REACTING TO THE ERUPTION OF CONFLICT

AN EVENT STUDY ON THE JANUARY 2020 U.S. – IRAN POLITICAL ESCALATIONS AND THE AMERICAN DEFENCE INDUSTRY

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Abstract:

Through conventional event study methods, we investigate how the shares of American defence companies reacted to arguably one of the most central developments in U.S. foreign policy in recent history - the intensified actions between the U.S. and Iran during the start of 2020. Furthermore, we aim to explain the differences in stock price reactions between the defence companies based on individual company characteristics. A portfolio of the industry constituents reacted positively, indicating the event's informational importance to the sector. However, only eight out of 28 publicly traded military contractors experienced significant abnormal returns due to the news on an individual level. While most of our selected financial ratios do not show significance, we conclude that the respective companies' share of revenue originating from defence activities is significant in explaining the observed variation in abnormal returns.

Keywords:

Abnormal return, Aerospace and Defence, Conflict, Event study, United States Iran tensions

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1 Introduction

On January 3, 2020, the existing tensions between the U.S. and Iran skyrocketed and consequentially sparked fears of an all-out war following the U.S. airstrike on Iran's high-ranked military official, Qasem Soleimani, and his associates. The gravity of this sudden political crisis caused a social media frenzy with fears of World War III and sparked financial and political journalists' interest into U.S. based aerospace and defence-related companies (Bogel-Burroughs, 2020 and Pound, 2020).

Determined by Berkman et al. (2011) and Capelle-Blancard and Couderc (2008), international unforeseen political crises influence the stock market as well as the defence industry significantly. Bearing this in mind, we assess whether the U.S. defence industry experienced abnormal returns on account of the noteworthy event on January 3, 2020. Assessing this on both industry and company level, we examine the event's implied informational value for the industry and its constituents. Additionally, in line with Capelle-Blancard and Couderc (2008), we focus on individual companies' exposure to military actions and, along with selected financial characteristics, relate it to the variance in abnormal returns between the companies.

Exploring the event on January 3, 2020, our objective is to create an insightful and specified case-study of the stock return implications for listed U.S. aerospace and defence ("A&D") companies. Attested by earlier mentioned studies, geopolitical escalations influence the world economy and cause fluctuations in capital markets. Uncertain times leads investors to seek reshuffling opportunities for their stock-portfolios with the quest of finding safer financial instruments to harbour their assets. In the wake of conflict escalation, the market may arguably expect companies supplying the military to meet an increase in demand, leading to increased expected financial prosperity. For publicly listed companies, this loop may infer higher stock returns and thus work as a relatively safe investment for investors seeking to mitigate the impact on their portfolio. In pursuit of expanding on-topic literature we also aim at improving the understanding of investor behaviour vis-à-vis the defence industry. At the time of writing, the Council on Foreign Affairs (2020) presents the interstate conflict status between the United States and Iran as critical and worsening. The primary concerns of a worsening conflict between the countries would have severe complications for the nations, both politically and economically (Council on Foreign Relations, 2020). Hence, we also hope to provide a good foundation for future reference in the analysis of financial performance as a consequence of U.S.- Iran conflict escalation.

We adopt traditional event study tools to examine the reaction of the stock market to the chosen event. In analysing abnormal returns, we utilise a multivariate model built around the Market model, the most widely used model for similar event studies (Ahern 2009). Our findings show that the aerospace and defence industry experienced positive abnormal returns of 2.35 per cent in the course of the January 3, 2020 conflict escalation. On a company-specific level, we observe that 25 out of 28 constituents experienced positive abnormal returns with eight proving significant at a $p<0.05$ significance level, due to the studied event.

We are aware and feel the need to disclose that our view represents a Western point of view with an, in some regards, unfortunate bias towards Americanism. Our culture links closely to U.S. culture, which pre-sets inevitable creation for bias towards American justification. However, the same fundamentals arguably play into the market rationale of western stock markets and are unlikely to influence the results of this study, as there are not any major disputed facts surrounding the specific event examined. Furthermore, the thesis simply aims to study the stock market impact of the event.

1.1 Disposition

We structure this paper as follows; Section 2 presents previous event study literature on the defence sector, and the history between the U.S. and Iran. In Section 3, we define the central hypothesis of our study. Section 4 discusses statistical models used in the analysis, followed by a description of our empirical data in section 5. In section 6, we present empirical results and significance tests, followed by an analysis of our findings. Finally, critical reflections of the study are discussed in section 7, as well as further, potential research areas on the studied subject.

1.2 Motivation and aim

We conduct a quantitative analysis in the form of an event study around how investors in the American defence industry interpreted the news of conflict escalation between the U.S. and Iran.

RQ: How did the U.S. airstrike on January 3, 2020, impact stock returns for the American defence industry?

2 Literature and background

2.1 Literary review

2.1.1 The stock market and global events

The general effects of political instability on the economy and the stock market is a widely studied area. Niederhoffer (1971) conducted one of the first event studies on the effects of world events on capital markets. Selecting 432 major headlines from the New York Times during 1950-1966, Niederhoffer focused on the movements in the S&P Price Index and Dow Jones Industrial Index five days following the chosen events. In his article, Niederhoffer defines substantial return changes as the bottom and top ten per cent of daily changes in the indices during the period. He then examined to what extent the chosen events resulted in said substantial return changes. Although not conducted using the common event study methods of today (Fama et al., 1969, Bowman, 1983, Brown and Warner, 1985, and MacKinley, 1997), his early results indicated that information presented by global events are of value to the equity markets, hence impacting stock returns. His findings also concluded that global events generally are not predicted by the markets or pre-factored into asset prices.

Berkman et al. (2011) examined the impact of rare disasters on global monthly stock returns. Using data on over 440 international political crises during the 20th century, the authors created a proxy for the probability of a widespread disaster at any given time. As the number of actual rare disasters during the period was low, Berkman et al. instead focused on a large sample of what they viewed as potential disasters. These events mainly included international political crises that were assumed likely to change the probabilities of rare disasters, for example, resulted in heightened tensions or risks of war.

The results of their study indicated that international political events significantly impacted the global stock market returns during the period, even when accounting for the tremendous impact of World War I and II. For each crisis that started during a given month, the world market showed a significant negative return of -0.43 per cent. Berkman et al. also characterised the observed crises into several categories based on their nature. Perhaps unsurprisingly, the outbreak of war had the most considerable negative impact on monthly index returns, with -1.25 per cent. Crises characterised as violent, and crises where major global powers (e.g. the

U.S. and the Soviet Union) were involved, followed war, and impacted monthly stock market returns with -0.75 and -0.70 per cent, respectively.

2.1.2 Global events and the defence industry

Capelle-Blancard and Couderc (2008) studied major unforeseen events' impact on the defence industry. Capelle-Blancard and Couderc's paper could be considered a reversed event study. Whereas the typical event study, such as our thesis, start by selecting an interesting event and then move on to examine stock returns during the period, the authors did the opposite. Capelle-Blancard and Couderc examined the share price development of 58 of the largest defence companies between 1995 and 2005 and identified the most substantial daily abnormal returns for each company during the period. They then used the dates of the identified abnormal returns to determine the events that caused the stock price reactions. Their findings showed that seven out of ten times, the abnormal returns originated from a news event; however, roughly 90 per cent of the news events were company-specific.

Circa eight per cent of significant abnormal returns were due to events of entirely unforeseeable geopolitical or macroeconomic nature, stating their impact on the A&D industry. Among these events were the terrorist attacks on September 11, 2001, concerns about the war in Iraq and Afghanistan, as well as oil price-related news. The authors also found that news around public spending was especially crucial to the industry, considering that the primary customer for American aerospace and defence firms is the U.S. government. Although the main drivers of share price returns were company-specific news, Capelle-Blancard and Couderc conclude that geopolitical events play a central role for both the defence sector and for the industry's constituents.

Furthermore, they analysed in increased detail the extraordinary incidents on September 11, 2001, where all but two of the studied defence companies experienced significant abnormal returns at the 5 per cent level (including all sampled American defence companies). Capelle-Blancard and Couderc found that the abnormal returns between companies in the defence sector varied vastly, with roughly half of the companies experiencing positive abnormal returns of +14 per cent on average, and the remaining half averaging negative returns of -9 per cent on the day. Interestingly, they observed a strong connection between positive abnormal returns and percentage of revenue from defence activities, indicating that defence activities reacted relatively better to the event than other areas where the sampled companies were involved. The observation also illustrates the A&D sector's activity in both civil and military activities.

Capelle-Blancard and Couderc's conclusions about the significance of international political events on the industry's stock returns coincide with the findings of several other event studies on the subject (McDonald and Kendall, 1994, and Billingsley et al., 1987). By analysing the stock price behaviour of 16 U.S. defence firms at 17 unforeseeable events involving military force during the Cold War, McDonald and Kendall showed that the stock prices of defence companies, on average, experienced positive abnormal returns on the news of such events. Among their sample of events, intensifying actions involving the former Soviet Union had the most prominent effect. Billingsley et al., in line with the earlier, market-wide findings of Niederhoffer, also concluded that international, political events are not foreseen by the investors of defence companies. As a result, the event requires investors to be reactive.

2.2 Context of U.S. – Iran tensions and timeline of the event

Diplomatic relations between the United States and Iran have been non-existent since 1980 when Iran closed its Embassy in the United States, and the lateral political relationship was severed. With the background of a failed construction of diplomatic relations, the U.S. has over 65 years been a victim and contributed to tumultuous history packed with intrigues and coups in the Middle East. Most notable events that have shaped people's conviction and the affected countries' foreign policies include the 1953 Iranian coup d'état, 1979 Iranian revolution and the 1979-1981 Iranian hostage crisis. Also notable are the 1988 U.S. downing of Iran Air flight 655, early 21st century U.S. "Axis of evil" policy and fear of nuclear escalation as well as 2013-2016 converging relations, lifted sanctions and Joint Comprehensive Plan of Action ("JCPOA") nuclear agreement (Defense Intelligence Agency, 2019). The U.S. designated Iran as a state sponsor of terrorism in 1984. Since then, the U.S. has significantly ramped up its military presence in the Middle East, on what after 9/11 became labelled the "global war on terrorism" (Bureau of Counterterrorism, 2019). Through 2020, the U.S. will have spent an estimated $6.4 trillion on post-9/11 Wars (mostly concentrated in the Gulf Region), clearly stating its importance as a revenue stream for the defence industry. (Crawford, 2019).

2.2.1 Heightened U.S.-Iran tensions

In May 2018, the Trump administration withdrew the U.S. from the 2015 nuclear agreement (JCPOA), resulting in a rise in tensions and shifting the countries' understanding for one another further apart. The withdrawal from JCPOA and the reintroduction of sanctions lifted three years earlier stirred up the pot in international relations (Smith, 2019 and U.S. Department of the Treasury, 2019). Since then, the Iranians have rejected renegotiations and the discussion of a new agreement. In early December 2019, signs of Iranian pressure on U.S interests in Iraq started to emerge, which urged U.S Secretary of State Michael Pompeo and U.S. Secretary of Defense Mark Esper to express decisiveness of action (Katzmann et al., 2020).

