (Stith Buttler et al. 2003). Given the marked increase in the intensity of terrorist attacks in recent times (Miller 2016), our findings suggest that regulators should consider the adverse effects of terrorist attacks on firms' ability to raise external funds when assessing the costs of terrorism and forming policies. Our results also imply that investment practitioners should consider incorporating the impact of negative sentiment induced by terrorist attacks on IPO valuations in their investment decisions.

The paper is organized as follows. Section 2 describes the sample and variables. Section 3 discusses the baseline findings and the results of sensitivity tests. Section 4 tests the validity of the key assumptions underpinning our analysis. Section 5 presents the results of cross-sectional tests and Section 6 outlines the results of supplemental analyses. Section 7 concludes the paper.

2. Sample and Variables

2.1 Sample

We obtain the data for the study from multiple sources. The terrorist attacks data are obtained from the June 2017 edition of the Global Terrorism Database (GTD), an open source database that contains systematic data on global terrorist events. The GTD defines a terrorist attack as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation." (GTD Codebook 2019, p.10).[7] The National Consortium for the Study of Terrorism and Responses to Terrorism (START) makes the GTD available via its online interface. We collect information on the exact source, date, location, number of causalities, and specific motive behind the terrorist attacks from the database. Our sample includes terrorist attacks that took place in the U.S. from 1994 to 2016.[8] We focus on the U.S. market because it is the most active IPO market in the world (Ljungqvist 2007). By focusing on a single country, we also obtain a more homogeneous sample in terms of regulations and institutional factors (Ljungqvist 2007), facilitating comparison of the effects of pre-IPO terrorist attacks across IPOs.

[7] To be included in the GTD, all three of the following attributes must be present: (1) the incident must be intentional, (2) the incident must entail some level of violence or immediate threat of violence and (3) the perpetrators of the incidents must be sub-national actors. In addition, at least two of the following three criteria must be present for an incident to be included in the GTD: (1) the act must be aimed at attaining a political, economic, religious, or social goal, (2) there must be evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) than the immediate victims, (3) the action must be outside the context of legitimate warfare activities. (GTD Codebook 2019).

[8] The data on terrorist attacks that took place in 1993 are not available from the GTD. They were lost prior to START's compilation of the GTD through multiple data collection efforts. Therefore, we commence our study in 1994 to prevent our results from being biased due to the loss of terrorist attack data in 1993.

Following prior literature, we include terrorist attacks that resulted in at least one casualty, since these attacks are perceived to have a greater negative impact on human emotions (Antoniou et al. 2017; Kearns et al. 2019). To further filter out low-impact events, we only consider terrorist attacks covered in at least one of the national media (print or television) within 72 hours of the attack. We provide a detailed description of the terrorist attacks included in our sample in Appendix A. The appendix shows that terrorist attacks vary considerably by the target of the attack as well as by the number of fatalities, with the Alfred P. Murray Federal Building bombing having the largest number of fatalities in our sample.[9]

We use the Thomson Financial SDC Platinum database as our primary data source on new issues by firms in the U.S. We obtain financial statement information of IPO firms from Compustat and Worldscope and post-listing stock price information from CRSP and Datastream. Following prior IPO literature (Cook et al. 2006; Liu et al. 2014), we exclude foreign ADRs, closed-end funds, rights offerings, unit offerings, real estate investment trusts, limited partnerships, and depository receipts. We also exclude IPOs with missing information regarding their listing day returns. Further, we require the IPO firms to have nonmissing information of the control variables. Our final sample consists of 3,683 IPOs in the U.S. over the period 1994–2016. We summarize our sample selection procedure in Appendix B.

2.2 Variables

Our dependent variable is the IPO first-day return (*First-day return*). Following prior research (e.g., Bajo et al. 2016; Ljungqvist 2007), we calculate *First-day return* as the first-day closing price of an IPO minus its offer price, scaled by the offer price. Following prior literature (e.g., Boulton et al. 2010), we winsorize the variable in the bottom and top one percentiles to

[9] Our sample does not include the 9/11 World Trade Center attacks in 2001. As we discuss in Section 2.2, to be included in our sample, an attack must have at least one IPO listed in the 30-day period following the attack to allow us to examine the impact of the attack on IPO investor sentiment. The 9/11 World Trade Center attacks do no meet this inclusion criterion. Further, due to the economy-wide nature of shocks induced by the 9/11 attacks (Kim and Kung 2017), the impact of these attacks on IPO pricing could reflect stock market revision of firms' fundamentals rather than investor sentiment.

mitigate the potential impact of outliers. Our key explanatory variable of interest is the terrorist attack dummy (*Attack*), which is equal to one if at least one terrorist attack occurred within the 30 days prior to the IPO listing date, and zero otherwise.[10]

Our selection of firm-level control variables is in line with prior literature (e.g., Bajo et al. 2016; Bajo and Raimondo 2017; Colack et al. 2017; Chemmanur and Yan 2017). The variable *Profitability* is defined as earnings before interest and taxes, divided by total assets; *Asset turnover* is calculated as sales divided by total assets; *Offer Size* is calculated as the natural logarithm of the total proceeds raised in the IPO; *Market-to-book* is calculated as market value of equity divided by the book value of equity; *Leverage* is measured as the ratio of total debt over total assets; *Float* is the proportion of regular shares issued by the firm to the public and available to trade; *Underwriter* is the reputation rank of the lead underwriter at the time of listing, based on the updated Carter and Manaster (1990) classification. Further, *Big 4 auditor* is a dummy variable equal to one if the IPO firm is audited by a Big 4 auditing firm, and zero otherwise; *VC back* is a dummy variable equal to one if the IPO firm is backed by venture capital, and zero otherwise; *Commitment* is a dummy variable equal to one if the underwriter guarantees to purchase all the securities offered for sale by the issuer regardless of whether they can sell them to investors, and zero otherwise [11]; *Firm age* is the natural logarithm of the difference between the year of listing and year the firm was founded; *Equity carve-out* is a dummy variable equal to one if the IPO firm is an equity carve-out from another firm, and zero otherwise; *NASDAQ* is a dummy variable equal to one if the IPO was listed on the NASDAQ, and zero otherwise.

Prior literature (e.g., Sibley et al. 2016) emphasizes the importance of controlling for macroeconomic conditions when examining the impact of investor sentiment on stock prices.

[10] We focus on the 30 days prior to the IPO date because investor interest in the IPO is more likely to intensify in the short window leading up to the firm's listing (Liu et al. 2014; Chen et al. 2020).
[11] Our results remain intact when we exclude the best efforts IPOs from our sample.

Accordingly, we include a wide array of macroeconomic and market-wide controls. We include monthly change in the University of Michigan consumer sentiment index (Δ*Consumer sentiment*) as prior literature shows the role of this variable as a leading indicator of real economic conditions (Song and Shin 2019). We also include monthly change in the OECD business confidence index (Δ*Business confidence*) which helps in monitoring output growth and anticipating turning points in economic activity (OECD 2003). We obtain the data for the two variables from the Main Economic Indicators published by the Organisation for Economic Co-operation and Development.[12] We include monthly change in the Economic Policy Uncertainty Index (Δ*Policy uncertainty*) as prior research shows that innovations in policy uncertainty foreshadow declines in investment, output, and employment (Baker et al. 2016); we obtain the data for this variable from the Economic Policy Uncertainty database.[13] We also include aggregate revision in analysts' earnings forecasts at the end of the month (*EPS forecast revision*) as prior studies show that aggregate earnings growth helps in predicting future inflation and GDP growth (Konchitchki and Patatoukas 2014; Shivakumar and Urcan 2017); the data for this variable was obtained from I/B/E/S. In addition, we include monthly changes in real risk premium (Δ*Real risk premium*) and real interest rate (Δ*Real 10-year rate*) given the evidence from literature that both variables vary with and predict turning points in business cycles (Harvey 1989; King and Watson 1996). We obtain the data for these two variables from the Federal Reserve Bank of Cleveland. We also include *Market Return* defined as the excess return on the Standard & Poor's 500 Index over the three months preceding the IPO. We obtain the data from Datastream. Lastly, we control for election cycles (Aksoy 2014) by including *Election*, which takes the value of one if a senate or presidential election took place in the 30 days prior to the listing date, and zero otherwise. We obtain the data for this

[12] Available at https://data.oecd.org/leadind/consumer-confidence-index-cci.htm.
[13] Available at http://www.policyuncertainty.com.

variable from the U.S. federal government election database.[14] Detailed definitions of the variables are presented in Appendix C.

2.3 Descriptive Statistics

Table 1 presents the annual distribution of our sample. Columns (1) and (2) of the table report the number of IPOs and the average first-day return in each year, respectively. The number of IPOs in our sample is relatively stable, except during the dot-com bubble and the Global Financial Crisis periods. Consistent with prior studies (e.g., Ritter and Welch 2002), we find that the average IPO first-day return exhibits substantial time series variation: in our sample, the minimum average IPO first-day return was 0.0669 (in 2008) and the maximum average IPO first-day return was 0.6409 (in 1999).

Further, we separate IPOs into those affected and not affected by terrorist attacks, based on whether at least one terrorist attack occurred within the 30-day period prior to the IPO listing date. Columns (3) to (6) of Table 1 present the number of IPOs and the average IPO first-day return for each of the two groups. To facilitate the comparison, we plot the average IPO first-day returns of both groups in Figure 1. The results show that the average first-day return of IPOs affected by terrorist attacks is 0.1554, while the average first-day return of the nonaffected IPOs is 0.2276. Columns (7) and (8) show that the difference between the two values is statistically significant (p-value < 0.01).[15] Further, the table shows that, for all the years, the average first-day return was consistently lower for the IPOs that were affected by terrorist attacks and that for the vast majority of the years, the differences between the two groups are statistically significant. For completeness, we also report descriptive statistics of IPO-level controls for both affected and non-affected IPOs in Panel A of Appendix D.

[Insert Table 1 and Figure 1 here]

[14] Available at https://www.usa.gov/election and https://www.senate.gov/reference/Index/Elections.htm.
[15] All reported p-values are for two-tailed tests.

Table 2 reports the summary statistics of the variables. The table shows that the mean IPO first-day return in our sample is 0.2172. The table also shows that 14.36% of the IPOs in our sample had at least one terrorist attack in the pre-IPO 30-day period. The summary statistics of the control variables are largely consistent with prior studies (e.g., Bajo et al. 2016; Bajo and Raimondo 2017; Colack et al. 2017; Chemmanur and Yan 2017). Table 3 presents the correlation matrix of the variables. The table shows that the IPO first-day return is negatively correlated with the terrorist attack dummy; correlations with control variables are largely consistent with prior literature.[16]

[Insert Tables 2 and 3 here]

3. Terrorist Attacks and IPO First-Day Returns

3.1 Baseline Analysis

In this section, we examine the effect of terrorist attacks on IPO first-day returns using regression analysis. Our baseline regression specification is as follows:

$$\begin{aligned} &\textit{First-day return}_i = \alpha + \beta_1 \textit{Attack}_i + \beta_2 \textit{Offer size}_i + \beta_3 \textit{Profitability}_i \\ &+\beta_4 \textit{Asset turnover}_i + \beta_5 \textit{Market-to-book}_i + \beta_6 \textit{Leverage}_i + \beta_7 \textit{Float}_i \\ &+\beta_8 \textit{Shares issued}_i + \beta_9 \textit{Underwriter}_i + \beta_{10} \textit{Big 4 auditor}_i + \beta_{11} \textit{VC back}_i \\ &+\beta_{12} \textit{Commitment}_i + \beta_{13} \textit{Firm age}_i + \beta_{14} \textit{Equity carve-out}_i + \beta_{15} \textit{NASDAQ}_i \\ &+\beta_{16} \textit{Election}_t + \beta_{17} \textit{Market return}_t + \beta_{18} \Delta\, \textit{Business confidence}_t \\ &+\beta_{19} \Delta\, \textit{Consumer sentiment}_t + \beta_{20} \Delta\, \textit{Policy uncertainty}_t \\ &+\beta_{21} \textit{EPS forecast revision}_t + \beta_{22} \Delta\, \textit{Real risk premium}_t \\ &+\beta_{23} \Delta\, \textit{Real 10 year rate}_t + \textit{Industry} + \textit{Year} + \textit{State} + \varepsilon_i \end{aligned} \quad (1)$$

where *i* denotes the IPO firm, *t* denotes the year, *Industry* denotes the IPO firm's industry fixed effects based on Fama-French 48 industries, *Year* denotes year fixed effects, *State* denotes the IPO firm's state fixed effects based on the location of the firm's headquarters, and ε is the error

[16] For breviety, we only report the summary statistics and correlation matrix of the variables in the baseline analysis. The summary statistics and correlation matrix of variables in the other analyses are available upon request.

term. The model is estimated using ordinary least squares (OLS), with standard errors adjusted for heteroskedasticity.[17]

We report the results in Table 4 using a set of nested models. Column (1) presents the results with industry, year, and state fixed effects but without control variables; column (2) presents the results after controlling for IPO-level control variables; and column (3) presents the results of a fully specified baseline model (Equation (1)) with both IPO-level and economy-wide controls included. In all three columns, the coefficient of *Attack* is significantly negative (largest p-value < 0.01), suggesting that IPOs with terrorist attacks in the pre-IPO period, on average, experience lower first-day returns compared to nonaffected IPOs. The effect is economically meaningful: the coefficient estimate of *Attack* reported in column (3) suggests that the first-day return of an IPO listed within 30-day period following terrorist attacks is, on average, 7.61 percentage points lower than that of an IPO not affected by the attacks. The coefficient estimates of the control variables are broadly consistent with prior literature. Overall, our baseline results are consistent with the notion that, by inducing negative sentiment among investors, terrorist attacks adversely affect IPO valuations, resulting in lower IPO first-day returns.