At Boxing week 2019 and the start of the New Year of 2020, the world came to encounter a dire escalation in U.S.-Iran relations. The sudden escalation necessitated fast manoeuvring from the U.S. government to curb calamity and halt what, from their point of view, could have been a '*new Benghazi*' (Appendix A.1). Referring to the Pro-Iranian siege of U.S. Embassy in Baghdad that eventually led up to the airstrikes on January 3 that targeted Iranian Major General Qasem Soleimani, leader of the Islamic Revolutionary Guard Corps Quds Force (Appendix A.1) and second hand to the Iranian Supreme Leader (Katzmann et al., 2020). As American defence companies (and their supply) are present in the affected area – and in case of occurrence of a full-scale conflict their offering would likely become more demanded – we find it interesting to see how the recent escalation influenced the listed American defence companies' share prices.

2.2.2 Timeline of event

The escalation of conflict between the U.S. and Iran can be divided into a four-phased timeline as described by the think tank Institute for the Study of War, ISW (2020). The timeline spans from May 2019 to the spring of 2020, with escalations peaking at the start of 2020. ISW refers to the peak to as phase 3. Table 2.1 provides the reader with a detailed timeline of the developments during phase 3, reaching its climax on January 3.

Date	Description
December 27, 2019	The militia group Kata’ib Hezbollah (Appendix A.1) orchestrates an attack near the city of Kirkuk in Iraq. (Defense Intelligence Agency, 2019). The attack killed an American contractor and wounded several American, and Iraqi service members (U.S. Department of Defense, 2019).
December 29-30, 2019	The U.S. responds with airstrikes in parts of Iraq and Syria where members of Kata’ib Hezbollah reportedly were located. A day later, a press briefing held by Secretary of State (“SoS”) Mike Pompeo and Secretary of Defence (“SoD”) Mike Esper presents a risen threat level in the Middle East. According to the White House (2019), U.S. targets in western Iraq and eastern Syria links to the Iranian paramilitary organisation.
December 31, 2019	Iraqi protesters made up of supporters of the Kata’ib Hezbollah militia followed up with storming the U.S. Embassy in Iraq’s capital, Baghdad, lighting the Embassy’s reception on fire. Later in the day, President Trump threatened Iran (Moore, 2020).
January 1, 2020	SoD Mark Esper announces that the U.S. will deploy troops into the area as a precaution (Browne et al., 2020).
January 2, 2020	SoD Mark Esper delivers a warning that the United States will not accept continued attacks against personnel and forces in the region. Esper also encourages the allies of the United States in the area to stand together against Iran as he warns about the high probability and signs of additional upcoming attacks by Iran (Moore, 2020). In a subsequent press briefing, Esper notes that the United States is prepared to do whatever necessary to defend its interests (U.S. Department of Defense, 2020).
January 3, 2020	On Friday, January 3, U.S. President Trump authorises airstrikes on target Qasem Soleimani and associates near Baghdad International Airport, Iraq about 1:00 AM local time (UTC+3). The airstrike kills ten individuals, including target Iranian Major General and Commander of Iran’s elite Quds Force – Qasem Soleimani as well as the commander of Kata’ib Hezbollah – Abu Mahdi al-Muhandis (Moore, 2020).

Table 2.1: Timeline of the conflict escalation between the U.S. and Iran during December 27 – January 3, 2020.

As an indicator for the influence of the actions on January 3, 2020, retired U.S. Army general, former CIA director and current KKR partner David Petraeus stated: “It’s impossible to overstate the significance of this [the U.S. airstrike on January 3] action, it is much more substantial than the killing of Osama bin Laden, it’s even more substantial than the killing of [Abu Bakr] al-Baghdadi” (Public Radio International, 2020).

The actions by the U.S. on the night of January 3, 2020, brought the countries’ relationship to a tipping point. After the event, Iran's Supreme leader declared Soleimani a martyr and threatened severe revenge against the United States (BBC News, 2020). Consequently, the U.S. deployed roughly 3,000 more combat troops and aircraft to the affected area and U.S. anti-missile batteries were on alert throughout the Middle East, and Embassies put on lockdown (Abduhl-Zahra et al., 2020). Afterwards, not only newspapers wrote about the aftermath, people on social media started to wage in on the implications of the airstrike. Until the time of writing, the tensions remain high.

2.3 Theoretical assumptions

Studying abnormal stock returns due to specific events can be done through already well-defined daily event study methods, as laid out by Brown and Warner (1985). Commonly, which also holds for this paper, examining stock returns requires a few theoretical assumptions. Below, we present the central assumptions on which this study relies.

Market efficiency. The ability to study an event's impact on asset prices requires the assumption that security prices quickly adjust to fully reflect the value of the new information (Brown and Warner, 1980). This concept is consistent with the efficient market hypothesis, which states that share prices reflect all relevant information currently available and is one of the cornerstones of modern financial theory (Fama, 1970). As we conduct the study on daily abnormal returns, the market must sufficiently trade the examined securities to enable quick adjustments in prices.

Unforeseeable event. The event must be considered unexpected for observing how the market reacts to the news. In brief, this implies that the event comes as entirely new information to the market. Thus, the market does not factor the event into share prices before its occurrence. As the event is unforeseen, investors are required to be reactive to the economic impacts of the event, which, together with the market efficiency assumption, allows for a sudden change in share prices.

Absence of other significant events. Essential for being able to draw any correct conclusions about an individual event's impact is that no other major events or news emerged during the same period. If there were a possibility that the abnormal returns were due to some other information, it would be impossible to firmly relate any results of such an event study to the specific event. The assumption must hold on both a market-wide and company level.

3 Hypotheses

We present several hypotheses for studying the event's impact on the industry. Due to the severity of the U.S. actions, as well as the findings in several studies on the defence industry and geopolitical tensions (Capelle-Blancard and Couderc, 2008, McDonald and Kendall, 1994, and Billingsley et al., 1987), our first hypothesis is that the share prices of companies within the defence industry were significantly affected by the event. We test this on both the industry and company level.

H_1: The American defence industry experienced abnormal returns due to the event.

Furthermore, we set out to explore how selected financial ratios for the A&D companies relate to the abnormal returns they experienced on the date of the U.S. actions. Based on the findings of Capelle-Blancard and Couderc (2008), we also study the companies' exposure to military actions. As the defence sector also often are active within civil, commercial industries, we use the share of revenue originating from defence-related activities as a proxy for exposure towards military actions. As political events, such as the one studied in this paper, often affect several industries, especially those heavily reliant on exports, a given event might have multiple, varying influences on a company within the industry. Capelle-Blancard and Couderc's (2008) example of Boeing and Airbus' negative reactions to 9/11 poses as a visible indicator of this phenomenon. The other financial ratios viewed as potentially relevant for investors are the size of the company, leverage, and prior profitability (Humphrey et al., 2016).

H_2: A&D companies' abnormal returns due to the event were related to the selected financial characteristics.

4 Methodology

4.1 Hypothesis 1: Measuring abnormal returns

The method for testing hypothesis 1 will roughly follow the event study frameworks by MacKinley (1997) and Bowman (1983), using the statistical methods of Binder (1985) and Humphrey et al. (2016). Studying the effect of an event on a company's stock returns requires measuring to which extent the stock return was due to the specific event. The literature refers to this as abnormal returns ("AR"). We define the abnormal return as the difference between the realised return during a specific period and a predicted return during the same period (absent the effect of the event). The impossibility of viewing how the stock reacted to the event, and simultaneously how the security behaved without the event, leaves the conductor of an event study to the second-best option. We use statistical models to predict how the share would have behaved on the same day without the effect of the event. Aiming to study the immediate reactions of the stock market following the event, we are interested in studying the stock returns daily. We denote our time variable t, measured in trading days, and define the daily abnormal return as:

$$AR_{i,t} = R_{i,t} - E\left(R_{i,t} \middle| X_t\right) \tag{1}$$

Where $AR_{i,t}$ is the daily abnormal share return of company i on date t,

$R_{i,t}$ is the realised daily share return of company i at date t, and

$E\left(R_{i,t} \middle| X_t\right)$ is the predicted daily share return of company i on date t according to a statistical model.

The abnormal returns are assumed to be normally distributed with a zero-conditional mean.

$$AR_i \sim N\left(0, \sigma^2_{AR_i}\right) \tag{2}$$

We calculate abnormal returns for both the individual sampled companies and the entire industry, answering our first hypothesis if the event had any impact on the sector.

4.1.1 Defining the statistical model

Over the years, several financial models for estimating stock returns have been presented (MacKinley, 1997). One commonality among most models, however, is that a specific company's returns are expected, in some form, to result from its historical correlation with the returns of the general market. In analysing the abnormal returns, we base our regression model on the Market model ("MM"), which is considered the most widely used model for these type of event studies (Ahern, 2009).

The MM (equation 3) is relatively resemblant of the Capital Asset Pricing Model ("CAPM"), where one assumes that a company's daily returns follow a linear relationship with the market's returns (McKinley 1997). The MM, like the CAPM, considers the individual company's

CAPM risk – the company's reaction to market-wide events/movements – through the factor $\hat{\beta}_i * R_{m,t}$. The abnormal return tells us if and how the company's actual return deviates from how it usually would react to a market-wide event, capturing to which extent the event has a company-specific impact. Models, in which one assumes a linear relationship, are called factor models. For event studies, factor models are preferred to other return prediction models as they reduce the variance in the residuals, possibly resulting in an increased ability to detect event effects (MacKinley, 1997). One may compare factor models to simpler models, such as the Constant Mean Return Model where the predicted return is simply equal to the historical mean return of the security.

$$R_{i,t} = \alpha_i + \beta_i * R_{m,t} + \varepsilon_{i,t} \tag{3}$$

Where $R_{i,t}$ is the daily share return of company i at date t,

α_i is the intercept of the linear regression model for company i,

β_i is the slope of the linear regression model for company i,

$R_{m,t}$ is the return of the market benchmark at date t, and

$\varepsilon_{i,t}$ is the error term for company i at date t with the expected value of zero and finite variance.

ε_i is assumed to be uncorrelated with the market return $R_{m,t}$, not autocorrelated and homoscedastic.

However, the MM deviates from the CAPM in several ways. Most noticeably, the CAPM is considered an economic model and includes economic restrictions such as constraining the constant of the equation to the risk-free rate (McKinley, 1997). With the MM, we are only interested in the security's historical relationship with a chosen index, without posing any such restrictions. McKinley (1997) finds that the validity of the CAPM restrictions on the MM is sometimes questionable, and the results of an event study may be sensitive to these assumptions. By instead using the MM, one can easily avoid the sensitivity to said restrictions. As a result, the use of the CAPM in event studies has ceased almost entirely. Also, worth noting is that the MM relates a specific security's return to the absolute return of the market, whereas the CAPM uses returns above the risk-free rate. Although the MM is one of the simpler factor models in the realm of statistical models, Ahern (2009) argues that the MM provides similar explanatory powers as some of the more advanced alternatives. Based on the model given in equation 3, we express the predicted daily return of the individual company as:

$$E(R_{i,t}) = \alpha_i + \beta_i * R_{m,t} \tag{4}$$

Where $E(R_{i,t})$ is the predicted return of company i on date t according to the MM.