[Insert Table 4 here]

3.2 Sensitivity Tests

To assess the robustness of our baseline results, we conduct an array of sensitivity tests and report the results in Table 5. For brevity, we only report the coefficient estimate of *Attack*; control variables and fixed effects are included in all tests.

[17] We include state fixed effects based on location of the IPO firm's headquarters to control for potential effects of state-level clustering of terrorist attacks (LaFre et al. 2014). In untabulated robustness test, we re-estimate our baseline regression model with state fixed effects based on the state in which IPO firm is incorporated. Using this alternative specification of state fixed effects leaves our core results intact. We also verify that our core results remain intact when we use standard errors clustered by terrorist attack.

We begin by considering potential alternative mechanisms driving our findings. Prior research suggests that the level of IPO firm visibility is positively associated with IPO returns (Cook et al. 2006; Liu et al. 2014). Terrorist attacks can garner all the attention of the mass media, thereby reducing the level of media coverage devoted to IPO firms and adversely affecting IPO firm visibility. Accordingly, if the documented effect of terrorist attacks is driven by the visibility channel, it should become insignificant once we control for IPO firm visibility. To examine this issue, we include the following visibility measures as additional controls (Grullon et al. 2004; Cook et al. 2006; Liu et al. 2014): pre-IPO media coverage, IPO-day media coverage, and IPO firm advertising intensity. We collect the media coverage data from RavenPack database which has been widely used in recent finance and accounting research (e.g., Dang et al. 2015; Bushman et al. 2017; You et al. 2018). We calculate pre-IPO (IPO-day) media coverage as the log-transformed number of news articles about the IPO firm during the 30-day window prior to (on the) IPO day and we calculate IPO firm advertising intensity as the ratio of the firm's advertising expenses over sales at the time of listing.[18] The sample size for these tests is smaller than the one used in our baseline analysis because RavenPack starts its coverage in 2000 and some IPOs have missing data for advertising intensity in the year of listing. The results are presented in Panel A of Table 5 and show that the coefficient of *Attack* remains significantly negative in all three tests (largest p-value < 0.01).[19]

Second, we consider the possibility that our results are conflated by self-selection—namely, that, in our sample, IPO firms with certain characteristics are more likely to end up

[18] We exclude duplicate entries using RavanPack's even similarity key and only include news articles with a relevant score of 100 to ensure that the firm is the main subject of the news article..

[19] The negative coefficients of media coverage controls are consistent with the results reported in Chen et al. (2020). Chen et al. (2020) describe two distinct channels through which media coverage may affect IPO first-day return: (1) information asymmetry reduction channel and (2) visibility enhancement channel. The information asymmetry reduction channel suggests that higher pre-IPO media coverage alleviates informational frictions among the parties involved in an IPO, resulting in lower IPO first-day returns. The visibility enhancement mechanism suggests that, by attracting retail investor attention to a new issue in the aftermarket trading, higher pre-IPO media coverage leads to higher IPO first-day return. Similar to our study, Chen et al. (2020) document negative relation between media coverage and IPO first-day return, concluding that information asymmetry reduction mechanism dominates the media coverage-IPO first-day return relation.

being listed within the 30-day window following a terrorist attack. As discussed, the exogenous nature of terrorist attacks alleviates such concerns. Nonetheless, to examine this issue, we conduct three tests. First, we construct a propensity score–matched sample in which we match each IPO affected by terrorist attacks with a nonaffected IPO with the closest propensity score. The matching is based on a propensity score calculated using all the firm-level control variables in Equation (1), as well as industry, year, and state fixed effects. Second, we only include IPOs affected by terrorist attacks and IPOs not affected by any terrorist attack with issuance dates within the 30-day window prior to a terrorist attack in the analysis. Third, we construct a propensity score–matched sample in which we match each IPO affected by terrorist attacks with an IPO not affected by any terrorist attack with issuance date within the 30-day window prior to a terrorist attack. We match based on the closest propensity score calculated in the same way as in the first test. For completeness, we report the descriptive statistics of the affected and non-affected IPOs in these samples in Panels B and C of the Appendix D. The results are presented in Panel B of Table 5 and show that the coefficient of *Attack* remains significantly negative in all three tests (largest *p*-value = 0.027).

Third, we examine whether our findings are robust to alternative windows in defining the terrorist attack dummy. As discussed, we construct *Attack* indicator using a 30-day window. To verify that our findings are not driven by this specific choice of time window, we consider three alternative measures of *Attack* based on 15-day, 45-day, and 60-day windows, respectively and use each of these alterative measures as our explanatory variable of interest. The results are reported in Panel C of Table 5 and show that the coefficient of *Attack* remains significantly negative in all three tests (largest *p*-value = 0.013).

Fourth, we decompose IPO first-day return into its primary market component (i.e., the difference between first-day opening price and offer price scaled by offer price) and the secondary market component (i.e., the difference between the first-day closing price and first-

day opening price scaled by first-day opening price). The results are reported in Panel D of Table 5, which shows that the coefficient of *Attack* is significantly negative for the primary market component (*p*-value < 0.01) while is statistically insignificant for the secondary market component (*p*-value = 0.317). These results suggest that the effect of terrorist attacks on IPO first-day return is driven by the primary market component, consistent with the sentiment-based IPO pricing theories (e.g., Ljungqvist et al. 2006) in which issuers set the offer price based on their anticipation of retail investor sentiment on the secondary market. Specifically, as discussed earlier, sentiment-based IPO pricing theories maintain that the investment banker partially adjusts the offer price to reflect the bullish sentiment of retail investors, allowing the issuer to benefit from a higher valuation than appropriate, given the intrinsic value of the issue. In turn, institutional investors benefit from selling their allocations on the secondary market to retail investors, who have higher valuations. Accordingly, when retail investor sentiment experiences a positive (negative) shock, the investment banker adjusts the offer price upwards (downwards) but not to the full extent of the effect of retail investor sentiment change on IPO price on the secondary market.

Fifth, we consider the possibility that our results are driven by IPO firms whose fundamentals could be directly affected by terrorist attacks. To examine this issue, we repeat our analysis after excluding IPOs in the transportation and tourism industries, industries that could be adversely affected by terrorist attacks. The results of this estimation are presented in Panel E of Table and show that the coefficient of *Attack* remains significantly negative (*p*-value = 0.026).

Last, we examine the sensitivity of our findings to alternative specifications of terrorist attacks. To that end, we extend our sample by including mass shooting events from the Stanford Mass Shootings of America (MSA) database.[20] The MSA defines a mass shooting as three or

[20] Available at https://library.stanford.edu/projects/mass-shootings-america.

more shooting victims (not necessarily fatalities), not including the shooter, and the shooting must not be gang, drug, or organized crime related. The results of this analysis are reported in Panel F of Table 5, showing that the coefficient of *Attack* remains significantly negative (*p*-value = 0.010).

[Insert Table 5 here]

To further gauge the robustness of our findings, we conduct four untabulated tests. In the first test, we consider the possibility that terrorist attacks cause issuers to withdraw an IPO in order to return to the IPO market in a later stage when market conditions improve. We expect the impact of pre-IPO terrorist attacks on IPO withdrawal decision to be limited, given evidence in prior literature showing that prior withdrawals increase the perceived riskiness of the second-time IPOs and result in significantly lower valuations of such IPOs (Dunbar and Foerster 2008; Lian and Wang 2009). Morevover, such an effect, if present in our sample, would bias against finding significant effect of pre-IPO terrorist attacks on IPO first-day return, as withdrawn IPOs are likely to be the ones mostly affected by the deterioration in market conditions induced by terrorist attacks.

Nevertheless, to examine this issue in our sample, we compare the relative frequency of IPOs in the 30-day window following terrorist attack with (1) the relative frequency of IPOs in the [+31,+60] day window following the attack and (2) the relative frequency of IPOs in the [-31,-1] day window preceding the attack. If terrorist attacks cause issuers to withdraw IPOs, IPO frequency in the 30-day window following the attack should be significantly lower compared to IPO frequencies in the adjacent non-attack 30-day windows. The results of our analysis lend no support to this conjecture: among the 3,683 successful IPOs in our sample, 529 (14.36%) are in the 30-day window following terrorist attack, 475 (12.89%) are in the [+31,+60] day non-attack window, and 405 (11.00%) are in the [-31,-1] day non-attack window. To further investigate this issue, we identify 2,096 withdrawn IPOs during our sample period

from the SDC Platinum database. We reason that, if terrorist attacks cause issuers to withdraw IPOs, frequency of withdrawn IPOs in the 30-day window following the attack should be significantly higher compared to withdrawn IPO frequencies in the adjacent non-attack 30-day windows. Among withdrawn IPOs during our sample period, 277 (13.22%) are in the 30-day window following terrorist attack, 246 (11.74%) are in the [+31,+60] day non-attack window, and 294 IPOs (14.03%) are in the [-31,-1] day non-attack window. We find no significant differences between the estimated frequencies of withdrawn IPOs in the attack versus non-attack windows. Collectively, the results of these analyses suggest that our findings are unlikely to be affected by IPO withdrawals.

In the second test, we consider the possibility that our findings could be limited for IPOs affiliated with a certain industry. To examine this issue, we perform industry-by-industry analysis based on the Fama-French 12 industry classification. Notwithstanding a substantial reduction in the sample size used to estimate these industry-level regressions, we find that the coefficient of *Attack* is significantly negative at the 10% level or better for most of the industries in our sample, suggesting that our results are not confined to a single industry.

In the third test, we consider the effect of price stabilization on the documented relationship. Notably, such an effect would bias against finding significant effect of terrorist attacks on IPO underpricing. Nonetheless, to examine this issue, we estimate our baseline regression model using four-week initial return (the difference between closing price four weeks after the IPO listing day and offer price, scaled by the offer price) as the dependent variable. The coefficient of *Attack* remains significantly negative in this estimation (p-value < 0.01), reinforcing the robustness of our findings.

Lastly, we examine the possibility that our results are spuriously driven by the underlying data, namely, that the documented effect of terrorist attacks is identified in our setting by sheer chance. To help dispel this concern, we run a series of placebo tests. For each IPO in our sample,

we assign a "pseudo" attack dummy by sampling from a Bernoulli distribution with probability 0.1436, which is the proportion of IPOs with pre-IPO terrorist attacks in our sample—i.e., the probability of a randomly chosen IPO in our sample being included in the terrorist attack treatment group. We then re-estimate our baseline model (Equation (1)) using the pseudo *Attack* variable instead of the actual *Attack* variable, repeat the process 1,000 times, and compare coefficient estimate of the actual *Attack* variable to the distribution of the pseudo-coefficient estimates. The (untabulated) results indicate that the distribution of pseudo-coefficients is centered around zero (mean = -0.001, median = -0.0009) and that 99% of the pseudo-coefficient estimates lie between -0.056 and 0.04. A comparison of these results to our actual coefficient estimate of -0.0761 (see column (3) of Table 4) indicates that actual coefficient of *Attack* lies in the very extreme left tail of the distribution of pseudo-coefficients, suggesting that our results are unlikely to stem from spurious correlations in our sample.

4. Terrorist Attacks, Investor Beliefs, and IPO Firms' Fundamentals

Prior research defines investor sentiment as beliefs about future cash flows and investment risks that are not justified by the facts at hand—namely, beliefs about asset values unwarranted by fundamentals (Baker and Wurgler 2006, 2007; Dorn 2009). Building on this definition, the investor sentiment perspective implies that terrorist attacks negatively influence investors' subjective beliefs about IPO firms' prospects, but not IPO firms' fundamentals. Accordingly, we should observe the following two patterns: (1) a positive association between incidences of terrorist attacks in the pre-IPO period and the degree of pessimism in investors' beliefs and (2) no direct effect of terrorist attacks in the pre-IPO period on operating performance in the post-IPO period. In this section, we examine the empirical validity of these two predictions in our sample.

4.1 Terrorist Attacks and Investor Beliefs

Prior studies highlight the role of media tone in shaping investors' perceptions and beliefs (Tetlock 2007; Dougal et al. 2012; Garcia 2013). Building on this literature, we use the tone of media articles covering an IPO firm to gauge investors' prevailing beliefs regarding its prospects. Since we posit that pre-IPO terrorist attacks adversely affect investor sentiment, we expect IPOs with terrorist attacks in the pre-IPO period, on average, to have a more pessimistic media tone in the period following the attacks, compared to nonaffected IPOs.

Following prior literature (e.g., Dang et al. 2015; Bushman et al. 2017), we obtain media tone data from the RavenPack database. Since the coverage of RavenPack starts in 2000, we focus on IPOs from 2000 to 2016 for this analysis. This leaves us with 293 IPOs affected by terrorist attacks. Next, we construct a propensity score–matched sample in which we match each IPO affected by terrorist attacks with a nonaffected IPO, which gives us an initial sample of 586 IPOs. The propensity score is calculated in the same way as in Panel B of Table 5. Lastly, for each affected IPO, we collect news articles about the IPO firm for the period from the day of the attack to the day of the listing. We use the same time window to collect news articles for the matched nonaffected IPO firm. Since some IPOs do not have any news articles in RavenPack, we focus only on IPOs with media coverage data available from RavenPack. This leaves us with a final sample of 536 IPOs.

We employ the RavenPack event sentiment score (ESS) to capture the tone of the news articles about the IPO firms. The ESS score captures the informational content of news events based on proprietary algorithms developed by RavenPack. These algorithms combine traditional language analysis and ratings of experts with extensive experience in linguistics, finance, and economics to determine the quantified sentiment score for each news event (Dang et al. 2015). The score ranges from zero (extremely negative tone) to 100 (extremely positive tone), where 50 represents a neutral tone. Following Bushman et al. (2017), we transform the

ESS by assigning a value of 1 if the ESS is greater than 50, a value of -1 if the ESS is less than 50, and a value of zero if the ESS is equal to 50. The number of negative articles (*Negative articles*) is calculated as the natural logarithm of the number of news articles about the IPO firm with a transformed ESS of -1 from the day of the terrorist attack up to the listing date. The number of positive articles (*Positive articles*) is calculated as the natural logarithm of the number of news articles about the IPO firm with a transformed ESS of 1 from the day of the terrorist attack up to the listing date. In addition, we construct the average media tone (*Average tone*), calculated as the average value of the transformed ESS among all the news articles about the IPO firm from the day of the terrorist attack up to the listing date.[21] We then re-estimate the regression specification in Equation (1) three times, using each of the aforementioned three media tone variables as the dependent variable, respectively.

The results of this analysis are reported in Table 6. Column (1) shows that the coefficient of *Attack* in the *Negative articles* regression is significantly positive (p-value < 0.01), suggesting that IPOs affected by terrorist attacks, on average, have more news articles with a negative tone, compared to nonaffected IPOs. Column (2) shows that the coefficient of *Attack* in the *Positive articles* regression is significantly negative (p-value < 0.01), suggesting that IPOs affected by terrorist attacks, on average, have fewer news articles with a positive tone, compared to nonaffected IPOs. Reinforcing these results, column (3) shows that the coefficient of *Attack* in the *Average tone* regression is negative and significant (p-value < 0.01), suggesting that IPOs affected by terrorist attacks, on average, have a more pessimistic media tone, compared to nonaffected IPOs. Taken within the context of prior research (Tetlock 2007; Dougal et al. 2012; Garcia 2013), these findings are consistent with pre-IPO terrorist attacks eliciting more pessimistic beliefs regarding the IPO firms' prospects.

[21] The average IPO in our sample has 9.71 news articles in the post-attack/pre-listing day period. Out of these, 60.2% are articles with positive tone (transformed ESS = 1), 26.3% are articles with negative tone (transformed ESS = -1), and 13.5% are articles with neutral tone (transformed ESS = 0).

[Insert Table 6 here]

4.2 Terrorist Attacks and Post-IPO Operating Performance

As discussed above, we document that pre-IPO terrorist attacks have a negative impact on media sentiment regarding IPO firms, and we ascribe this finding to terrorist attacks adversely affecting investors' subjective beliefs and expectations regarding the IPO firms' prospects. If our interpretation is valid, we should find no direct effect of pre-IPO terrorist attacks on the post-IPO operating performance of issuing firms. To gauge this, we define the return on assets in the first year (*ROA_1Y*), second year (*ROA_2Y*), and third year (*ROA_3Y*) as net income divided by total assets at the end of the first, second, and third year, respectively, after the IPO year. Then, we regress each of the three operating performance measures on the *Attack* variable and controls, which include control variables used in our baseline model (Equation (1)) and a set of control variables suggested in prior studies examining post-IPO performance (e.g., Jain and Kini 1994; Krishnan et al. 2011). The latter include *First-day return, Managerial ownership, Price revision* and *Market value* with the detailed defitions of these variables provided in Appendix C.

The results of this analysis are presented in Table 7. The coefficient of the *Attack* variable is not significant in any of the three regression models (smallest *p*-value = 0.289). Accordingly, we find no evidence that issuing firms with terrorist attacks in the pre-IPO period exhibit poorer post-IPO operating performance.[22]

[Insert Table 7 here]

Taken together, the results reported in this section suggest that (1) pre-IPO terrorist attacks lead to a decline in media sentiment following the attacks and (2) the decline in media sentiment cannot be ascribed to an adverse effect of terrorist attacks on the fundamentals of the

[22] As a robustness test, we repeat this analysis using a propensity score-matched sample. The results of this estimation (untabulated for brevity) remain qualitatively similar to those reported in Table 7.

issuing firms. Collectively, these findings provide support for investor sentiment as the mechanism driving our findings.

5. Cross-Sectional Tests

5.1 Hard-to-Value IPOs

Prior literature suggests that the magnitude of the impact of investor sentiment on stock prices varies in the cross section of firms. Specifically, Baker and Wurgler (2006, 2007) argue that the stocks of firms with a higher level of uncertainty—for example, young firms, firms with low profitability, and firms with a high proportion of intangible assets—are more difficult to value, making biases more insidious and valuation mistakes more likely. Applying these insights to our setting, we expect the documented effect of pre-IPO terrorist attacks on IPO first-day returns to be amplified for IPO firms with low profitability and a high proportion of intangible assets, and mitigated for mature IPO firms.

To test these predictions, we construct three variables capturing the aforementioned IPO firm characteristics. We construct *Low Profitability* as an indicator variable equal to one if *Profitability* is in the bottom quartile of the IPOs listed in the same year as the focal IPO; *Firm age* as the natural logarithm of the difference between the year of listing and the year the firm was founded; and *Intangibility* as one minus the ratio of property, plant, and equipment over total assets. We interact the three variables with the *Attack* variable and include the interaction terms separately in the regression specification in Equation (1).

The results of this analysis are reported in Table 8. Column (1) shows that the coefficient of the *Attack*×*Firm Age* interaction term is positive and marginally significant (*p*-value = 0.085), suggesting that the effect of pre-IPO terrorist attacks on IPO first-day returns is mitigated for more mature IPO firms. Columns (2) and (3) report that the coefficients of the *Attack*×*Low Profitability* and *Attack*×*Intangibility* interaction terms are both significantly negative (largest *p*-value = 0.016). These results suggest that the negative effect of pre-IPO

terrorist attacks on IPO first-day returns is amplified for IPO firms with low profitability and IPO firms with a greater proportion of intangible assets. Collectively, these findings provide support for our conjecture that greater valuation uncertainty magnifies the negative impact of terrorist attacks on IPO first-day returns, consistent with investor sentiment channel driving our findings.

[Insert Table 8 here]

5.2 Third-Party Certification

Prior research suggests that the presence of prestigious intermediaries (e.g., underwriters with a strong reputation and Big 4 auditing firms) and venture capitalists as investors plays an important certification role for a new issue, reducing the information uncertainty faced by the market (Booth and Smith 1986; Carter and Manaster 1990; Megginson and Weiss 1991; Menon and Williams 1991; Michaely and Shaw 1994; Bajo et al. 2016). Further, prior research (e.g., Baker and Wurgler 2006, 2007) maintains that the stocks of firms with a higher level of information uncertainty are more succeptible to investor sentiment. Integrating these two insights together, we reason that the effect of terrorist attacks on IPO first-day returns is weaker for IPOs with greater levels of certification.

Following prior literature (Bajo et al. 2016; Chen et al. 2020), we employ three measures of IPO certification. Underwriter reputation (*Underwriter*) is the reputation rank of the lead underwriter at the time of listing, based on the updated Carter and Manaster (1990) classification. The Big 4 auditor dummy (*Big 4 auditor*) is a dummy variable equal to one if the IPO firm is audited by one of the Big 4 auditors, and zero otherwise. The venture capital dummy (*VC back*) is a dummy variable equal to one if the IPO firm is backed by a venture capital firm, and zero otherwise. We interact the three variables with *Attack* and include the interaction terms separately in the regression specification in Equation (1).

The results of this analysis are reported in Table 9. Column (1) shows that the coefficient of the *Attack×Underwriter* interaction term is positive and significant (*p*-value < 0.01), suggesting that the negative effect of pre-IPO terrorist attacks on IPO first-day returns is mitigated if the IPO is underwritten by a reputable underwriter. Columns (2) and (3) show that the coefficients of the *Attack×Big 4 auditor* and *Attack×VC back* interaction terms are both significantly positive (largest *p*-value < 0.01). These results suggest that the effect of pre-IPO terrorist attacks on IPO first-day returns is attenuated if the IPO firm is audited by a Big 4 auditor or if an IPO firm is backed by a venture capital firm. Collectively, the results reported in Table 9 suggest that IPO certification mitigates the negative impact of pre-IPO terrorist attacks on IPO first-day returns, lending further support for the investor sentiment channel as the mechanism driving our findings.

[Insert Table 9 here]

5.3 Salience of Terrorist Attacks

Evidence from prior literature (e.g., Galea et al. 2002; Hughes et al. 2011) suggests that the impact of a negative event on individuals' beliefs and behaviors is amplified with the salience of the event. Accordingly, we reason that the impact of pre-IPO terrorist attacks on investor sentiment—and thus the negative effect of pre-IPO terrorist attacks on IPO first-day returns—should be amplified when the attacks are more salient to investors.

We measure the salience of the terrorist attacks using the following variables. The number of fatalities (*Num fatalities*) is the natural logarithm of one plus the total number of victims killed in the attacks. Terrorist attacks with greater numbers of fatalities attract more attention from the media and the general public (Kearns et al. 2019), making these attacks more salient to investors. The number of attacks (*Num attacks*) is the number of terrorist attacks in the 30-day period prior to the listing date. We reason that greater numbers of attacks in the pre-IPO window could magnify investor attention on terrorist attacks. The financial center attack

indicator variable (*Financial center attack*) is a dummy variable equal to one if at least one of the terrorist attacks took place at one of the financial centers or Washington, DC, and zero otherwise.[23] We reason that terrorist attacks that take place at financial centers are likely to attract more attention from investors in other locations. We further conjecture that terrorist attacks that take place closer to the IPO date should have a greater impact on IPO investor sentiment. We measure time proximity to the attack (*Time proximity*) as -1 times the natural logarithm of the number of days between the closest terrorist attack date and the IPO date. Finally, since retail investors—that is, investors who are more likely to be sentiment driven (Ljungqvist et al. 2006)—tend to focus on the stocks of locally headquartered firms (Seasholes and Zhu 2010; Korniotis and Kumar 2013), we reason that the negative effect of pre-IPO terrorist attacks should be magnified for attacks that take place in geographic proximity to the IPO firms' headquarters. We measure the geographic proximity of attacks (*Distance proximity*) as -1 times the geographic distance between the location of the closest terrorist attack and the headquarters of the IPO firm.