Note that, according to the MM, the daily abnormal returns are equal to the residuals of the model ($\varepsilon_{i,t}$). In other words, abnormal returns are the share of the daily returns that cannot be explained by the model.

The MM from equation 3 serves as the foundation for our regression model, presented below. We expand the model into a multivariate model by adding a dummy variable D, equal to 1 on the event date, and 0 on any other date (Binder, 1985, and Humphrey et al., 2016). Several similar event studies deploy the multivariate regression model, most notably in studying how the impact of a specific event varies between an industry's constituents. Previous studies using the method include measuring banks' stock price reactions in financial crises (Smirlock and

Kaufold, 1987, and Lau and McInish, 2003) and oil companies' reactions to marine oil spills (Humphrey et al., 2016). In the multivariate regression model, the coefficient of D fully absorbs any abnormal return on the event date. The abnormal return of company i on the event date is therefore equal to the gamma coefficient in our model ($AR_{i,0} = \gamma_i$). In testing for abnormal returns, we test the null hypothesis stating that γ_i is equal to zero. Our initial belief is that γ_i exhibits a positive value, as we expect the market to perceive the event as positive for the companies within the A&D industry.

$$R_{i,t} = \hat{\alpha}_i + \hat{\beta}_i * R_{m,t} + \gamma_i * D + \varepsilon_{i,t} \tag{5}$$

Where $R_{i,t}$ is the daily share return of company i at date t,

$\hat{\alpha}_i$ is the estimated alpha intercept of the regression model for company i,

$\hat{\beta}_i$ is the estimated beta coefficient of the regression model for company i,

$R_{m,t}$ is the return of the market benchmark at date t,

γ_i is the coefficient for the dummy variable for company i, which captures the difference between $R_{i,t}$ and the regression model's prediction on the event date,

D is a dummy variable equal to 1 on the event date, and 0 otherwise, and

$\varepsilon_{i,t}$ is the error term for company i at date t with the expected value of zero and finite variance.

We determine all coefficients through an ordinary least squares (OLS) regression of the company's daily returns against the market benchmark's returns during a pre-determined regression window. The regression shows how the security has correlated with the market historically and lets us predict what the stock's 'normal' behaviour on the event date would be.

To study the daily abnormal return for the industry on average, we create an equal-weighted average daily return of our sampled industry companies (equation 6). Effectively we create a continuously rebalanced index, placing equal weight on all included companies. We then treat the daily average returns in the same manner as the individual companies' returns in our model (as illustrated in equation 7), yielding us the abnormal return for the industry ($\gamma_{industry}$) on the event date. In practice, we study how an equal-weighted portfolio of our chosen companies correlate with the market index.

$$R_{industry,t} = \frac{1}{N} * \sum_{i=1}^{N} R_{i,t} \tag{6}$$

$$R_{industry,t} = \hat{\alpha}_{industry} + \hat{\beta}_{industry} * R_{m,t} + \gamma_{industry} * D + \varepsilon_{industry,t} \tag{7}$$

Where $R_{industry,t}$ is the average return of all our sampled companies (i.e. the industry portfolio) at date t,

N is the number of sampled A&D companies,

$\hat{\alpha}_{industry}$ is the estimated intercept of the linear regression model for the industry portfolio,

$\hat{\beta}_{industry}$ is the beta coefficient of the regression model for the industry portfolio,

$R_{m,t}$ is the return of the market benchmark at date t,

$\gamma_{industry}$ is the coefficient for the dummy variable for the industry portfolio, which captures the difference between $R_{i,t}$ and the regression model's prediction on the event date,

D is a dummy variable equal to 1 on the event date, and 0 otherwise, and

$\varepsilon_{industry,t}$ is the error term for the industry portfolio at date t with the expected value of zero and finite variance.

4.1.2 Estimation and event window

The event of interest in this event study is the U.S. airstrike at Baghdad Airport on January 3, 2020, around 1:00 AM local time (UTC+3), or 6:00 PM ET (January 2). As the event timing is after the stock market closes in the U.S., we define January 3 as the first day of trading following the event. We label this the event date (t = 0). The dummy variable *D* (defined in equation 5) is therefore equal to 1 on January 3, 2020, and 0 on all other dates.

We define the timeline leading up to the event as the regression window, with the event window examined limited to January 3, the first trading day after the airstrike. As it is the first day that the market is open after the event, this is the date on which we expect the market to react to the news. The time window is divided into two sub-windows, the event window, and the estimation window, i.e. the period before the event window. In cases where the researcher is interested in studying the impact of an event over an extended period, she may expand the event window beyond the event date to include several days. By doing so, one can account for any uncertainties regarding the timing of the event. The relevant length is highly dependent on the examined event and varies significantly in previous event studies. At the longer end, Felimban et al. (2018) used an event window of 40 days centred on the event date when studying the impacts of dividend announcements on share prices. Using the large event window, they accounted for any risks of leaked insider information between the vote by the Board of Directors and the public announcement.

Choosing the correct event period is thus highly dependent on the specific event and the goal of the study. Although a more extended period might result in a complete picture of the returns of a prolonged crisis, it increases the risk of other events influencing the results. The risk of other influencing events poses a problem, as we conclude in the theoretical assumptions. Due to the examined event of this study being a classified military operation of which there are no uncertainties regarding its timing, we isolate the event window to the specific event date during which the U.S. decided to strike on the Baghdad International Airport in 2020.

Like the event window, the length of the chosen period before the event – the estimation period – also varies. Typically, researchers choose a range of between 100 and 300 days for daily return studies (Peterson, 1989). In this study, we use an estimation period of 120 trading days before the event window, as suggested by MacKinley (1997). The estimation period could also occur after the event window, however not relevant for this study due to the recency of the event, and the unrelated market turmoil that followed during the spring of 2020. If the estimation period stretches too far back in time, the returns used in the modelling of the stock's returns might not be an accurate depiction of how the share would behave on the event date. A too short estimation period instead runs the risk of not including enough data points to model the share's returns accurately. As the statistical model used in this thesis also assumes that market returns do not vary over time, one should also be careful of using a very long estimation period. We illustrate the event study timeline in figure 4.1.

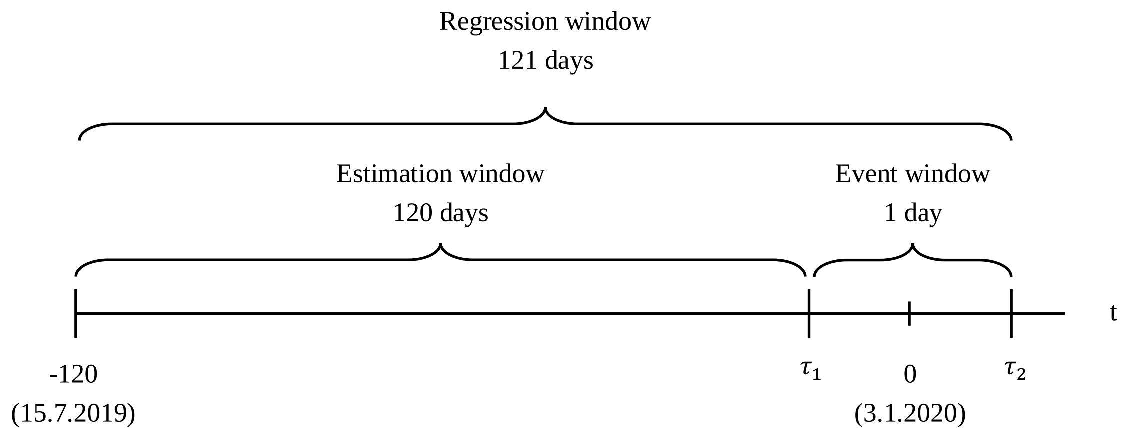

Figure 4.1: Illustration of the regression model timeline, including the estimation period before the U.S. actions, t= [-120, -1], and the event date itself, t=0. t is defined as time, measured in trading days.

4.2 Hypothesis 2: Differences in abnormal returns

Given that our observed company-specific abnormal returns vary in size on the day of the event, we conduct a cross-sectional analysis. By doing so, we aim to study if any differences between the companies' abnormal returns (γ_i) on the event date are due to the companies' specific financial characteristics.

We adopt a similar regression model as used by Humphrey et al. (2016) when studying how abnormal returns varied between oil and gas stocks during the Gulf oil spill in 2010. Controlling for several financial ratios, they examined whether the sampled firms' exposure to the U.S. oil and gas market could be considered an explaining factor in the varying abnormal returns. The abnormal return on January 3 for each company, as estimated in equation 5, is used as the dependent variable. We define several key financial ratios as independent variables. ln(SIZE) is the logarithmic value of the company's total assets in 2018 (in USD millions), which we use as a control variable for the difference in size between our sampled companies. ROA is the company's Return on Assets for the year 2018, controlling for previous profitability. Hence, we account for any differences in abnormal returns possibly due to the popularity or size of the company. Through ROA, we aim to account for any investor preference to invest in a company with previous profitability. We define DEFENCE as the per cent of revenue for the fiscal year 2018 originating from the defence sector. The variable acts as a proxy for each company's exposure to military actions, which Capelle-Blancard and Couderc (2008) related to differing abnormal returns on 9/11. LEVERAGE is the debt-to-equity ratio, controlling for the effect of leverage. We present a detailed description of how we calculate the variables DEFENCE, ln(SIZE), ROA and LEVERAGE in Appendix A.2. Our initial expectation is that all of the independent variables will show positive coefficients due to the belief that investors favour more substantial companies with proven business models, as well as the boost in return on equity that increased leverage may imply. Note that ROA, DEFENCE and LEVERAGE are multiplied by 100. We quote one per cent as 1, as opposed to 0.01. We present the cross-sectional model in equation 8:

$$AR_{i,0} = \gamma_i = \alpha_0 + \beta_1 * \ln(SIZE_i) + \beta_2 * ROA_i + \beta_3 * DEFENCE_i + \beta_4 * LEVERAGE_i + \varepsilon_i \quad (8)$$

Where $AR_{i,0}$ is the abnormal return of company i on the date of the event (January 3, 2020), which is equal to γ_i, the coefficient of the dummy variable D in equation 5,

α_0, β_1, β_2, β_3 and β_4 are the estimated intercept and regression coefficients,

$\ln(SIZE_i)$ is the natural logarithm of the total assets of company i at the end of year 2018,

ROA_i is the Return on Assets for company i for the year 2018,

$DEFENCE_i$ is the share of company i's revenue originating from business activities in the defence sector during the fiscal year 2018,

$LEVERAGE_i$ is the debt-to-equity ratio for company i for year 2018, and

ε_i is the error term for company i with the expected value of zero and finite variance.

To examine if the differences in abnormal returns on the event date were related to the selected financial ratios, we test for the significance of each variable in the multivariate regression model.