We include the aforementioned five variables as the explanatory variables of interest in the regression specification in Equation (1). Since we can examine the salience of terrorist attack only for IPOs with terrorist attacks in the pre-IPO period, we restrict the sample to IPOs with at least one terrorist attack within the 30-day period prior to the IPO listing date (i.e., IPOs with *Attack* = 1). The results of this analysis are presented in Table 10. Columns (1) and (2) show that coefficients of the *Num attacks* and *Financial center attack* variables, respectively, are both significantly negative (largest *p*-value = 0.02), suggesting that IPOs with multiple attacks in the pre-IPO period or with pre-IPO attacks that took place at one of the financial centers experience lower first-day returns, on average. Column (3) shows that the coefficient of the *Num fatalities* variable is significantly negative (*p*-value = 0.04), suggesting that IPOs

[23] The financial centers in our sample include Atlanta, Boston, Dallas, Los Angeles, New York, and Seattle.

with more deadly pre-IPO terrorist attacks, on average, experience lower first-day returns.[24] Columns (4) and (5) show that the coefficients of the *Time proximity* and *Distance proximity* variables are both significantly negative (largest *p*-value = 0.036), suggesting that IPOs with terrorist attacks closer to the IPO date or attacks that take place in geographic proximity to their headquarters, on average, experience lower first-day returns. Collectively, the results of this analysis support our conjecture that the impact of negative sentiment induced by pre-IPO terrorist attacks is amplified for attacks that are more salient to investors.

[Insert Table 10 here]

6. Supplemental Analysis

6.1 Post-Listing Day Stock Returns

In this section, we examine the impact of pre-IPO terrorist attacks on the post-listing day stock returns of new issues. Since investor sentiment captures beliefs about asset values unwarranted by fundamentals (Dorn 2009), sentiment-driven returns should subsequently revert. In our setting, if the first-day returns of the affected IPOs are lowered by a downward shift in investor sentiment elicited by pre-IPO terrorist attacks, such an effect should reverse itself in the post-listing day period. Therefore, we expect to observe a positive association between pre-IPO terrorist attacks and the post-listing day stock returns. To test this prediction, we calculate the stock returns over one week (*Return_1W*), two weeks (*Return_2W*), and four weeks (*Return_4W*) after the IPO listing date.[25] We then re-estimate the regression

[24] In untabulated analysis, we extend our sample to include terrorist attacks without casualties. Using this extended sample, we create two dummy variables: (1) *Attack_with_fatalities* and (2) *Attack_without_fatalities* and regress *First-day return* on these two dummy variables and controls specified in our baseline model. The coefficient of *Attack_with_fatalities* is -0.0737 (*p*-value = 0.000), the coefficient of *Attack_without_fatalities* is -0.018 (*p*-value = 0.214), and the difference between the two coefficients is significantly negative (*p*-value = 0.019), further confirming that the documented effect is amplified for attacks that are more salient to investors.

[25] Our focus on the short-term (weekly) post-listing stock returns is consistent with prior literature suggesting that noise traders—and thus, sentiment-driven valuation biases—cannot survive in the long run (Kogan et al. 2006). Relatedly, Gao et al. (2020) note that the lack of evidence on the short-term return predictability using existing sentiment proxies constitutes a significant gap in the sentiment literature.

specification in Equation (1) three times, using each of the three post-listing day return measures as the dependent variable, respectively.

The results of this analysis are presented in Table 11. Column (1) shows that the coefficient of *Attack* is significantly positive in the *Return_1W* regression model (*p*-value < 0.01). Similarly, columns (2) and (3) show that the *Attack* variable loads positively in *Return_2W* and *Return_4W* regression models (*p*-value < 0.01 for *Return_2W*, *p*-value = 0.057 for *Return_4W*). The results of this analysis suggest that the documented effect of pre-IPO attacks on the listing day return reverts in the post-listing day period, lending further support for investor sentiment as the mechanism underpinning our findings.

[Insert Table 11 here]

6.2 Other IPO Outcomes

In this section, we extend our analysis beyond the IPO first-day return by examining the impact of terrorist attacks on a set of alternative measures of IPO performance studied in prior literature (e.g., Benveniste and Wilhelm 1990; Ljungqvist and Wilhelm 2003; Cook et al. 2006; Wang and Yung 2015), which includes price revision, oversubscription, total proceeds, and primary share revision. Sentiment-based IPO pricing models stipulate that underwriters set the final offer price to reflect investor bullishness in early aftermarket trading (Cook et al. 2006). Therefore, we expect the negative shocks to investor sentiment induced by terrorist attacks to result in lower price revisions. We further reason that, to the extent that IPO oversubscription captures the ex ante demand for an IPO (Jenkinson and Jones 2004), a decline in investor sentiment induced by terrorist attacks should reduce the likelihood of the affected IPOs being oversubscribed, as investors in the primary IPO market would expect lower returns from flipping shares to retail investors on the first day of trading. Following similar reasoning, we expect that pre-IPO terrorist attacks result in lower total proceeds and lower primary share revisions for the affected new issues.

Construction of the variables used in this analysis follows prior literature (Bradley and Jordan 2002; Lowry and Schwert 2004; Cook et al. 2006; Wang and Yung 2015). We calculate price revision (*Price revision*) as the difference between the IPO offer price and the mid-point of the initial filing range, divided by the mid-point of the initial filing range. We construct the oversubscription dummy (*Oversubscription*) as a dummy variable equal to 1 if the total volume of orders in the underwriting book exceeds the number of shares offered and zero otherwise as indicated by the SDC Platinum oversubscription flag. We calculate total proceeds (*Proceeds*) as the number of shares issued times the final offer price divided by the total assets of the issuing firm. We calculate primary share revision (*Primary share revision*) as the difference between the number of primary shares offered and the number of primary shares filed, divided by the total number of shares filed. We re-estimate the regression specification in Equation (1) four times, using each of the four aforementioned variables as the dependent variable, respectively.

We present the results of this analysis in Table 12 which shows that the coefficient of *Attack* is significantly negative in all four regression models (largest *p*-value = 0.023). These results suggest that IPOs affected by terrorist attacks have lower price revisions, lower proceeds, lower primary share revisions, and are less likely to be oversubscribed by investors. Coupled with the documented negative effect of terrorist attacks on IPO first-day return, these findings suggest that terrorist attacks have two distinct effects. First, issuing firms affected by terrorist attacks are less aggressive when setting IPO offer prices. Second, notwithstanding less aggressive offer prices, IPO investors are less "bullish" and do not bid up post-IPO prices of the issuing firms affected by terrorist attacks to the same extent as they would in the absence of a terrorist attack.[26]

[26] The negative impact of pre-IPO terrorist attacks on IPO proceeds is notable, given the results reported in Table 7 showing (1) the lack of a significant direct effect of the attacks on post-IPO operating performance and (2) a positive association between IPO proceeds and post-IPO operating performance. Collectively, these findings

[Insert Table 12 here]

7. Conclusions

Utilizing incidences of terrorist attacks in the pre-IPO period as exogenous shocks to investor sentiment, we study the impact of investor sentiment on IPO pricing. We find that IPOs listed within 30-day period following the attacks, on average, experience lower first-day returns. We also find that pre-IPO terrorist attacks are associated with a more negative media tone of the articles covering the IPO, but not with post-IPO operating performance. In a cross-sectional analysis, we find that the documented effect of attacks is amplified for hard-to-value IPOs, mitigated for IPOs with reputable intermediaries, and magnified by the salience of the attacks. Further, we show that terrorist attacks in the pre-IPO period are associated with higher post-listing day stock returns, consistent with sentiment-driven return reversals. We also find that affected IPOs have lower price revisions, total proceeds, primary share revisions, and are less likely to be oversubscribed. Collectively, our results are consistent with terrorist attacks inducing negative shocks to investor sentiment, resulting in lower demand for new offerings and lower IPO valuations.

Our paper contributes to the emerging stream of research examining the role of investor sentiment in IPO pricing. Providing causal inferences on this relation is challenged by the latent nature of the sentiment construct and substantial endogeneity issues. We tackle these challenges by using incidences of terrorist attacks in the pre-IPO period as exogenous shocks to investor sentiment. Our paper also contributes to the literature examining the impact of terrorism on financial market outcomes and corporate policies. While studies in this stream of research predominantly focus on the economy-wide effects of terrorism, we provide evidence of the micro-level (firm-level) impact of terrorist attacks in the IPO setting. Lastly, our findings

suggest that, while having no direct effect on the IPO firms' fundamentals, a decline in investor sentiment induced by terrorist attacks impacts post-IPO performance indirectly by reducing IPO proceeds.

have policy implications, suggesting that regulators consider the adverse effects of terrorist attacks on firms' abilities to raise external funds, when forming economic policies.

We conclude by highlighting potential avenues for future research. Similar to other studies (e.g., Edmans et al. 2007; Baker and Wurgler 2006, 2007; Wang and Young 2020), we do not measure investor sentiment directly since doing so in a large-scale archival study such as ours would not be feasible. Future studies could explore the interplay between investor sentiment and IPO underpricing using experimental research design, whereby sentiment could potentially be induced and measured in a controlled environment. Also, in line with prior studies (e.g., Wang and Young 2020) our study focuses on terrorist attacks that took place in the U.S. Future research could fruitfully extend our analysis by examining a panel of IPOs and terrorist attacks from different countries. Such an analysis would provide useful insights on the role of investor sentiment in shaping IPO outcomes in the global setting.

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Appendix A.
List of Terrorist Attacks

	Target	Attack date	No. of casualties	Attack city	Attack state	No. of IPOs affected
1	Van carrying rabbinical students, Brooklyn Bridge	1-Mar-1994	1	New York City	New York	35
2	Unabomber—Thomas Mosser	10-Dec-1994	1	Caldwell	New Jersey	10
3	Planned Parenthood Clinic	30-Dec-1994	2	Brookline	Massachusetts	9
4	Alfred P. Murray Federal Building	19-Apr-1995	168	Oklahoma City	Oklahoma	16
5	Gilbert Murray—Gilbert Murray	24-Apr-1995	1	Sacramento	California	15
6	Olympic Park bombing	27-Jul-1996	1	Atlanta	Georgia	36
7	Empire State Building	23-Feb-1997	1	New York City	New York	22
8	Abortion clinic bombing	29-Jan-1998	1	Birmingham	Alabama	26
9	U.S. Capitol Building	24-Jul-1998	2	Washington DC	District of Columbia	17
10	Barnett Slepian murder	23-Oct-1998	1	Amherst	New York	5
11	Columbine High School	20-Apr-1999	15	Littleton	Colorado	23
12	Korean Methodist Church	4-Jul-1999	2	Bloomington	Indiana	35
13	Bank of America, Plaza Building	5-Jan-2002	1	Tampa	Florida	2
14	Los Angeles International Airport	4-Jul-2002	3	Los Angeles	California	4
15	Seattle Jewish Federation	28-Jul-2006	1	Seattle	Washington	4
16	Virginia Tech. Shooting	16-Apr-2007	32	Blacksburg	Virginia	19
17	Knoxville Unitarian Church	27-Jul-2008	2	Knoxville	Tennessee	1
18	Immigration center	3-Apr-2009	13	Binghamton	New York	2
19	Late term abortion doctor - Dr. George Tiller	31-May-2009	1	Wichita	Kansas	3
20	Military recruiting station	1-Jun-2009	1	Little Rock	Arkansas	4
21	The National Holocaust Museum	10-Jun-2009	1	Washington DC	District of Columbia	3
22	Military Personnel, Fort Hood	5-Nov-2009	13	Killeen	Texas	6
23	Internal Revenue Service Building	18-Feb-2010	2	Austin	Texas	2
24	Pentagon Building	4-Mar-2010	1	Arlington	Virginia	9
25	Discovery Communications Headquarters	1-Sep-2010	1	Silver Spring	Maryland	3
26	Movie theater, Aurora	20-Jul-2012	12	Aurora	Colorado	12
27	Sikh temple	5-Aug-2012	7	Oak Creek	Wisconsin	6
28	Sandy Hook School	14-Dec-2012	12	Sandy Hook	Connecticut	1
29	Boston Marathon	15-Apr-2013	3	Boston	Massachusetts	16

30	Security officer while pursuing Boston Marathon Bombers	18-Apr-2013	1	Cambridge	Massachusetts	17
31	Navy Yard	16-Sep-2013	12	Washington DC	DC	31
32	Terminal 3, Los Angeles Airport	1-Nov-2013	1	Los Angeles	California	18
33	Jewish retirement home	13-Apr-2014	3	Overland Park	Kansas	15
34	Civilian shooting, Seattle	27-Apr-2014	1	Seattle	Washington	15
35	Civilian shooting, Seattle	1-Jun-2014	2	Seattle	Washington	24
36	Police officer shooting, Las Vegas	8-Jun-2014	5	Las Vegas	Nevada	23
37	Blooming Grove Barracks	12-Sep-2014	1	Blooming Grove	Pennsylvania	24
38	Police officer shooting, New York	20-Dec-2014	2	New York City	New York	2
39	Civilian shooting, Chapel Hill	10-Feb-2015	3	Chapel Hill	North Carolina	8
40	African Methodist Episcopal Church, Charleston	17-Jun-2015	9	Charleston	South Carolina	26
41	Navy recruiting station	16-Jul-2015	6	Chattanooga	Tennessee	20
42	Movie theatre, Lafayette	23-Jul-2015	3	Lafayette	Louisiana	15
43	Umpqua Community College shooting	1-Oct-2015	9	Roseburg	Oregon	12
44	Planned Parenthood shooting	27-Nov-2015	3	Colorado Springs	Colorado	2
45	Holiday party	2-Dec-2015	16	San Bernardino	California	2
46	Nightclub	12-Jun-2016	50	Orlando	Florida	4
47	Police officer shooting, Dallas	7-Jul-2016	6	Dallas	Texas	12
48	Police officer shooting, Bristol	7-Jul-2016	1	Bristol	Tennessee	12
49	Police officer shooting, Baton Rouge	17-Jul-2016	4	Baton Rouge	Louisiana	13

Appendix B.
Sample Selection

SDC Platinum sample from January 1, 1994, to December 31, 2016		13,453
Less withdrawn or postponed IPOs	2,096	
Less duplicate CUSIP entries or firm name	1,729	
Less foreign listings, closed-end funds, rights offerings, and unit offerings	3,487	
Less IPOs with missing offer price or offer price less than $1.00	452	
Less IPOs with missing listing day returns or missing value for any of the control variables	1,827	
Less IPO firms with negative leverage, sales, or market-to-book ratio	179	
Final sample		3,683

Appendix C.
Variable Definitions

Variable	Definition
Variables in the baseline regression (Table 4)	
First-day return	IPO first-day closing price minus offer price, scaled by offer price.
Attack	Dummy variable equal to 1 if there was a terrorist attack 30 days prior to the listing date, and 0 otherwise.
Offer size	Natural logarithm of total proceeds raised, in millions of U.S. dollars.
Profitability	Earnings before interest and tax divided by the total assets of the IPO firm at the time of listing.
Asset turnover	Sales divided by the total assets of the IPO firm at the time of listing.
Market-to-book	Market value of assets divided by the book value of the assets of the IPO firm at the time of listing.
Leverage	Total debt divided by the total assets of the IPO firm at the time of listing.
Float	Regular shares issued to the public for trading divided by the total number of outstanding shares.
Shares issued	Natural logarithm of regular shares issued to the public for trading.
Underwriter	Reputation rank of the lead underwriter at the time of listing, based on the updated Carter and Manaster (1990) classification.
Big 4 auditor	Dummy variable equal to 1 if the IPO firm is audited by a Big 4 auditing firm, and 0 otherwise.
VC back	Dummy variable equal to 1 if the IPO firm is backed by venture capital, and 0 otherwise.
Commitment	Dummy variable equal to 1 if the underwriter guarantees to purchase all the securities offered for sale by the issuer regardless of whether they can sell them to investors, and 0 otherwise.
Firm age	Natural logarithm of the difference between the year of listing and the year the firm was founded.
Equity carve-out	Dummy variable equal to 1 if the IPO firm is an equity carve-out from another firm, and 0 otherwise.
NASDAQ	Dummy variable equal to 1 if the IPO was listed on the NASDAQ, and 0 otherwise.
Election	Dummy variable equal to 1 if there was a senate or presidential election in the 30 days prior to the listing date, and 0 otherwise.
Market return	Return on the Standard & Poor's 500 over the three months preceding the offering.
Δ*Business confidence*	Monthly change in the business confidence index.
Δ*Consumer sentiment*	Monthly change in the University of Michigan Consumer Sentiment Index.
Δ*Policy uncertainty*	Monthly change in Economic Policy Uncertainty.
EPS forecast revision	Average earnings per share (EPS) forecast revision, which is the average revision in the analysts' EPS forecasts scaled by the stock price across all listed firms.
Δ*Real risk premium*	Monthly change in the real risk premium.
Δ*Real 10 year rate*	Monthly change in the real 10-year interest rate.
Additional variables (Table 5)	
Pre-IPO media coverage	Natural logarithm of the number of news articles about the IPO firm during the 30-day window prior to IPO day.
IPO day media coverage	Natural logarithm of the number of news articles about the IPO firm on the IPO day.
Advertising intensity	Advertising expenses divided by sales at the time of listing.
Primary return	IPO first-day opening price minus offer price, scaled by offer price.
Secondary return	IPO first-day closing price minus first-day opening price, scaled by first-day opening price.
Additional variables (Table 6)	
Negative articles	Natural logarithm of the number of news articles about the IPO firm from the day of the terrorist attack up to the listing date that has a transformed ESS of -1.
Positive articles	Natural logarithm of the number of news articles about the IPO firm from the day of the terrorist attack up to the listing date that has a transformed ESS of 1.
Average tone	Average value of the transformed ESS among all the news articles about the IPO firm from the day of the terrorist attack up to the listing date.

Additional variables (Table 7)	
ROA_1Y/2Y/3Y	Net income divided by total assets at the end of the first/second/third year after listing.
Managerial ownership	Dummy variable that takes the value 1, if managers retain more than the median ownership retention level after the IPO, and 0 otherwise.
Price revision	Difference between the IPO offer price and the mid-point of the initial filing range, divided by the mid-point of the initial filing range.
Market value	Natural logarithm of market capitalization of the IPO firm.
Additional variables (Table 8)	
Low profitability	Dummy variable equal to 1 if the IPO firm belongs to the bottom quartile of *Profitability*, and 0 otherwise.
Intangibility	One minus the ratio of property, plant, and equipment over the total assets of the IPO firm at the time of listing.
Additional variables (Table 10)	
Num attacks	Number of terrorist attacks in the 30-day period prior to the listing date.
Financial center attack	Dummy variable equal to 1 if at least one of the terrorist attacks was at one of the financial centers or Washington, DC, and 0 otherwise.
Num fatalities	Natural logarithm of one plus the number of victims killed in the terrorist attack.
Time proximity	-1 times the natural logarithm of the difference between the date of the terrorist attack and the IPO listing date.
Distance proximity	-1 times the natural logarithm of the geographic distance between the location of the terrorist attack and the headquarters of the IPO firm.
Additional variable (Table 11)	
Return_1W/2W/4W	Closing price one/two/four week(s) after the IPO listing day minus the closing price on the listing day divided by the closing price on the listing day.
Additional variables (Table 12)	
Oversubscription	Dummy variable equal to 1 if the total volume of orders in the underwiting book exceeds the number of shares offered and zero otherwise.
Total proceeds	Total proceeds raised in the IPO, scaled by total assets at the time of listing.
Primary share revision	Difference between the number of primary shares offered and the number of primary shares filed, divided by the total number of shares filed.

Appendix D.
Comparison of IPO Firm Characteristics

Panel A. Full Sample

Variable	Attack	No Attack	Diff.	*t*-Stat.
Offer size	4.1525	4.3254	-0.1729	-3.0533
Profitability	0.0202	0.0334	-0.0132	-0.8512
Asset turnover	0.5911	0.6153	-0.0242	-0.7187
Market-to-book	2.4382	2.4220	0.0161	0.1165
Leverage	0.2497	0.2244	0.0253	2.0148
Float	0.4670	0.4657	0.0013	0.1185
Shares issued	1.9427	1.8164	0.1263	3.3328
Underwriter	7.2467	7.4990	-0.2522	-2.4758
Big 4 auditor	0.3728	0.3698	0.0030	0.1409
VC back	0.3875	0.4084	-0.0208	-0.9088
Commitment	0.6408	0.8126	-0.1718	-7.8068
Firm age	2.2528	2.2424	0.0104	0.2140
Equity carve-out	0.2439	0.1798	0.0641	3.2204
NASDAQ	0.6503	0.6760	-0.0257	-1.1484
Obs.	529	3,154		

Panel B. Propensity Score-Matched Sample Based on All Nonaffected IPOs

Variable	Attack	No Attack	Diff.	*t*-Stat.
Offer size	4.1525	4.2470	-0.0945	-1.3122
Profitability	0.0202	0.0208	-0.0007	-0.0309
Asset turnover	0.5911	0.5552	0.0359	0.8451
Market-to-book	2.4382	2.5301	-0.0919	-0.5266
Leverage	0.2497	0.2333	0.0163	1.0158
Float	0.4670	0.4488	0.0182	1.2508
Shares issued	1.9427	1.8917	0.0511	1.0638
Underwriter	7.2467	7.4657	-0.2189	-1.6631
Big 4 auditor	0.3728	0.3705	0.0023	0.0818
VC back	0.3875	0.4093	-0.0218	-0.7181
Commitment	0.6408	0.6465	-0.0057	-0.1924
Firm age	2.2528	2.1956	0.0572	0.9275
Equity carve-out	0.2439	0.2300	0.0138	0.5409
NASDAQ	0.6503	0.6673	-0.0170	-0.5831
Obs.	529	529		

Panel C. 30-Day Pre- and Post-Attack Sample

Variable	Attack	No Attack	Diff.	*t*-Stat.
Offer size	4.1525	4.1284	0.0241	0.3074
Profitability	0.0202	0.0420	-0.0219	-1.0642
Asset turnover	0.5911	0.5757	0.0154	0.3467
Market-to-book	2.4382	2.3767	0.0615	0.3217
Leverage	0.2497	0.2556	-0.0059	-0.3331
Float	0.4670	0.4589	0.0081	0.5198
Shares issued	1.9427	1.8064	0.1364	2.6210
Underwriter	7.2467	7.4822	-0.2355	-1.6767
Big 4 auditor	0.3728	0.3765	-0.0038	-0.1243
VC back	0.3875	0.4049	-0.0174	-0.5385
Commitment	0.6408	0.7457	-0.1048	-3.4846
Firm age	2.2528	2.2792	-0.0263	-0.3833
Equity carve-out	0.2439	0.2000	0.0439	1.6065
NASDAQ	0.6503	0.6617	-0.0114	-0.3647
Obs.	529	405		

FIGURE 1
Average First-Day Returns of IPOs and Terrorist Attacks

This figure presents the average first-day returns of IPOs affected and not affected by terrorist attacks, respectively, for each year and in total. The numbers are not presented for 2000-2001, 2003-2005 and 2011 since there were not affected IPOs in these years. The variable definitions are presented in Appendix C.