4.3 Description of model variables

Variable	Type	Description
$R_{i,t}$	Dependent	Change in stock price for company i on date t, per cent
$R_{industry,t}$	Dependent	Average change in stock price for the N sampled A&D companies on date t, per cent
$R_{m,t}$	Independent	Change in the market benchmark index on date t, per cent
D	Dummy	1 on the event date (January 3, 2020), 0 otherwise
$AR_{i,0}$	Dependent	Abnormal return for company i on the event date, per cent. The abnormal return on the event date is equal to the regression coefficient γ_i in the multivariate abnormal return model
ROA_i	Independent	Return on Assets for company i during 2018, per cent. See Appendix A.2 for a detailed description of the variable.
$\ln(SIZE_i)$	Independent	The natural logarithm of Total Assets for company i at the end of year 2018, USDm
$LEVERAGE_i$	Independent	Debt-to-equity ratio for company i at the end of 2018, per cent. See Appendix A.2 for a detailed description of the variable.
$DEFENCE_i$	Independent	Share of 2018 fiscal year's revenue from defence activities for company i, per cent. See Appendix A.2 for a detailed description of the variable.

Table 4.1: Description of model variables used in the multivariate abnormal return model and the cross-sectional regression model on company characteristics.

5 Empirical data

5.1 Sampled A&D companies

Our focus group, before exclusions, consists of 32 U.S. based companies within the Aerospace and Defence GICS sub-industry (see Appendix A.1 for definition). These are large- and mid-cap, U.S. listed, stocks of companies which all supply the defence industry in the U.S. To avoid any selection bias, we have chosen to include the entire S&P Aerospace and Defence sector, as it includes a wide selection of U.S. based A&D companies. We also deem the use of American companies as a sample most appropriate, as the event examined was a bilateral escalation between the U.S. and Iran. The sampled companies are presented in Appendix A.3.

The U.S. listed aerospace and defence companies included in the study are among the largest arms producers in the world. Including companies like Lockheed Martin, Boeing, Raytheon, Northrop Grumman, Huntington Ingalls and General Dynamics, the study comprises companies with businesses ranging widely from technologically advanced surveillance and intelligence products and services to missile defence systems as well as heavy-duty vehicles such as tanks and nuclear-powered aircraft carriers and submarines (Annual Reports, 2018). Our sample includes both primes and subcontractors to the defence industry (see Appendix A.1 for definition).

Using annual reports for each company, total revenue, and an estimation of the defence-related revenue, based on the companies' revenue splits for the fiscal year 2018 is collected. Using the revenue splits, we calculate the DEFENCE variable, our proxy for each company's exposure to military actions. Financial data for 2018, including total assets, debt, equity, and net income for each included company, is collected through the database S&P Capital IQ. As an accurate calculation of debt and equity is challenging and requires the addition of various hybrid securities (Appendix A.1), we use S&P Capital IQ to ensure consistency in the calculation between companies. All collected numbers are in millions of U.S. dollars, and as all the included companies are U.S. based, we eliminate the need for currency conversions. Three of the 28 sampled A&D companies did not enclose their revenue share originating from the defence sector. We, therefore, exclude these companies from the cross-sectional analysis of company characteristics. The three excluded companies are AeroVironment Inc, Axon Enterprise Inc, and Spirit AeroSystems Holdings Inc.

Figure 5.1 illustrates the American defence companies' widespread coexistence in commercial and defence sectors. Among the 25 companies sampled here, the median defence-related revenue share is only around 45 per cent of total revenue. For example, Boeing only receives 22 per cent of its revenue from sales to the defence sector, whereas the company generates a majority of its revenue from the commercial aviation space.

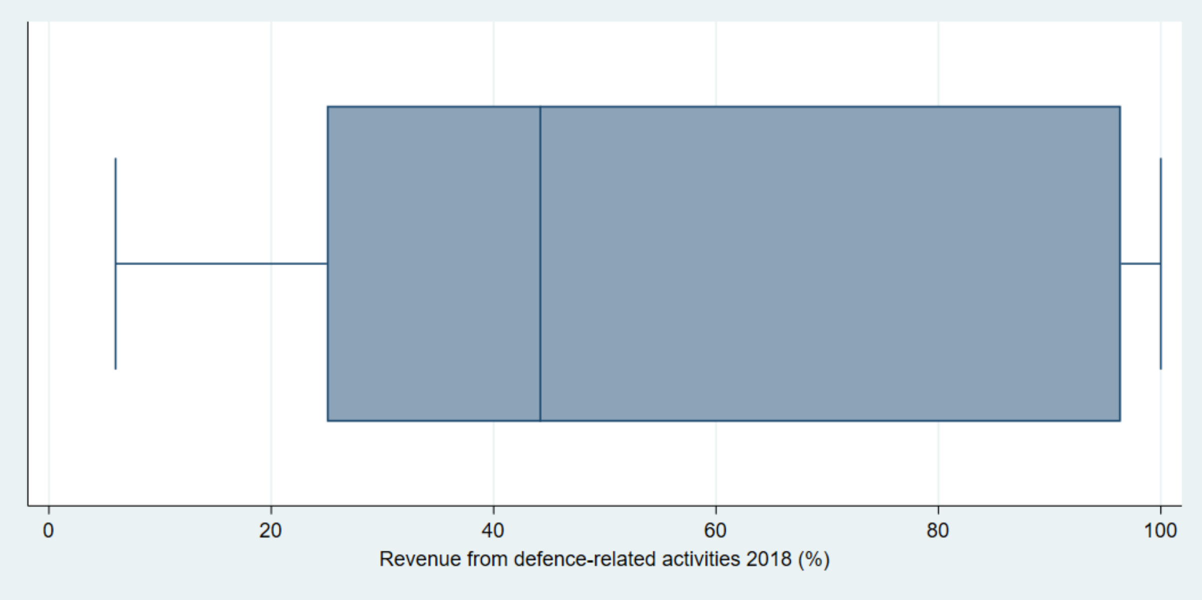

Figure 5.1: Box-and-whiskers plot on the share of revenue originating from defence-related activities during the fiscal year 2018, among 25 of the 28 sampled Aerospace and Defence companies. n=25.

To avoid the presence of any other factors influencing the stock price during the event date, we conduct a screening of press releases and other news during the period involving the 32 identified companies. Four companies were excluded due to other important news during the period surrounding the event, resulting in a final set of 28 U.S. aerospace and defence companies. We use Dow Jones' Factiva database (2020) to examine whether other, significant market-wide news or major U.S. economic reports were released on the event date. As the exercise did not yield any findings, we ensure that any possible abnormal returns are not the result of other significant events. We, therefore, deem the theoretical assumption of the absence of other significant events to hold.

5.2 Stock data

Our stock dataset consists of the daily closing prices for each of the 28 selected companies for all trading days from January 2018 to March 2020. We exclude all days where no trading occurs in the U.S., namely holidays and weekends. By excluding non-trading days, we ensure that our data set does not include duplicates in closing prices, which would result in days where the daily return is equal to zero. The stock prices were retrieved from Thomson Reuters Eikon and are all in U.S. dollars. Thompson Reuters defines the closing price as the price of the security at the end of the day's trading session on the security's exchange. Thomson Reuters excludes after-market trading in the closing prices, and all companies are listed in the U.S. Thereby, we ensure that there are no time discrepancies between the closing prices of the securities. In other words, the closing prices all occur at the same point in time. Should our sample include both European and American companies, we would run the risk of wrongly defining the timing of the event.

The reader should note that the prices are unadjusted for any dividends paid out during the period, which may result in an inaccurate daily return on the day of the dividend pay-out. Due to the recency of the event, adjusted daily stock return data was not available. We conduct an investigative analysis of any new issues and/or stock splits during the time window of the study, which came up empty for our sample of 28 companies. The analysis was done through examination of each company's press releases during the examined period.

As all stocks are quoted in U.S. Dollars, we avoid any currency exchange rate effects on daily returns. All selected companies are categorised within the Large- or Mid-cap segments on either the New York Stock Exchange or Nasdaq Exchange. All shares are traded daily and based on the companies' sizes deemed sufficiently liquid for their prices to react to the news quickly. We define the daily returns of the stocks as the difference in closing price compared to the previous trading day. Note again that we multiply the daily returns by 100. Thus, a one per cent change is quoted as 1, as opposed to 0.01.

$$R_{i,t} = \left(\frac{Closing\ price_{i,t}}{Closing\ price_{i,t-1}} - 1\right) * 100 \tag{9}$$

Where $R_{i,t}$ represents the daily share return of company i at date t,

$Closing\ price_{i,t}$ is equal to the closing share price of company i at date t, and

$Closing\ price_{i,t-1}$ is equal to the closing share price of company i during the previous trading day (t-1).

Brown and Warner (1985) acknowledge the presence of outliers and non-normality in daily stock returns, which raises the question of how one should treat this. Three common methods for treating outliers in event studies exist, to simply ignore them, to trim the sample to remove inconvenient data points, or to replace the smallest and largest observations with values of pre-selected cut-off points (Sorokina et al., 2013). Due to the nature of our regression model from equation 5, outliers in individual stock returns cannot easily be identified by their absolute values. Instead, outliers are defined by the size of the residual from our regression model. Sorokina et al. (2013) advise against the removal of data points due to the possibility of deleting valuable information from the analysis and decreasing transparency. Outliers, referring to absolute stock returns, are therefore not excluded from our sample.

5.3 Market benchmark data

We use the MSCI USA Equal Weighted index as a reference index for the market. The index, consisting of 636 American companies, measures the performance of U.S. Large- and Mid-cap segments in the U.S. The chosen index is therefore assumed to provide a fair benchmark index for the chosen companies, which fall into the same characteristics. Note that hence, the index also includes some of the sampled A&D companies. Equal to the individual stocks, we also calculate the daily return of the index as the change in closing price from the previous trading day. The independent variable $R_{m,t}$ is defined as:

$$R_{m,t} = \left(\frac{Closing\ quote_{i,t}}{Closing\ quote_{i,t-1}} - 1\right) * 100 \tag{10}$$

Where $R_{m,t}$ represents the daily return of the MSCI USA Equal Weighted index at date t,

$Closing\ quote_{i,t}$ is equal to the closing quote of the MSCI USA Equal Weighted index at date t, and

$Closing\ quote_{i,t-1}$ is equal to the closing quote of the MSCI USA Equal Weighted index during the previous trading day (t-1).

We eliminate any discrepancies in returns between the index and the individual securities caused by currency exchange rates, as the index is also measured in U.S. dollars. Although asset pricing commonly suggests using a value-weighted index as a market benchmark, an equal-weighted index is more likely to detect abnormal returns due to the higher correlation between the equal-weighted index and the security (Peterson, 1989).

That said, we will test the robustness of our results for the first hypothesis using an alternative index, the S&P 500 value-weighted index. The characteristics of the two indices are similar. However, the S&P 500 is limited to the largest roughly 500 companies in the U.S. As the respective constituents' market capitalisation determines the index weights, the S&P 500 is more affected by the share price developments of its largest constituents. The MSCI USA index, on the other hand, places equal weight on all included companies.