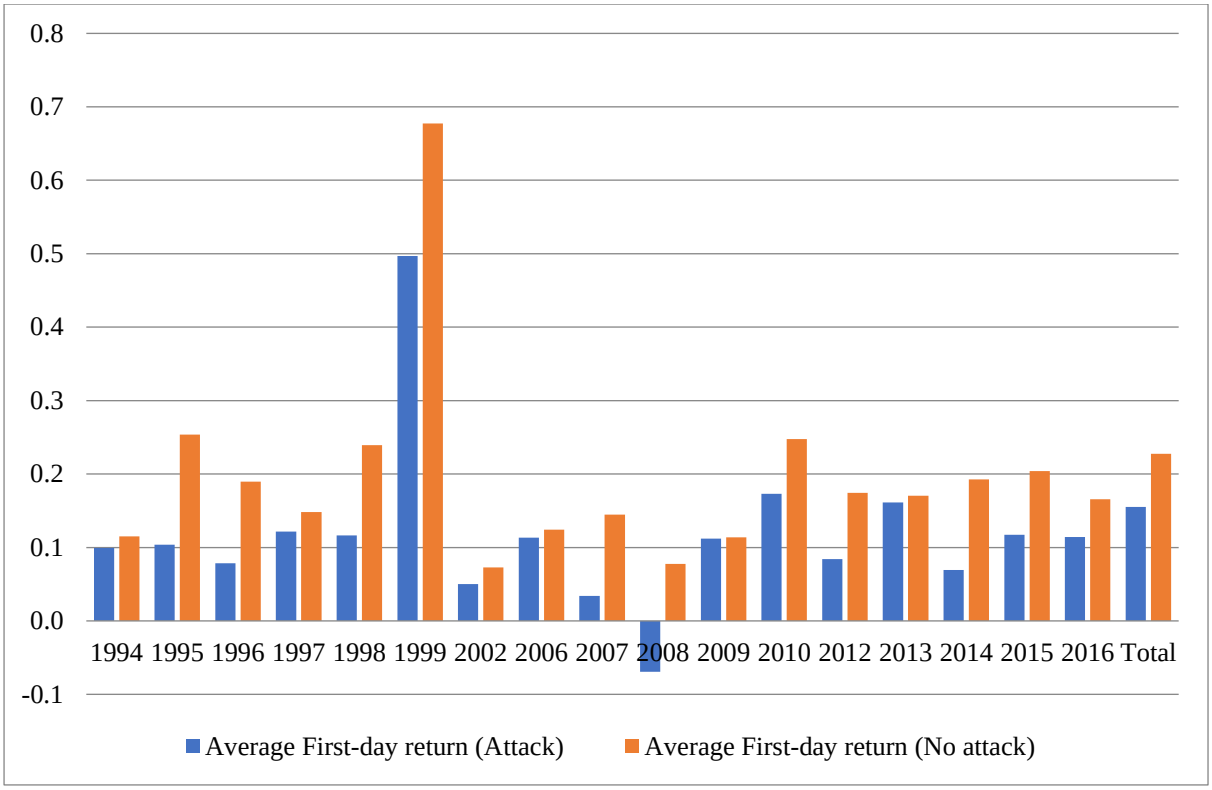


TABLE 1
Sample Distribution

This table presents the annual distribution of the IPOs and the average first-day returns of IPOs affected and not affected by terrorist attacks, respectively. The variable definitions are presented in Appendix C.

Year	Full Sample		Attack		No Attack		Diff.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	No. of IPOs	Average *First-day return*	No. of IPOs	Average *First-day return*	No. of IPOs	Average *First-day return*	(4) Minus (6)	*t*-Stat.
1994	312	0.1130	45	0.0995	267	0.1152	-0.0157	-0.56
1995	302	0.2402	27	0.1036	275	0.2536	-0.1501	-4.10
1996	445	0.1807	36	0.0786	409	0.1897	-0.1112	-4.04
1997	314	0.1464	22	0.1218	292	0.1483	-0.0265	-0.50
1998	185	0.2198	48	0.1164	137	0.2393	-0.1229	-1.92
1999	287	0.6409	58	0.4968	229	0.6774	-0.1805	-1.74
2000	213	0.5730	0	-	213	0.5730	-	-
2001	46	0.1489	0	-	46	0.1489	-	-
2002	49	0.0701	6	0.0503	43	0.0729	-0.0226	-0.56
2003	52	0.1301	0	-	52	0.1301	-	-
2004	134	0.1337	0	-	134	0.1337	-	-
2005	115	0.1029	0	-	115	0.1029	-	-
2006	125	0.1240	4	0.1134	121	0.1243	-0.0109	-0.24
2007	153	0.1311	19	0.0339	134	0.1449	-0.1110	-3.89
2008	23	0.0669	1	-0.0693	22	0.0776	-0.1469	-2.77
2009	42	0.1156	12	0.1120	30	0.1137	-0.0017	-0.02
2010	92	0.0958	12	0.1731	80	0.2474	-0.0743	-1.82
2011	89	0.1102	0	-	89	0.1102	-	-
2012	115	0.1635	14	0.0843	101	0.1745	-0.0902	-2.43
2013	173	0.1670	68	0.1613	105	0.1706	-0.0094	-0.22
2014	211	0.1512	71	0.0692	140	0.1928	-0.1236	-3.61
2015	130	0.1593	67	0.1172	63	0.2040	-0.0867	-2.33
2016	76	0.1528	19	0.1143	57	0.1656	-0.0512	-0.94
Total	3,683	0.2172	529	0.1554	3154	0.2276	-0.0722	-3.73

TABLE 2
Summary Statistics

This table presents the summary statistics for the variables in this study. The variable definitions are presented in Appendix C.

	Mean	Std. Dev.	5%	Median	95%
First-day return	0.2172	0.4131	-0.0961	0.0933	0.9698
Attack	0.1436	0.3508	0.0000	0.0000	1.0000
Offer size	4.1773	1.1559	2.1883	4.1109	6.2166
Profitability	0.0313	0.2862	-0.1550	0.0352	0.2549
Asset turnover	0.6118	0.6909	0.0000	0.3955	1.9828
Market-to-book	2.4244	2.7955	0.1499	1.6950	7.3103
Leverage	0.2280	0.2527	0.0010	0.1371	0.7385
Float	0.4659	0.2404	0.1290	0.4330	0.9250
Shares issued	1.8346	0.7621	0.7885	1.7234	3.3673
Underwriter	7.4944	2.0692	3.0000	8.0000	9.0000
Big 4 auditor	0.3702	0.4573	0.0000	0.0000	1.0000
VC back	0.4054	0.4910	0.0000	0.0000	1.0000
Commitment	0.7879	0.4088	0.0000	1.0000	1.0000
Firm age	2.2439	1.0622	0.0000	2.1972	4.1431
Equity carve-out	0.1890	0.3915	0.0000	0.0000	1.0000
NASDAQ	0.6723	0.4694	0.0000	1.0000	1.0000
Election	0.0521	0.2223	0.0000	0.0000	1.0000
Market return	0.0375	0.0540	-0.0456	0.0422	0.1295
Δ*Business confidence*	0.0071	0.1767	-0.2482	0.0095	0.2812
Δ*Consumer sentiment*	0.0030	0.0384	-0.0560	0.0026	0.0599
Δ*Policy uncertainty*	4.4916	0.2976	4.0234	4.4572	5.1128
EPS forecast revision	0.0289	0.2379	-0.2626	-0.0078	0.4146
Δ*Real risk premium*	-0.0003	0.0364	-0.0452	-0.0062	0.0600
Δ*Real 10 year rate*	0.0172	1.5400	-0.2722	-0.0076	0.3012
Obs.			3,683		

TABLE 3
Correlation Matrix

This table presents the correlation matrix for the variables in this study. The variable definitions are presented in Appendix C.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	*First-day return*	1.000											
(2)	*Attack*	-0.061	1.000										
(3)	*Offer size*	0.025	0.053	1.000									
(4)	*Profitability*	0.058	-0.058	0.109	1.000								
(5)	*Asset turnover*	-0.057	-0.012	-0.084	0.332	1.000							
(6)	*Market-to-book*	0.332	0.002	-0.132	-0.156	-0.017	1.000						
(7)	*Leverage*	-0.125	0.035	0.151	0.056	0.162	-0.138	1.000					
(8)	*Float*	-0.163	0.002	-0.078	0.034	-0.108	-0.106	-0.019	1.000				
(9)	*Shares issued*	-0.071	0.058	0.940	0.078	-0.098	-0.181	0.171	-0.023	1.000			
(10)	*Underwriter*	0.113	-0.005	0.589	0.082	-0.016	0.038	0.025	-0.145	0.455	1.000		
(11)	*Big 4 auditor*	0.069	0.023	0.286	-0.041	-0.015	0.037	0.025	-0.073	0.259	0.312	1.000	
(12)	*VC back*	0.206	-0.015	-0.113	-0.314	-0.167	0.266	-0.208	-0.082	-0.149	0.206	0.160	1.000
(13)	*Commitment*	0.077	-0.147	-0.276	0.101	0.097	0.101	-0.056	-0.008	-0.304	-0.069	-0.091	-0.014
(14)	*Firm age*	-0.075	0.003	0.160	0.207	0.290	-0.137	0.179	-0.131	0.142	0.126	0.068	-0.123
(15)	*Equity carve-out*	-0.063	0.057	0.208	0.118	0.072	-0.099	0.148	-0.025	0.215	0.055	0.040	-0.252
(16)	*NASDAQ*	0.130	-0.019	-0.325	-0.151	0.008	0.159	-0.143	-0.040	-0.357	-0.036	-0.017	0.324
(17)	*Election*	-0.039	-0.075	-0.019	0.008	0.007	-0.003	-0.025	0.017	-0.015	-0.004	-0.002	-0.005
(18)	*Market return*	0.034	-0.074	-0.057	0.025	0.002	0.009	-0.008	0.012	-0.068	-0.031	-0.017	-0.023
(19)	*ΔBusiness confidence*	-0.001	-0.045	-0.013	0.031	-0.010	0.027	-0.012	-0.009	-0.016	-0.027	0.019	-0.021
(20)	*ΔConsumer sentiment*	-0.020	0.015	-0.015	0.008	-0.010	0.011	-0.019	-0.018	-0.013	0.000	0.013	-0.006
(21)	*ΔPolicy uncertainty*	-0.087	0.159	0.214	-0.031	-0.059	-0.110	0.052	-0.052	0.242	0.074	0.078	-0.024
(22)	*EPS forecast revision*	-0.010	0.004	-0.015	-0.029	-0.006	0.018	-0.036	-0.050	-0.015	0.024	0.011	0.028
(23)	*ΔReal risk premium*	-0.017	0.006	0.003	0.024	0.006	-0.019	0.016	-0.007	0.000	-0.024	-0.024	-0.025
(24)	*ΔReal 10 year rate*	0.002	0.009	0.017	-0.005	-0.038	-0.006	-0.010	-0.006	0.015	0.027	-0.013	-0.011

TABLE 3 (continued)

		(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(13)	*Commitment*	1.000											
(14)	*Firm age*	-0.012	1.000										
(15)	*Equity carve-out*	-0.065	0.108	1.000									
(16)	*NASDAQ*	0.055	-0.059	-0.188	1.000								
(17)	*Election*	-0.034	-0.033	-0.001	0.013	1.000							
(18)	*Market return*	0.055	-0.004	-0.030	-0.025	0.067	1.000						
(19)	Δ*Business confidence*	-0.016	0.003	0.008	-0.026	0.005	0.201	1.000					
(20)	Δ*Consumer sentiment*	0.008	-0.015	-0.020	-0.035	0.059	0.195	0.094	1.000				
(21)	Δ*Policy uncertainty*	-0.192	-0.001	0.098	-0.109	-0.031	-0.225	-0.062	-0.076	1.000			
(22)	*EPS forecast revision*	0.034	0.005	-0.029	0.006	0.034	-0.095	-0.100	0.058	-0.083	1.000		
(23)	Δ*Real risk premium*	-0.020	0.033	0.032	0.000	-0.030	-0.037	0.258	0.098	-0.017	0.033	1.000	
(24)	Δ*Real 10 year rate*	0.019	-0.011	0.022	-0.026	-0.007	0.008	0.011	-0.081	0.034	0.005	0.008	1.000

TABLE 4

Terrorist Attacks and IPO First-Day Returns: Baseline Regression Results

This table presents the regression results for the relation between terrorist attacks and IPO first-day returns. The regressions are performed by OLS, with *t*-statistics computed using heteroskedasticity-robust standard errors. All the regressions include a constant and industry, year, and state fixed effects. The variable definitions are presented in Appendix C.

Dependent Variable:	*First-day return* (1)		*First-day return* (2)		*First-day return* (3)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Attack	-0.0882	-5.07	-0.0825	-4.93	-0.0761	-4.47
Offer size			0.2272	10.88	0.2223	10.64
Profitability			0.0818	2.28	0.0823	2.31
Asset turnover			-0.0431	-3.72	-0.0425	-3.67
Market-to-book			0.0264	6.69	0.0267	6.79
Leverage			-0.0295	-1.25	-0.0318	-1.35
Float			-0.1056	-3.67	-0.1090	-3.81
Shares issued			-0.2919	-10.86	-0.2859	-10.61
Underwriter			0.0152	4.00	0.0145	3.81
Big 4 auditor			0.0421	3.12	0.0449	3.33
VC back			0.0574	3.55	0.0571	3.54
Commitment			0.0031	0.21	0.0015	0.10
Firm age			-0.0188	-3.33	-0.0190	-3.37
Equity carve-out			-0.0048	-0.34	-0.0053	-0.38
NASDAQ			0.0564	4.14	0.0542	3.96
Election					-0.0335	-1.80
Market return					0.2518	2.62
Δ*Business confidence*					0.0326	0.67
Δ*Consumer sentiment*					-0.1725	-1.28
Δ*Policy uncertainty*					-0.0753	-2.60
EPS forecast revision					-0.0776	-2.34
Δ*Real risk premium*					0.0767	0.47
Δ*Real 10 year rate*					0.0006	0.23
Industry fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
State fixed effects	Yes		Yes		Yes	
Obs.	3,683		3,683		3,683	
Adjusted R^2	0.2216		0.3034		0.3070	

TABLE 5
Terrorist Attacks and IPO First-Day Returns: Robustness Checks

This table presents the regression results for various robustness checks for the relation between terrorist attacks and IPO first-day returns. For brevity, the table reports only the coefficient for terrorist attack. The regressions are performed by OLS, with *t*-statistics computed using heteroskedasticity-robust standard errors. All the regressions include control variables, a constant, and industry, year, and state fixed effects, but these are not tabulated for brevity. The variable definitions are presented in Appendix C.