6 Results and Analysis

6.1 Hypothesis 1: Abnormal returns

6.1.1 Industry abnormal returns

Table 6.1 presents the OLS regression results from the industry-level regression model 120 days before the event date plus the event date. The industry-level analysis may be interpreted as substituting the individual security in the multivariate regression model, for an equal-weighted portfolio of our sample of 28 A&D companies. Thus, the regression results illustrate the regression results of how our equal-weighted portfolio co-moves with the market benchmark. We may observe that the estimated coefficient of the variable $R_{m,t}$, $\hat{\beta}_{industry}$, is equal to 0.961 on a p<0.01 significance level. The t-values, in parenthesis, relates to the rejection of the null hypothesis assuming the corresponding coefficient equals zero.

The A&D industry experienced positive average abnormal returns of 2.35 per cent during the event date, statistically significant at the 1 per cent significance level. The abnormal returns are indicated by the value of the coefficient of dummy variable D, defined as $\gamma_{industry}$ in equation 7. The t-value of the coefficient, in parenthesis, is larger than 1.96 and therefore the coefficient is significant at a p<0.05 level. We reject our null hypothesis of zero abnormal returns on the industry level and conclude that the event resulted in significant abnormal returns for the industry.

VARIABLES	**(1)** **Aerospace and Defence**
Rm	0.968***
	(13.85)
D	**2.352*** **
	(3.638)
Constant	0.00349
	(0.0594)
Observations	121
R-squared	0.628

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.1: Regression results for the industry-level abnormal return model ($R_{industry,t} = \hat{\alpha}_{industry} + \hat{\beta}_{industry} * R_{m,t} + \gamma_{industry} * D + \varepsilon_{industry,t}$), where R_m equals the daily return of the MSCI USA index, and D is a dummy variable equal to the event date (capturing the abnormal return on the date). Aerospace and Defence is the dependent variable (equal to the daily return of the A&D industry, $R_{industry}$).

According to the multivariate regression model, the A&D industry exhibits roughly the same daily return, on average, as our market benchmark index, the MSCI USA equal-weighted index. A beta coefficient of 1 would imply that the model predicts the portfolio to move precisely the same way as the benchmark index. Implying that the A&D during our regression period is neither more nor less sensitive to market-wide movements than the market in general. It is rather intuitive that as more and more companies are added to the portfolio, and our portfolio moves closer to that of the market as a whole, the movements of the portfolio will start to resemble the movements of the general market.

The findings indicate that the U.S. actions on January 3, 2020, were of significant informational value to the U.S. defence industry. This is in line with McDonald and Kendall's (1994) and Capelle-Blancard and Couderc's (2008) conclusions that major geopolitical events generally result in positive abnormal returns for the industry. The result indicates market confidence in U.S. aerospace and defence contractors as a consequence of the particular conflict. As the U.S. government largely influences the revenue of the sector's constituents, the abnormal returns could relate to expectations of increased government spending on the defence sector. We also conclude that the actions of the U.S. seem to have been unexpected by the market, due to the significant abnormal returns.

The reader should note that the industry abnormal returns of 2.35 per cent do not correspond to the value of investor funds that flowed into the sector, but rather how investors in the sector's constituents reacted on average. This is due to our studied portfolio placing equal weight on each company, regardless of total market value. However, as we are interested in studying the share price reactions in the industry, rather than the total monetary value of said reactions, we find the equal-weighted approach more appropriate.

Our regression model has relatively high explanatory value as 63.5 per cent, explained by the dependent variable. As the difference between the observed values and fitted values are relatively small, this could be a sign of good fit for the model. As we have bundled 28 companies, the standard deviation of the daily returns is relatively lower than individual companies, increasing the fit of the linear model.

6.1.2 Company abnormal returns

Table 6.2 shows the OLS regression results for each sampled A&D company. We note that eight of the 28 sampled defence companies experienced significant abnormal returns on the event date on a five per cent significance level ($p<0.05$), and six of the eight companies showed abnormal returns on a $p<0.01$ level. Again, the abnormal return in the multivariate model is given by the coefficient of the dummy variable *D*, (equal to 1 on January 3, 2020, and 0 on all other dates). Significant abnormal returns on a $p<0.05$ ($p<0.01$) significance level are indicated by ** (***) following the coefficient of *D* in table 6.2 and bolded rows. We reject our company-specific null hypothesis, stating that the company's abnormal return is zero, for eight of our 28 sampled firms. On an individual level, the event thus posed as significant informational value for these eight companies.

Company	Rm	D	Constant	N	R-squared
(1) AAR Corp	1.165*** (5.380)	0.468 (0.234)	0.0485 (0.266)	121	0.197
(2) AeroVironment Inc	**1.102*** (5.129)**	**7.397*** (3.727)**	**0.0662 (0.367)**	**121**	**0.244**
(3) Aerojet Rocketdyne Holdings Inc	**0.337 (1.534)**	**4.257** (2.098)**	**0.0142 (0.0767)**	**121**	**0.051**
(4) Arconic Inc	1.007*** (8.252)	0.244 (0.217)	0.118 (1.156)	121	0.366
(5) Astronics Corp	1.838*** (7.530)	3.359 (1.489)	-0.333 (-1.622)	121	0.329
(6) Axon Enterprise Inc	1.468*** (4.365)	-2.800 (-0.901)	0.119 (0.420)	121	0.148
(7) BWX Technologies Inc	**1.029*** (6.151)**	**3.248** (2.100)**	**0.114 (0.814)**	**121**	**0.257**
(8) Boeing Co	0.638*** (3.419)	0.256 (0.148)	-0.0936 (-0.597)	121	0.090
(9) Cubic Corp	0.766*** (2.702)	1.765 (0.674)	-0.0429 (-0.180)	121	0.060
(10) Curtiss-Wright Corp	1.030*** (11.67)	0.698 (0.856)	0.0522 (0.704)	121	0.536
(11) General Dynamics Corp	0.825*** (9.130)	1.479* (1.772)	-0.0710 (-0.935)	121	0.418
(12) Hexcel Corp	0.972*** (7.964)	1.153 (1.022)	-0.105 (-1.023)	121	0.351
(13) Huntington Ingalls Industries Inc	**1.036*** (8.305)**	**3.498*** (3.035)**	**0.0284 (0.271)**	**121**	**0.390**
(14) Kratos Defense & Security Solutions Inc	**0.946*** (3.257)**	**11.61*** (4.325)**	**-0.232 (-0.952)**	**121**	**0.190**
(15) L3Harris Technologies Inc	**0.359** (2.582)**	**3.686*** (2.871)**	**0.0215 (0.184)**	**121**	**0.106**
(16) Lockheed Martin Corp	**0.524*** (5.568)**	**3.827*** (4.402)**	**0.0423 (0.535)**	**121**	**0.287**
(17) Mercury Systems Inc	0.684*** (2.725)	2.758 (1.188)	-0.0225 (-0.107)	121	0.067
(18) Moog Inc	1.247*** (7.673)	1.874 (1.248)	-0.104 (-0.759)	121	0.335
(19) National Presto Industries Inc	1.032*** (6.763)	0.242 (0.171)	-0.0887 (-0.692)	121	0.280
(20) Northrop Grumman Corp	**0.440*** (2.951)**	**5.606*** (4.073)**	**0.0507 (0.405)**	**121**	**0.168**
(21) Parsons Corp	1.032*** (5.454)	1.623 (0.928)	0.0749 (0.471)	121	0.203
(22) Raytheon Co	0.688*** (5.492)	1.679 (1.451)	0.161 (1.527)	121	0.210
(23) Spirit AeroSystems Holdings Inc	0.706*** (3.985)	-0.00125 (-0.000766)	-0.0371 (-0.249)	121	0.119
(24) Teledyne Technologies Inc	0.764*** (5.886)	0.933 (0.778)	0.179 (1.640)	121	0.228
(25) Textron Inc	1.575*** (10.04)	-0.612 (-0.422)	-0.200 (-1.514)	121	0.463

Company	Rm	D	Constant	N	R-squared
(26) TransDigm Group Inc	0.970***	2.167	0.168	121	0.220
	(5.679)	(1.374)	(1.168)		
(27) Triumph Group Inc	1.839***	3.604	0.0144	121	0.257
	(6.311)	(1.338)	(0.0587)		
(28) Vectrus Inc	1.101***	1.840	0.155	121	0.186
	(5.153)	(0.932)	(0.862)		

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.2: Regression results of the company-specific abnormal return model for each of the 28 sampled A&D companies ($R_{i,t} = \hat{\alpha}_i + \hat{\beta}_i * R_{m,t} + \gamma_i * D + \varepsilon_{i,t}$), where R_m is equal to the daily return of the MSCI USA index, and D is a dummy variable equal to 1 on the event date (capturing the abnormal return on the date).

It is also observable that most of the defence firms, 25 out of 28, experienced positive abnormal returns, including all eight companies that showed significance. We may compare our results to Capelle-Blancard and Couderc's (2008) results on the impact of 9/11, which showed a roughly 50/50 split between negative and positive abnormal returns. Many factors could, however, explain the difference, including a different sample of defence companies, and mainly very different implications of the event. The prevailing direction of the abnormal returns is further evidence that the event posed as positive news for the industry and is likely one of the reasons for why the industry portfolio showed significant abnormal returns despite only eight companies showing significance on the individual level.

The mentioned eight companies mainly include the most high-profile defence companies in the U.S., which are often referred to as the prime contractors (Peters, 2020). These are the companies that the Department of Defense awards the most contracts. These companies are also the largest in the industry, including General Dynamics, L3Harris and Lockheed Martin, which brings up another reasoning for why the difference in size is interesting to study in the cross-sectional analysis. Interpreting the results on abnormal returns, the market may view the abovementioned companies as essential in the region, hence most likely to profit from increased military presence in the area. Table 6.3 lists the eight companies and illustrates both their actual and abnormal returns on the event date. The benchmark index return is also shown, telling us that the market overall reacted with a negative return of -0.518 per cent on the day. Recall that we define the abnormal returns based on the MM as the difference between the observed return and the linear prediction. The third column, difference, can, therefore, be interpreted as the predicted return for the company based on the estimated alpha and beta coefficients. As the estimated beta coefficients were positive for all companies, and the market return was negative on the event date, the predicted returns (differences) are all negative.

Company	Abnormal return	Actual return	Difference
AeroVironment Inc	7.397	6.892	-0.504
Aerojet Rocketdyne Holdings Inc	4.257	4.096	-0.160
BWX Technologies Inc	3.248	2.829	-0.419
Huntington Ingalls Industries Inc	3.498	2.990	-0.508
Kratos Defense & Security Solutions Inc	11.610	10.888	-0.722
L3Harris Technologies Inc	3.686	3.522	-0.164
Lockheed Martin Corp	3.827	3.598	-0.229
Northrop Grumman Corp	5.606	5.429	-0.177
MSCI USA Equal-Weighted index		**-0.518**	

(All values in per cent)

Table 6.3: List of the eight A&D companies that experienced significant ($p<0.05$) abnormal returns on January 3, 2020, including their abnormal return, actual return, and the difference, as well as the return of the MSCI USA index on the event date.

The differences in abnormal returns are highly notable. Of the 28 sampled companies, Kratos Defense & Security Solutions Inc, a producer of, among other, high-tech, unmanned aerial vehicles (UAVs) or colloquially known as drones, showed the highest abnormal returns – circa 11.61 per cent. The company shows actual returns on the event date of 10.89 per cent, as seen in table 6.3. Following Kratos Defense & Security Solutions Inc, AeroVironment Inc and Northrop Grumman Corp, also leading producers of unmanned vehicles, experienced abnormal returns of circa 7.38 and 5.61 per cent, respectively. This commonality is particularly interesting, as the United States' grand strategy on the war in the Gulf region since George. W. Bush administration has been heavily focused on drone-usage in targeted attacks (Sterio, 2012). However, it should be noted that we are unable to firmly conclude if this is the reason behind the substantial abnormal returns of these specific companies. On the other end of the spectrum, Axon Enterprise Inc, which manufactures non-lethal weapons and body cameras for law enforcement, showed negative abnormal returns on -2.80 per cent, although nonsignificant. As Axon Enterprise Inc. has not received any public procurement contracts from the Department of Defense in recent years, but rather supplying law enforcement agencies on the state and municipality level, one could assume that the company's exposure towards the U.S. Army and the U.S.-Iran event would be limited (Axon Enterprises Inc Annual Report, 2018). The broad span in abnormal returns, over 14 per cent, makes a cross-sectional analysis of why the abnormal returns might differ deemed highly relevant.

Two central assumptions are the efficient market assumption, stating that the current share price of a public company reflects all available information and that the company's share price reflects the present value of all future expected cash flows to the shareholder. Given these assumptions, the U.S. escalations resulted in heightened investor expectations of financial prosperity for the eight companies that experienced significant abnormal returns. Simply, we interpret the quick adjustments of the share prices (the abnormal returns) as investors readjusting their expectations of the companies' future cash flows due to the event.

It is worth touching upon the R-squared values of the regression, which for some companies seem very low. The company-specific R-squared values can be compared to the industry portfolio's in table 6.1, which is considerably higher. The difference can partly be explained by the fact that a portfolio smooths over the "noise" present in individual security returns (Brown and Warner, 1985). Hence, the standard deviation of the portfolio is lower than the standard deviation of the individual securities.

6.1.3 Robustness of the results

6.1.3.1 Alternative market benchmark index

In some cases, the wrong choice of a market benchmark index can also explain the low R-squared values (Peterson, 1989). If the chosen index is not relevant for the company, the co-movement between the two are naturally not likely to be high. As the MM uses error terms for calculating abnormal returns, and a worse fitted model increases the error terms, rejecting the null hypothesis becomes more difficult (Peterson, 1989). We test our model using a different market benchmark index to see whether our initial results hold.

We conduct the same empirical analysis of the first hypothesis using the value-weighted S&P 500 index, as opposed to the MSCI USA index. Appendix A.4 illustrates the results. On average, the regressions using the value-weighted S&P 500 index yielded lower R-squared values than our chosen, equal-weighted, market benchmark index. The company-specific results are very similar using the two indices, with the same eight companies experiencing significant abnormal returns. Noticeable, however, is that General Dynamics Corp, manufacturer of, by the U.S. air force widely used, F-16 fighter jets, now shows significant abnormal returns on a $p<0.05$ significance level, as opposed to the previous significance level ($p<0.10$) when using the MSCI USA index. The equal-weighted industry portfolio experienced abnormal returns of 2.57 per cent according to the MM with the S&P 500 index, compared to our previous result of 2.35 per cent using the MSCI USA index. The indices' daily returns naturally differ due to their different weighting methods, which impacts the regression results. Overall, the two indices yielded very similar results regarding significant abnormal returns.

6.1.3.2 Different estimation windows

Ahern (2009) argues that the regression results, and therefore possibly the conclusions of an event study, are likely to differ based on the selected estimation period used in the statistical prediction model for daily returns. To account for this possibility, we re-estimate the regression using different time windows. We change our estimation window by 33 per cent in either direction, to 160 as well as 80 days. Appendix A.5 illustrates the results using the longer and shorter estimation periods.

Like the use of an alternative index, we observe that the regression results change slightly. This can be expected due to the removal or addition of data points. However, it is also visible that the results on abnormal returns are similar to the ones from our initial analysis (seen in table 6.2). The main difference in the results is that, given the shorter estimation period of 80 days, TransDigm Group Inc shows significant abnormal returns at a $p<0.05$ significance level. As can be expected with the industry portfolio, where the noise in daily returns is considerably less than of the individual stocks', the results have changed minimally. In all cases, we estimate the industry abnormal return at 2.35 per cent and significant.

The exercise using different time windows and a different index highlights the fact that the results of an event study vary slightly based on the assumptions made. Thus, there is not a one-size-fits-all method that may be applied. We may, however, conclude that our results on significant abnormal returns hold fairly well when altering the assumptions on benchmark index and estimation period.

6.2 Hypothesis 2: Differences in abnormal returns

We begin by presenting a correlation matrix between all variables in the multivariate cross-sectional regression model (Table 6.4). The p-values (shown in parenthesis) relate to the rejection of a null hypothesis assuming zero correlation. We observe that no independent variable exhibits a perfect linear correlation with the abnormal returns. However, we find that our independent variable DEFENCE significantly correlates with the abnormal returns on the event date on a $p<0.05$ significance level, with a correlation coefficient of 0.537. The variables, therefore, are exhibit a moderate linear relationship. We find that the independent variables LEVERAGE and ln(SIZE) correlates on a $p<0.05$ significance level, with a correlation coefficient of 0.45. The correlation implies that in our sample, the larger firms (in terms of total assets) have higher amounts of debt relative to equity. Correlation between the independent variables can result in multicollinearity, which poses a problem when estimating the regression model. In section 6.2.1, we show that strong multicollinearity is not present in the analysis.

	AR	lnSIZE	ROA	LEVERAGE	DEFENCE
AR	1.000				
lnSIZE	-0.120	1.000			
	(0.568)				
ROA	-0.240	0.209	1.000		
	(0.248)	(0.315)			
LEVERAGE	-0.127	0.453*	0.297	1.000	
	(0.547)	(0.023)	(0.149)		
DEFENCE	0.537*	0.085	0.196	-0.037	1.000
	(0.006)	(0.687)	(0.349)	(0.861)	

p-values in parenthesis
* p<0.05

Table 6.4: Correlation matrix of all variables in the cross-sectional regression model on company characteristics ($\mathrm{AR}_{i,0} = \alpha_0 + \beta_1 * \ln(\mathrm{SIZE}_i) + \beta_2 * \mathrm{ROA}_i + \beta_3 * \mathrm{DEFENCE}_i + \beta_4 * \mathrm{LEVERAGE}_i + \varepsilon_i$).

The results from our cross-sectional regression model, aiming to relate the abnormal returns between the companies to their characteristics, are inconclusive (Table 6.5). The companies' share of revenue originating from the defence sector (the independent variable DEFENCE) proved significant on a $p<0.01$ level, with a coefficient of 0.044. Our controlling variables ROA and ln(SIZE) did not prove significant on a $p<0.05$ level, although both exhibited negative coefficients of -0.17 and -0.19, respectively. ROA is significant on a $p<0.10$ level. The variable LEVERAGE showed a positive coefficient of 0.02, however insignificant at a 5 per cent significance level.

VARIABLES	(1) AR
lnSIZE	-0.189
	(-0.649)
ROA	-0.171*
	(-1.931)
LEVERAGE	0.0193
	(0.291)
DEFENCE	0.0441***
	(3.541)
Constant	2.612
	(1.051)
Observations	25
R-squared	0.424

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6.5: Results from the cross-sectional regression of company abnormal returns ($AR_{i,0} = \gamma_i = \alpha_0 + \beta_1 * \ln(SIZE_i) + \beta_2 * ROA_i + \beta_3 * DEFENCE_i + \beta_4 * LEVERAGE_i + \varepsilon_i$ where ln(SIZE) is equal to the natural logarithm of company i's total assets 2018, ROA is equal to Return on Assets 2018 for company i, DEFENCE is equal to the is the share of company i's revenue originating from business activities in the defence sector, and LEVERAGE is equal to the debt-to-equity-ratio for company i.

The significance in DEFENCE supports our hypothesis that the companies' abnormal returns due to the U.S. escalations were significantly related to the weight of the company's business operations within the defence sector. With every percentage point increase in DEFENCE, the abnormal return increased with 0.04 percentage points. The results are intuitive, given that the event impacted a larger share of the entire business for a company with a higher value of DEFENCE. The significance supports our expectation that investors would favour companies with larger relative military exposure to the event. Figure 6.2 illustrates the relationship between the share of the revenue from defence activities and abnormal returns on the event date. As seen in the regression results above, a slight upwards-sloping trend can be noted in figure 6.2, as well.

The significant relationship between DEFENCE and abnormal returns coincide with the findings of Capelle-Blancard and Couderc (2008) on defence companies during the September 11, 2001, acts of terrorism. Unlike our method, however, they compared the mean abnormal returns for defence companies with under 49 per cent in defence-related revenue, to the mean of those with 50 per cent and above. Our findings suggest that the defence sector reacted more positively to the news regarding the U.S. airstrike relative to the other business areas, in which the defence contractors are engaged. These other business areas include a range of activities, including commercial aviation, marine technology and even kitchen appliances and baby products.

The insignificance in ln(SIZE) and ROA does not support our initial belief that both more substantial companies, in terms of total assets, and companies with prior profitability, would experience higher abnormal returns on the event date. The insignificance of ln(SIZE) also suggests that we do not find any favouring of prime contractors by the market, although the reader should note that the ln(SIZE) variable is a crude proxy. Any differences in abnormal returns due to a leverage effect on shareholder returns can neither be acknowledged. Similarly, Humphrey et al. (2016) also did not find the variables significant in their event study on oil-related companies. Hypothesis 2 is thereby only partly supported due to the significance in DEFENCE, whereas all other explanatory variables proved insignificant.

The explanatory power of our cross-sectional analysis is weakened by the fact that only eight of the companies' abnormal returns were significant in the testing of hypothesis 1. Hence, the low significance in the dependent variable itself might have influenced the results of the cross-sectional regression model. Other reasons for why the model is unable to explain the differences between the companies may be due to our data, which we base on 2018 financials. Whereas markets generally are forward-looking, and 2019 had already ended (but not yet reported), we rely on historical ratios. These may not have been of interest to the stock market anymore, which focused on updated predictions. A final possibility is that the financial ratios chosen due to their perceived importance to investors, are faulty and were not considered by investors. I.e. we cannot rule out the risk of a wrongly specified model.