Panel A: Additional controls		
(1) Control for pre-IPO media coverage (obs. = 1,838)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0730	-3.68
Pre-IPO media coverage	-0.0404	-3.69
(2) Control for IPO day media coverage (obs. = 1,838)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0694	-3.50
IPO-day media coverage	-0.0522	-4.37
(3) Control for pre-IPO advertising expenses (obs. = 2,140)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0724	-3.10
Advertising intensity	0.0655	2.82
Panel B: Alternative samples		
(1) Propensity score-matched sample based on all unaffected IPOs (obs. = 1,058)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0514	-2.21
(2) Sample of 30-day pre- and post-attack IPOs (obs. = 934)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0621	-2.40
(3) Propensity score-matched sample based on 30-day pre-attack IPOs (obs. = 810)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0751	-2.80
Panel C: Alternative terrorist attack windows		
(1) 15-day window (obs. = 3,683)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0816	-4.95
(2) 45-day window (obs. = 3,683)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0591	-3.49
(3) 60-day window (obs. = 3,683)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0388	-2.48
Panel D: Decomposition of IPO initial return		
(1) Primary market return (obs. = 3,642)		

Dependent variable:	*Primary return*	
	Coeff.	*t*-Stat.
Attack	-0.0732	-4.04
(2) Secondary market return (obs. = 3,642)		
Dependent variable:	*Secondary return*	
	Coeff.	*t*-Stat.
Attack	-0.0054	-1.00
Panel E: Excluding the transportation and tourism industries (obs. = 3,533)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0722	-4.14
Panel F: Including mass shooting events from the MSA (obs. = 3,683)		
Dependent variable:	*First-day return*	
	Coeff.	*t*-Stat.
Attack	-0.0450	-3.02

TABLE 6
Terrorist Attacks and Media-Based Sentiment Regarding IPOs

This table presents the regression results for the relation between terrorist attacks and media-based sentiment regarding IPOs. The regressions are performed by OLS, with *t*-statistics computed using heteroskedasticity-robust standard errors. All the regressions include a constant and industry, year, and state fixed effects. The variable definitions are presented in Appendix C.

Dependent Variable:	*Negative articles* (1)		*Positive articles* (2)		*Average tone* (3)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Attack	0.2545	4.09	-0.3791	-5.63	-0.2745	-5.78
Offer size	0.0945	0.98	0.0586	0.49	-0.0113	-0.16
Profitability	-0.2157	-2.32	0.0744	2.16	0.1409	1.76
Asset turnover	-0.0974	-1.88	0.0079	0.13	0.0266	0.66
Market-to-book	0.0178	0.97	-0.0114	-0.52	-0.0096	-0.64
Leverage	0.1949	1.80	-0.3412	-2.59	-0.1598	-1.89
Float	-0.1069	-0.82	-0.2512	-1.37	-0.0460	-0.43
Shares issued	0.0993	0.80	-0.0464	-0.31	-0.0810	-0.88
Underwriter	-0.0305	-1.71	0.0491	2.24	0.0235	1.76
Big 4 auditor	-0.0986	-1.06	0.1018	1.10	0.0776	1.08
VC back	-0.2729	-3.06	0.1940	1.96	0.1421	2.05
Commitment	0.1138	1.71	-0.0491	-0.60	-0.0645	-1.21
Firm age	0.0490	1.27	0.0610	1.47	-0.0067	-0.24
Equity carve-out	-0.0428	-0.57	0.0133	0.15	0.0050	0.08
NASDAQ	0.0732	0.98	0.0550	0.64	-0.0237	-0.41
Election	0.0998	0.65	-0.0830	-0.52	-0.0537	-0.42
Market return	-0.3157	-0.27	0.0178	0.02	-0.1523	-0.20
Δ*Business confidence*	0.2260	0.89	-0.4197	-1.56	-0.4354	-2.43
Δ*Consumer sentiment*	0.9293	1.14	-0.3050	-0.32	-0.5689	-0.96
Δ*Policy uncertainty*	0.2796	1.92	0.2468	1.60	0.0434	0.41
EPS forecast revision	0.1077	0.55	-0.4006	-1.98	-0.1951	-1.32
Δ*Real risk premium*	1.6485	1.38	2.6645	2.16	0.7263	0.89
Δ*Real 10 year rate*	0.0169	1.31	-0.0241	-2.57	-0.0118	-1.55
Industry fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
State fixed effects	Yes		Yes		Yes	
Obs.	536		536		536	
Adjusted R^2	0.3592		0.4332		0.4027	

TABLE 7
Terrorist Attacks and Post-IPO Operating Performance

This table presents the regression results for the relation between terror attacks and post-IPO operating performance. The regressions are performed by OLS, with *t*-statistics computed using heteroskedasticity-robust standard errors. All the regressions include a constant and industry, year, and state fixed effects. The variable definitions are presented in Appendix C.

Dependent Variable:	*ROA_1Y* (1)		*ROA_2Y* (2)		*ROA_3Y* (3)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Attack	-0.0005	-0.02	-0.0243	-1.06	-0.0277	-0.94
Offer size	0.0373	1.89	0.0493	2.04	0.0877	2.99
Profitability	0.8010	14.73	0.5191	10.37	0.3878	6.99
Asset turnover	0.0376	3.70	0.0626	4.85	0.0729	4.72
Market-to-book	-0.0184	-3.64	-0.0376	-6.24	-0.0333	-5.03
Leverage	-0.0735	-2.31	-0.0875	-2.63	-0.1057	-2.35
Float	-0.0600	-1.30	-0.0389	-0.71	-0.0436	-0.61
Shares issued	-0.0332	-1.30	-0.0537	-1.76	-0.1076	-2.92
Underwriter	0.0054	1.25	0.0089	1.74	0.0105	1.74
Big 4 auditor	-0.0147	-1.01	-0.0219	-1.27	-0.0225	-1.06
VC back	-0.0073	-0.43	-0.0041	-0.19	-0.0121	-0.45
Commitment	0.0201	0.87	-0.0310	-1.36	-0.0308	-1.26
Firm age	-0.0016	-0.29	0.0135	2.06	0.0192	2.20
Equity carve-out	0.0175	1.34	0.0162	1.04	0.0016	0.08
NASDAQ	0.0044	0.38	-0.0073	-0.52	-0.0212	-1.03
Election	0.0181	0.87	0.0129	0.44	-0.0330	-0.83
Market return	0.0076	0.05	-0.1181	-0.55	-0.1817	-0.66
Δ*Business confidence*	-0.0520	-1.13	-0.0777	-1.42	-0.0509	-0.69
Δ*Consumer sentiment*	0.2383	1.48	0.2921	1.68	0.3996	1.83
Δ*Policy uncertainty*	0.0277	0.90	0.0185	0.57	0.0227	0.56
EPS forecast revision	-0.0007	-0.03	-0.0815	-2.62	0.0036	0.10
Δ*Real risk premium*	0.0444	0.28	0.0979	0.53	0.1145	0.41
Δ*Real 10 year rate*	0.0012	0.55	0.0042	1.64	0.0028	1.00
First-day return	-0.0488	-1.65	-0.0675	-1.93	-0.0116	-0.32
Managerial ownership	-0.0158	-0.68	-0.0153	-0.58	-0.0121	-0.35
Price revision	0.0188	0.34	0.0925	1.09	0.0705	0.60
Market value	0.0141	3.30	0.0126	2.36	0.0202	3.31
Industry fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
State fixed effects	Yes		Yes		Yes	
Obs.	2,828		2,828		2,828	
Adjusted R^2	0.5099		0.3945		0.2662	

TABLE 8

Terrorist Attacks and IPO First-Day Returns: Moderating Effect of IPO Firm Characteristics

This table presents the regression results for the effect of IPO firm characteristics on the relation between terrorist attacks and IPO first-day returns. The regressions are performed by OLS, with *t*-statistics computed using heteroskedasticity-robust standard errors. For the binary variable moderators, we also report the *F*-statisic for the conditional effect of *Attack* when the moderator takes the value 1. All the regressions include a constant and industry, year, and state fixed effects. The variable definitions are presented in Appendix C.

Dependent Variable:	*First-day return* (1)		*First-day return* (2)		*First-day return* (3)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Attack	-0.1269	-3.58	-0.0683	-3.70	-0.0831	-2.99
*Attack*Firm age*	0.0226	1.72				
*Attack*Low profitability*			-0.0990	-2.76		
Low profitability			-0.0428	-1.84		
*Attack*Intangibility*					-0.1444	-2.40
Intangibility					0.0725	2.28
Offer size	0.2225	10.64	0.2175	10.43	0.2383	11.26
Profitability	0.0798	2.22	-0.0475	-1.14	0.1087	2.94
Asset turnover	-0.0426	-3.69	-0.0443	-3.85	-0.0434	-3.72
Market-to-book	0.0267	6.79	0.0270	6.86	0.0274	6.79
Leverage	-0.0336	-1.43	-0.0318	-1.34	-0.0424	-1.90
Float	-0.1089	-3.80	-0.1090	-3.80	-0.1169	-3.87
Shares issued	-0.2861	-10.62	-0.2808	-10.41	-0.3048	-10.85
Underwriter	0.0145	3.80	0.0145	3.80	0.0164	4.09
Big 4 auditor	0.0450	3.33	0.0485	3.63	0.0548	3.99
VC back	0.0566	3.50	0.0596	3.65	0.0518	3.15
Commitment	0.0002	0.02	0.0004	0.03	0.0006	0.04
Firm age	-0.0220	-3.61	-0.0197	-3.48	-0.0218	-3.59
Equity carve-out	-0.0050	-0.36	-0.0054	-0.39	-0.0035	-0.24
NASDAQ	0.0548	3.99	0.0546	3.99	0.0475	3.39
Election	-0.0338	-1.82	-0.0342	-1.83	-0.0380	-2.02
Market return	0.2487	2.60	0.2515	2.62	0.3422	3.14
Δ*Business confidence*	0.0327	0.67	0.0390	0.80	0.0170	0.34
Δ*Consumer sentiment*	-0.1737	-1.29	-0.1666	-1.24	-0.1420	-1.01
Δ*Policy uncertainty*	-0.0854	-2.90	-0.0861	-3.00	0.0029	0.10
EPS forecast revision	-0.0781	-2.36	-0.0767	-2.32	-0.0702	-2.07
Δ*Real risk premium*	0.0761	0.47	0.0672	0.41	0.1281	0.77
Δ*Real 10 year rate*	0.0008	0.27	0.0006	0.20	0.0006	0.17
Industry fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
State fixed effects	Yes		Yes		Yes	
Obs.	3,683		3,683		3,518	
Adjusted R^2	0.3073		0.3092		0.3146	
F-test of *Attack+Interaction term*	NA		Prob>F=0.45		NA	

TABLE 9

Terrorist Attacks and IPO First-Day Returns: Moderating Effect of Third-Party Certification

This table presents the regression results for the effect of third-party certification on the relation between terrorist attacks and IPO first-day returns. The regressions are performed by OLS, with *t*-statistics computed using heteroskedasticity-robust standard errors. For the binary variable moderators, we also report the *F*-statisic for the conditional effect of *Attack* when the moderator takes the value 1. All the regressions include a constant and industry, year, and state fixed effects. The variable definitions are presented in Appendix C.