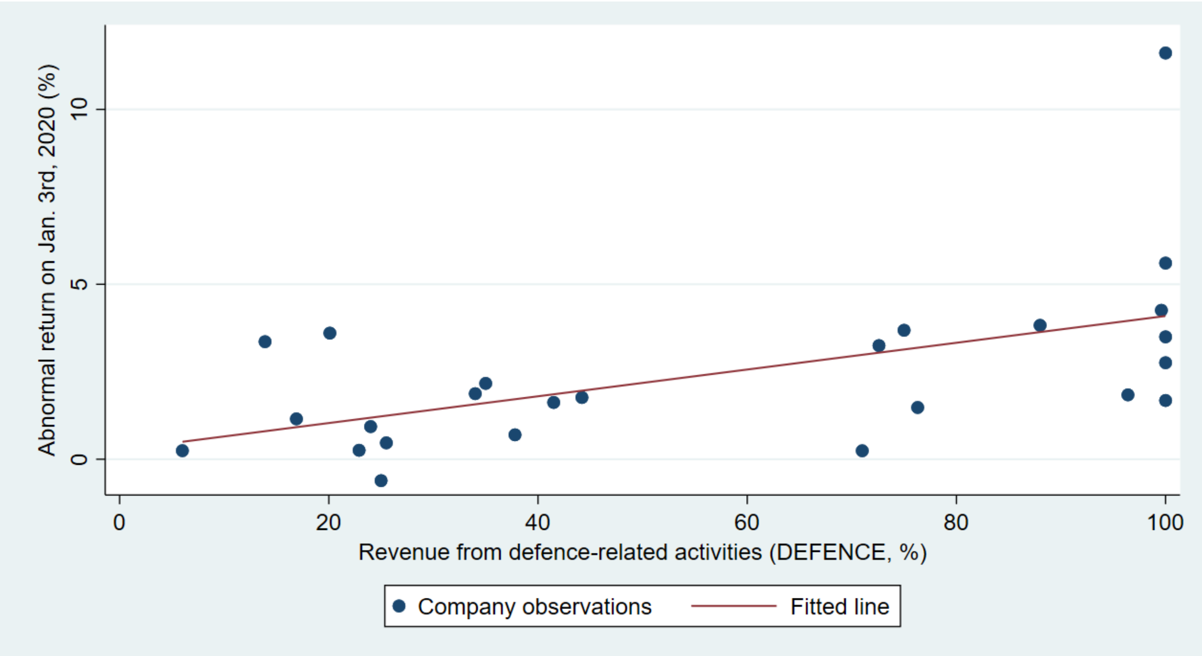

Figure 6.1: Scatter plot of company abnormal returns on the event date ($AR_{i,0}$) according to our statistical model and respective company's share of revenue from the defence sector ($DEFENCE_i$) for 25 of the 28 sampled Aerospace and Defence companies. n=25.

6.2.1 Multicollinearity

We test for multicollinearity in our cross-sectional model using the Variance Inflation Factor (VIF). Multicollinearity, the correlation between independent variables, poses a problem due to the difficulty in estimating the relationship between each independent variable and the dependent variable. Given a large presence of multicollinearity in our regression model, the results of how the independent variables each independently amounts to the regression output becomes unreliable. Wooldridge (2012) suggests ten as a general cut-off value for the VIF, where a higher number implies strong multicollinearity between the independent variables. As seen in Table 6.6, we observe a mean VIF of 1.21, with LEVERAGE exhibiting the highest value, 1.35. Hence, no multicollinearity is assumed present.

Variable	VIF	1/VIF
LEVERAGE	1.35	0.74
lnSIZE	1.28	0.78
ROA	1.16	0.87
DEFENCE	1.06	0.94
Mean VIF	**1.21**	

Table 6.6: Variable Inflation Factors (VIF), testing for multicollinearity between the independent variables in the cross-sectional regression model ($\gamma_i = \alpha_0 + \beta_1 * \ln(SIZE_i) + \beta_2 * ROA_i + \beta_3 * DEFENCE_i + \beta_4 * LEVERAGE_i + \varepsilon_i$).

7 Concluding remarks

7.1 Limitations

The major limitation of this study is its inability to provide any insight into the general effects of geopolitical events on the defence industry. The limitation is due to us having focused on a single, high-profile event in recent U.S. foreign policy. The study instead functions as a modern addition to the previous studies on the subject, such as Billingsley et al. (1987) and Capelle-Blancard and Couderc (2008).

Moreover, contrary to many event studies in general, the aim of this thesis is not to test the market rationality during the examined event. Testing for market rationality would require comparing the financial performance of the companies to the abnormal share price reaction, which is not possible due to the recency of the event. Instead, our purpose is rather to more in-depth examine how investors in the American defence industry immediately interpreted and responded to the news of the escalations. Although we successfully capture investors' reaction on the specific date, our limited event window does not allow us to capture the market reaction during the period of the escalations, including the events that followed. The small event window was chosen due to the risk of including the effects of other, unrelated events, as well as the chosen date being the most central in the U.S. – Iran developments.

The market reactions of other industries and their constituents due to the U.S. escalations, also remain unexplored, and we do not deem it unlikely that abnormal returns (positive or negative) could have been exhibited in other sectors as well. These could perhaps include the oil industry, which is also highly present in the Gulf region. Instead, the event study was limited to the A&D sector, due to its direct relationship with American foreign policy and the U.S. military. That said, our study has concluded that the A&D sector, according to our statistical model, experienced more substantial returns due to the event, than what our statistical model would expect if the U.S. actions had equal implications across the entire market. We also observed that the American defence industry experienced significantly larger returns than the U.S. market in general on the event date, which reacted with negative returns on -0.52 per cent on the event date.

7.2 Further research

Arguably U.S. geopolitics has changed since the Cold War when Billingsley et al. (1987) and McDonald and Kendall (1994) studied how the shares of defence companies reacted to news of escalations. Whereas our study finds anecdotal evidence that news on heightened conflict is still highly relevant for the American defence industry today, it fails to study the effect in general. Further research, revisiting the subject of conflict escalation in a broader level is therefore deemed increasingly interesting by us. The relevance of such a study is fuelled by what can be seen as a global rise of populism, not to mention among large global powers, and a heightened political focus on putting the country first, as opposed to cross-border unity. Moreover, our results indicate that several high-tech defence contractors, including manufacturers of unmanned aerial vehicles and robots, experienced the highest abnormal returns due to the event. Therefore, relating any general abnormal returns of such events to defence contractors' products could offer interesting insights into whether the stock market views technology firms as the largest profiteers of war in the new era.

7.3 Conclusion

In this thesis, we have examined how the skyrocketed geopolitical tensions between the U.S. and Iran, impacted the publicly traded American companies within the American aerospace and defence industry. In the first part of our empirical analysis, we use standard event study methods, a multivariate model built around the Market Model, to determine that the event resulted in significant abnormal returns for the American A&D industry. We also conclude that all but two of the sampled A&D companies exhibited positive abnormal returns on the date of the event, although not all significant. Given fundamental valuation theories, we conclude that the market plausibly perceived the event as likely to improve the financial status of the industry. The result indicates investor confidence in U.S. aerospace and defence contractors as a consequence of the particular conflict. The market's pro-reactiveness to the event also indicates that the event was unexpected, and not already factored into asset prices.

As mentioned, however, our results indicate that only eight of the 28 sampled companies experienced significant abnormal returns on an individual level. Although the reason for why the eight stand out is not statistically tested for, we provide a discussion around the eight significant securities, which include some of the most high-profile defence contractors in the U.S. and the world. The company-specific test also highlights the volatility in individual stock returns, which may pose difficulties when conducting event studies. Moreover, the differing abnormal returns between securities illustrate investors' differentiation between industry firms.

In the second part, we relate the differences in the companies' abnormal returns on January 3, 2020, to several selected financial ratios. Although most financial ratios, including size, profitability and leverage prove insignificant, we find a linear relationship between the company's share of revenue from the defence sector and its abnormal returns on the day of the event. The relationship is in line with previous event studies that studied the A&D industry.

Our anecdotal findings pose an interesting question whether Billingsley et al. (1987) and McDonald and Kendall's (1994) studies of the industry's general behaviour to political escalations during the Cold War era still hold today. While the evidence itself is compelling, the impossibility of predicting such an event somewhat limits the practical implications of predicting such an event. It could, however, be of interest to someone speculating in more frequent conflicts in the region.

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9 Appendix

A.1: Concepts and definitions

Aerospace & Defence	Businesses that manufacture civil or military aerospace and defence equipment. Including parts or products, defence electronics and space equipment, aircraft and aircraft parts primarily used in commercial or private air transport, military aircraft, radar equipment and weapons and excluding manufacturers of communications satellites (S&P Global Market Intelligence, 2018, and S&P Dow Jones Indices, 2020).
Hybrid securities	Financial instruments that have qualities of both debt and equity.
Islamic Revolutionary Guard Corps Quds Force (IRGC-QF)	Identified as supporting terrorist organisations throughout the Middle East. Iran has acknowledged the involvement of the IRGC-QF in the Iraq and Syria conflicts. (Defence Intelligence Agency, 2019 and U.S. House of Representatives Committee on Foreign Affairs, 2020).
Kata'ib Hezbollah	Iraqi Shia militia group linked to Iran's Quds Force and subordinate to the counter-insurgency group "Popular Mobilization Forces" or (PMF) which is supported by Iran (Defence Intelligence Agency, 2019)
New Benghazi	*Two U.S government diplomatic compounds were attacked by a militia group in the city of Benghazi in Libya in 2012. The attacks resulted in U.S casualties and created discussion if the attacks could have been anticipated and stopped. The 2012 Benghazi attacks became a point of embarrassment for U.S foreign policy and have arguably formed their continued obsession of being present in the Middle East to assert power. The fear of an equal event takin place with similar circumstances again – could be cited as a 'new Benghazi'.*
Prime	A company with a significant and frequent role as a prime contractor to the U.S. Department of Defence, who in turn subcontracts to other companies.