Dependent Variable:	*First-day return* (1)		*First-day return* (2)		*First-day return* (3)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Attack	-0.0935	-1.95	-0.0638	-2.53	-0.0580	-3.11
*Attack*Underwriter*	0.0233	3.60				
*Attack*Big 4 auditor*			0.0863	2.80		
*Attack*VC back*					0.1155	3.79
Offer size	0.2225	10.64	0.2221	10.64	0.2219	10.63
Profitability	0.0815	2.28	0.0825	2.31	0.0797	2.22
Asset turnover	-0.0424	-3.67	-0.0425	-3.67	-0.0425	-3.68
Market-to-book	0.0267	6.78	0.0267	6.79	0.0268	6.81
Leverage	-0.0319	-1.35	-0.0317	-1.35	-0.0319	-1.35
Float	-0.1090	-3.81	-0.1090	-3.81	-0.1093	-3.82
Shares issued	-0.2862	-10.61	-0.2855	-10.61	-0.2855	-10.60
Underwriter	0.0149	3.57	0.0145	3.81	0.0144	3.79
Big 4 auditor	0.0450	3.33	0.0518	3.54	0.0445	3.30
VC back	0.0571	3.54	0.0573	3.55	0.0631	3.71
Commitment	0.0015	0.10	0.0011	0.07	0.0016	0.11
Firm age	-0.0190	-3.36	-0.0190	-3.37	-0.0186	-3.29
Equity carve-out	-0.0053	-0.38	-0.0051	-0.37	-0.0064	-0.46
NASDAQ	0.0544	3.96	0.0543	3.96	0.0520	3.81
Election	-0.0335	-1.80	-0.0339	-1.82	-0.0334	-1.79
Market return	0.2508	2.62	0.2527	2.63	0.2513	2.62
Δ*Business confidence*	0.0318	0.65	0.0323	0.66	0.0345	0.71
Δ*Consumer sentiment*	-0.1720	-1.28	-0.1723	-1.28	-0.1728	-1.28
Δ*Policy uncertainty*	-0.0752	-2.60	-0.0718	-2.50	-0.0674	-2.30
EPS forecast revision	-0.0775	-2.34	-0.0771	-2.33	-0.0772	-2.33
Δ*Real risk premium*	0.0786	0.48	0.0748	0.46	0.0672	0.41
Δ*Real 10 year rate*	0.0006	0.23	0.0006	0.22	0.0006	0.22
Industry fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
State fixed effects	Yes		Yes		Yes	
Obs.	3,683		3,683		3,683	
Adjusted R^2	0.3107		0.3095		0.3079	
F-test of *Attack+Interaction term*	NA		Prob>F=0.37		Prob>F=0.78	

TABLE 10
Salience of Terrorist Attacks and IPO First-Day Returns

This table presents the regression results for the relation between the salience of terror attacks and IPO first-day returns. The regressions are performed by OLS, with *t*-statistics computed using heteroskedasticity-robust standard errors. All the regressions include a constant and industry, year, and state fixed effects. The variable definitions are presented in Appendix C.

Dependent Variable:	*First-day return* (1)		*First-day return* (2)		*First-day return* (3)		*First-day return* (4)		*First-day return* (5)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Num attacks	-0.0624	-2.32								
Financial center attack			-0.1084	-2.64						
Num fatalities					-0.0403	-2.05				
Time proximity							-0.0327	-2.10		
Distance proximity									-0.0356	-2.88
Offer size	0.1230	2.87	0.1214	2.82	0.1184	2.79	0.1211	2.81	0.1202	2.80
Profitability	0.1383	2.58	0.1296	2.40	0.1051	1.98	0.1290	2.40	0.1309	2.43
Asset turnover	0.0119	0.50	0.0141	0.59	0.0154	0.64	0.0141	0.59	0.0143	0.62
Market-to-book	0.0251	3.37	0.0251	3.34	0.0249	3.40	0.0252	3.36	0.0250	3.33
Leverage	-0.0303	-0.46	-0.0266	-0.40	-0.0324	-0.48	-0.0279	-0.42	-0.0235	-0.35
Float	-0.1853	-3.31	-0.1857	-3.28	-0.1833	-3.26	-0.1845	-3.27	-0.1787	-3.13
Shares issued	-0.1590	-2.74	-0.1562	-2.67	-0.1515	-2.62	-0.1554	-2.66	-0.1558	-2.67
Underwriter	0.0186	2.80	0.0143	2.17	0.0188	2.80	0.0137	2.03	0.0156	2.38
Big 4 auditor	0.0620	1.77	0.0615	1.74	0.0381	1.08	0.0630	1.80	0.0593	1.68
VC back	0.0572	1.71	0.0618	1.88	0.0639	1.96	0.0632	1.92	0.0634	1.93
Commitment	0.0007	0.02	0.0067	0.21	0.0133	0.43	0.0079	0.25	0.0072	0.23
Firm age	-0.0043	-0.31	-0.0033	-0.24	-0.0022	-0.16	-0.0032	-0.24	-0.0032	-0.23
Equity carve-out	-0.0237	-0.78	-0.0229	-0.75	-0.0195	-0.64	-0.0224	-0.73	-0.0212	-0.70
NASDAQ	0.0543	2.47	0.0506	2.26	0.0489	2.18	0.0502	2.22	0.0481	2.14
Election	0.0291	0.51	0.0390	0.66	0.0560	0.95	0.0497	0.84	0.0445	0.76
Market return	1.0940	2.01	0.9767	1.66	0.9070	1.67	1.0349	1.89	1.0509	1.92
Δ*Business confidence*	0.2333	1.28	0.2397	1.26	0.1504	0.88	0.2189	1.20	0.2205	1.20
Δ*Consumer sentiment*	-0.4993	-1.34	-0.4562	-1.16	-0.0778	-0.19	-0.3749	-1.01	-0.3646	-0.96
Δ*Policy uncertainty*	0.0140	0.14	0.0321	0.32	0.0565	0.60	0.0461	0.48	0.0499	0.52
EPS forecast revision	-0.0786	-0.90	-0.0711	-0.80	-0.0718	-0.83	-0.0667	-0.77	-0.0667	-0.77

TABLE 10 (continued)

Δ*Real risk premium*	-0.5651	-0.63	-0.4248	-0.47	-0.1219	-0.14	-0.3670	-0.41	-0.4250	-0.47
Δ*Real 10 year rate*	0.0013	0.28	0.0024	0.53	0.0042	0.93	0.0030	0.66	0.0022	0.47
Industry fixed effects	Yes		Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes		Yes	
State fixed effects	Yes		Yes		Yes		Yes		Yes	
Obs.	529		529		529		529		529	
Adjusted R^2	0.3521		0.3481		0.3532		0.3511		0.3597	

TABLE 11
Terrorist Attacks and IPO Post-Listing Day Stock Returns

This table presents the regression results for the relation between terror attacks and IPO post-listing day stock returns. The regressions are performed by OLS, with *t*-statistics computed using heteroskedasticity-robust standard errors. All the regressions include a constant and industry, year, and state fixed effects. the variable definitions are presented in Appendix C.

Dependent Variable:	*Return_1W* (1)		*Return_2W* (2)		*Return_4W* (3)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Attack	0.0228	3.82	0.0257	2.89	0.0235	1.90
Offer size	-0.0013	-0.18	-0.0099	-1.05	-0.0207	-1.47
Profitability	0.0144	2.56	0.0122	1.76	0.0656	3.50
Asset turnover	-0.0034	-1.11	-0.0039	-0.85	-0.0143	-2.25
Market-to-book	0.0058	4.38	0.0100	5.04	0.0167	5.91
Leverage	0.0018	0.22	0.0015	0.12	-0.0127	-0.78
Float	0.0040	0.43	-0.0165	-1.21	-0.0394	-2.01
Shares issued	-0.0002	-0.02	0.0116	0.87	0.0295	1.51
Underwriter	0.0003	0.27	0.0031	1.75	0.0060	2.25
Big 4 auditor	0.0054	1.14	0.0124	1.90	0.0243	2.62
VC back	0.0052	0.95	0.0164	2.09	0.0358	3.08
Commitment	0.0065	1.01	0.0100	1.16	0.0144	1.20
Firm age	0.0014	0.74	0.0030	1.12	-0.0025	-0.66
Equity carve-out	0.0000	-0.01	0.0013	0.19	0.0041	0.40
NASDAQ	-0.0016	-0.34	0.0050	0.80	0.0144	1.54
Election	0.0095	1.22	0.0057	0.53	-0.0046	-0.30
Market return	0.0183	0.34	0.1732	2.27	0.3028	2.57
Δ*Business confidence*	-0.0073	-0.43	-0.0242	-1.01	-0.0495	-1.41
Δ*Consumer sentiment*	0.0102	0.21	0.0252	0.37	-0.0023	-0.02
Δ*Policy uncertainty*	0.0079	0.76	0.0064	0.42	0.0118	0.53
EPS forecast revision	-0.0175	-1.56	-0.0090	-0.61	0.0588	2.59
Δ*Real risk premium*	0.0837	1.58	0.2695	3.42	0.3386	3.00
Δ*Real 10 year rate*	-0.0009	-1.01	-0.0010	-0.90	-0.0010	-0.43
Industry fixed effects	Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
State fixed effects	Yes		Yes		Yes	
Obs.	3,654		3,654		3,654	
Adjusted R^2	0.0695		0.1006		0.1605	

TABLE 12
Terrorist Attacks and Other Measures of IPO Performance

This table presents the regression results for the relation between terrorist attacks and other measures of IPO performance, including price revision, oversubscription, total proceeds, and share revision. The regressions in columns (1), (3), and (4) are performed by OLS and the regression in column (2) is performed by probit, with *t*- or *z*-statistics computed using heteroskedasticity-robust standard errors. All the regressions include a constant and industry, year, and state fixed effects. The variable definitions are presented in Appendix C.

Dependent Variable:	*Price revision*		*Oversubscription*		*Total proceeds*		*Primary share revision*	
	(1)		(2)		(3)		(4)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Attack	-0.0133	-2.66	-0.0280	-6.13	-0.1044	-4.27	-0.1123	-2.28
Offer size	0.0973	15.76	0.0078	0.89	-	-	-0.0974	-1.53
Profitability	0.0078	0.95	0.0687	6.88	0.2711	3.74	-0.1656	-1.52
Asset turnover	-0.0068	-2.12	0.0196	3.40	0.0247	1.22	0.0313	0.87
Market-to-book	0.0028	3.45	0.0131	6.80	0.0708	9.51	0.0124	0.83
Leverage	-0.0194	-2.66	-0.0179	-1.71	-0.0271	-0.61	0.1523	1.65
Float	-0.0055	-0.66	-0.0304	-2.27	0.4018	9.32	-0.3535	-3.23
Shares issued	-0.1162	-14.40	-0.0117	-0.99	0.0369	2.18	0.1744	1.92
Underwriter	-0.0060	-4.29	0.0086	5.13	0.0349	5.42	0.0223	1.87
Big 4 auditor	-0.0139	-2.87	-0.0080	-1.14	0.0420	1.90	0.0106	0.25
VC back	0.0076	1.42	-0.0156	-1.67	0.0754	2.81	0.0948	1.76
Commitment	0.0094	2.47	-0.0190	-2.70	-0.0118	-0.45	-0.0453	-0.59
Firm age	-0.0047	-2.50	0.0125	5.09	-0.0281	-2.89	0.0497	2.44
Equity carve-out	0.0027	0.54	-0.0104	-1.41	0.0208	0.79	0.0899	1.72
NASDAQ	0.0023	0.50	0.0088	1.34	0.0561	2.47	-0.0797	-1.68
Election	-0.0005	-0.06	0.0032	0.21	0.0309	0.67	0.0622	0.65
Market return	0.1054	2.40	0.2769	4.14	0.0126	0.05	-0.3611	-0.73
Δ*Business confidence*	0.0157	1.09	0.0128	0.51	-0.1262	-1.58	-0.0032	-0.02
Δ*Consumer sentiment*	0.1103	2.70	-0.0953	-1.40	0.3750	1.62	0.7952	2.42
Δ*Policy uncertainty*	-0.0221	-2.69	-0.0205	-2.44	0.0019	0.04	-0.0458	-0.44
EPS forecast revision	-0.0021	-0.28	0.0197	1.38	-0.0773	-2.30	0.3377	2.90
Δ*Real risk premium*	0.0848	1.69	0.0453	0.59	-0.2044	-0.84	0.9047	1.37
Δ*Real 10 year rate*	0.0002	0.22	-0.0007	-0.45	0.0079	2.31	0.0108	1.86
Industry fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
State fixed effects	Yes		Yes		Yes		Yes	
Obs.	3,675		3,683		3,683		3,324	
Adjusted/Pseudo R^2	0.1807		0.1270		0.2771		0.2495	