Table A.1: Central concepts and definitions

A.2: Specification of regression variables

For the cross-sectional regression model with company-specific characteristics (equation 8), the independent variables ln(SIZE) and ROA are defined accordingly:

ln($SIZE_i$) = Ln Total Assets = Natural logarithm of total assets of company i, reported at the end of the latest reported full year to the event (2018)

$$\ln\,(SIZE_i) = \ln\big(Total\ Assets_{i,2018}\big) \qquad (A.2.1)$$

Return on Assets (ROA_i) = Net income for 2018 / Average of opening and closing balance of total assets during 2018 for company i

$$ROA_i = \left(\frac{Net\ Income_{i,2018}}{\frac{Total\ Assets_{i,2017} + Total\ Assets_{i,2018}}{2}}\right) * 100 \qquad (A.2.2)$$

$DEFENCE_i$ = Revenue originating from the defence sector / Total Revenue for company i during 2018

$$DEFENCE_i = \left(\frac{Revenue\ from\ defence\ sector_{i,2018}}{Total\ Revenue_{i,2018}}\right) * 100 \qquad (A.2.3)$$

$LEVERAGE_i$ = Total interest-bearing debt / Total Shareholder’s equity for company i at the end of 2018

$$LEVERAGE_i = \left(\frac{Total\ interestbearing\ debt_{i,2018}}{Total\ equity_{i,2018}}\right) * 100 \qquad (A.2.4)$$

A.3: List of the 28 sampled Aerospace and Defence (A&D) companies

Ticker	Name	Revenue, 2018	Defense-Rev, 2018	Defense-Rev, 2018 (%)	Assets, 2018	ROA, 2018 (%)	D/E, 2018 (x)	Exclude
AIR	AAR Corp	1 748	446	25.5%	1 604	3.2%	0.2x	
AJRD.K	Aerojet Rocketdyne Holdings Inc	1 896	1 888	99.6%	2 490	5.8%	1.5x	
AVAV.O	AeroVironment Inc	271	n.a.	n.a.	499	12.6%	0.0x	
ARNC.K	Arconic Inc	14 014	841	6.0%	4 795	3.5%	0.1x	
ATRO.O	Astronics Corp	803	112	13.9%	775	6.2%	0.6x	
AAXN.O	Axon Enterprise Inc	420	n.a.	n.a.	720	5.5%	0.0x	
BWXT.K	BWX Technologies Inc	1 780	1 291	72.6%	1 655	13.5%	3.3x	
BA	Boeing Co	101 127	23 195	22.9%	117 359	9.1%	33.8x	
CUB	Cubic Corp	1 203	532	44.2%	1 549	1.1%	0.3x	
CW	Curtiss-Wright Corp	2 412	911	37.8%	3 255	8.5%	0.5x	
DCO	Ducommun Inc							Yes
GD	General Dynamics Corp	36 193	27 608	76.3%	45 408	8.3%	1.1x	
HEI	HEICO Corp							Yes
HXL	Hexcel Corp	2 189	370	16.9%	2 824	9.9%	0.7x	
HII	Huntington Ingalls Industries Inc	8 176	8 176	100%*	6 383	13.1%	0.8x	
KTOS.O	Kratos Defense & Security Solutions Inc	618	618	100%*	1 010	-0.3%	0.6x	
LHX	L3Harris Technologies Inc	6 801	5 101	75.0%	9 852	8.8%	1.1x	
LMT	Lockheed Martin Corp	53 762	47 311	88.0%	44 876	11.0%	9.7x	
MAXR.K	Maxar Technologies Inc							Yes
MRCY.O	Mercury Systems Inc	493	493	100%*	1 157	3.4%	0.3x	
MOGa	Moog Inc	2 709	921	34.0%	2 968	4.5%	0.6x	
NPK	National Presto Industries Inc	323	230	71.0%	414	9.7%	0.0x	
NOC	Northrop Grumman Corp	30 095	30 095	100%*	37 653	8.9%	1.8x	
PSN	Parsons Corp	3 561	1 479	41.5%	2 613	9.1%	-0.5x	
RTN	Raytheon Co	27 058	27 058	100%*	134 211	4.6%	1.1x	
SPR	Spirit AeroSystems Holdings Inc	7 222	n.a.	n.a.	5 686	11.3%	1.5x	
TDY	Teledyne Technologies Inc	2 902	697	24.0%	3 809	8.7%	0.3x	
TXT	Textron Inc	13 972	3 494	25.0%	14 264	8.3%	0.7x	
TDG	TransDigm Group Inc	957	335	35.0%	12 389	7.5%	-7.7x	
TGI	Triumph Group Inc	3 199	643	20.1%	3 331	-11.4%	-5.9x	
UTX	United Technologies Corp							Yes
VEC	Vectrus Inc	1 279	1 233	96.4%	572	6.6%	0.3x	

* Company is solely active within the defence sector, Defence-rev. (%) is defined as 100%

Table A.3: List of sample companies within the American Aerospace and Defence industry and selected financial data

A.4: Hypothesis 1 testing using the S&P 500 index

Company	Rm	D	Constant	N	R-squared
(1) AAR Corp	1.166*** (5.064)	0.706 (0.348)	0.0296 (0.161)	121	0.179
(2) AeroVironment Inc	**1.049*** (4.558)**	**7.581*** (3.738)**	**0.0520 (0.282)**	**121**	**0.213**
(3) Aerojet Rocketdyne Holdings Inc	**0.420* (1.827)**	**4.390** (2.169)**	**0.00306 (0.0167)**	**121**	**0.059**
(4) Arconic Inc	1.027*** (7.877)	0.465 (0.405)	0.101 (0.967)	121	0.345
(5) Astronics Corp	1.881*** (7.240)	3.768 (1.646)	-0.365* (-1.756)	121	0.312
(6) Axon Enterprise Inc	1.439*** (4.029)	-2.523 (-0.802)	0.0971 (0.339)	121	0.130
(7) BWX Technologies Inc	**1.060*** (5.987)**	**3.481** (2.232)**	**0.0958 (0.676)**	**121**	**0.247**
(8) Boeing Co	0.624*** (3.161)	0.375 (0.216)	-0.103 (-0.651)	121	0.078
(9) Cubic Corp	0.780** (2.615)	1.932 (0.735)	-0.0563 (-0.235)	121	0.057
(10) Curtiss-Wright Corp	1.053*** (11.01)	0.926 (1.099)	0.0340 (0.444)	121	0.507
(11) General Dynamics Corp	**0.886*** (9.482)**	**1.695** (2.059)**	**-0.0884 (-1.183)**	**121**	**0.437**
(12) Hexcel Corp	1.056*** (8.381)	1.416 (1.276)	-0.126 (-1.252)	121	0.374
(13) Huntington Ingalls Industries Inc	**1.028*** (7.603)**	**3.703*** (3.110)**	**0.0122 (0.113)**	**121**	**0.351**
(14) Kratos Defense & Security Solutions Inc	**0.907*** (2.948)**	**11.77*** (4.345)**	**-0.245 (-0.994)**	**121**	**0.178**
(15) L3Harris Technologies Inc	**0.445*** (3.081)**	**3.826*** (3.008)**	**0.00987 (0.0853)**	**121**	**0.126**
(16) Lockheed Martin Corp	**0.627*** (6.598)**	**4.014*** (4.797)**	**0.0269 (0.353)**	**121**	**0.342**
(17) Mercury Systems Inc	0.745*** (2.827)	2.944 (1.269)	-0.0376 (-0.179)	121	0.071
(18) Moog Inc	1.245*** (7.114)	2.127 (1.380)	-0.124 (-0.882)	121	0.303
(19) National Presto Industries Inc	1.002*** (6.075)	0.429 (0.295)	-0.103 (-0.783)	**121**	**0.239**
(20) Northrop Grumman Corp	**0.562*** (3.652)**	**5.790*** (4.274)**	**0.0353 (0.287)**	**121**	**0.198**
(21) Parsons Corp	1.165*** (5.974)	1.936 (1.128)	0.0492 (0.315)	121	0.234
(22) Raytheon Co	0.697*** (5.248)	1.826 (1.562)	0.149 (1.400)	121	0.196
(23) Spirit AeroSystems Holdings Inc	0.730*** (3.917)	0.162 (0.0986)	-0.0501 (-0.336)	121	0.115
(24) Teledyne Technologies Inc	0.863*** (6.479)	1.166 (0.993)	0.160 (1.497)	121	0.263

Company	Rm	D	Constant	N	R-squared
(25) Textron Inc	1.517*** (8.627)	-0.335 (-0.216)	-0.221 (-1.570)	121	0.390
(26) TransDigm Group Inc	1.089*** (6.186)	2.457 (1.585)	0.144 (1.021)	121	0.250
(27) Triumph Group Inc	1.741*** (5.510)	3.904 (1.403)	-0.00861 (-0.0341)	121	0.209
(28) Vectrus Inc	1.116*** (4.928)	2.076 (1.041)	0.136 (0.750)	121	0.173
(29) Aerospace and Defence sector	**0.997*** (13.13)**	**2.572*** (3.846)**	**-0.0141 (-0.232)**	**121**	**0.612**

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.4: Regression results of the company-specific abnormal return model for all A&D companies, as well as the industry portfolio using the S&P 500 index as an alternative to the MSCI USA index. The regression model is defined as $R_{i,t} = \hat{\alpha}_i + \hat{\beta}_i * R_{m,t} + \gamma_i * D + \varepsilon_{i,t}$, where R_m is equal to the daily return of the MSCI USA index, and D is a dummy variable equal to 1 on the event date (capturing the abnormal return on the date).

A.5: Hypothesis 1 testing using shorter and longer estimation periods

		Length of estimation window			
		160 days		80 days	
Company		**Rm**	**D**	**Rm**	**D**
(1)	AAR Corp	1.273***	0.427	1.290***	0.644
		(6.287)	(0.204)	(3.075)	(0.277)
(2)	**AeroVironment Inc**	**1.094*** **	**7.558*** **	**0.730* **	**7.193*** **
		(5.341)	**(3.580)**	**(1.827)**	**(3.243)**
(3)	**Aerojet Rocketdyne Holdings Inc**	**0.503*** **	**4.217** **	**0.685** **	**4.603*** **
		(2.729)	**(2.218)**	**(2.572)**	**(3.110)**
(4)	Arconic Inc	1.003***	0.199	1.317***	0.413
		(9.659)	(0.186)	(6.665)	(0.376)
(5)	Astronics Corp	1.656***	3.262	1.582***	3.006*
		(7.385)	(1.411)	(5.037)	(1.724)
(6)	Axon Enterprise Inc	1.438***	-2.739	1.516**	-2.877
		(5.082)	(-0.939)	(2.565)	(-0.876)
(7)	**BWX Technologies Inc**	**1.030*** **	**3.258** **	**0.837*** **	**3.248*** **
		(7.603)	**(2.332)**	**(5.424)**	**(3.790)**
(8)	Boeing Co	0.713***	0.260	0.701**	0.339
		(4.465)	(0.158)	(2.277)	(0.198)
(9)	Cubic Corp	0.880***	1.804	0.841	1.854
		(3.840)	(0.763)	(1.594)	(0.633)
(10)	Curtiss-Wright Corp	1.130***	0.733	0.898***	0.629
		(13.58)	(0.854)	(5.486)	(0.691)
(11)	General Dynamics Corp	0.904***	1.469*	0.814***	1.541*
		(10.72)	(1.688)	(5.117)	(1.744)
(12)	Hexcel Corp	0.977***	1.066	0.958***	1.243
		(9.206)	(0.974)	(4.593)	(1.073)
(13)	**Huntington Ingalls Industries Inc**	**1.014*** **	**3.439*** **	**0.988*** **	**3.373*** **
		(9.394)	**(3.091)**	**(4.753)**	**(2.921)**
(14)	**Kratos Defense & Security Solutions Inc**	**0.901*** **	**11.45*** **	**0.719**	**11.33*** **
		(3.657)	**(4.508)**	**(1.548)**	**(4.389)**
(15)	**L3Harris Technologies Inc**	**0.377*** **	**3.669*** **	**0.0945**	**3.605*** **
		(2.762)	**(2.610)**	**(0.403)**	**(2.766)**
(16)	**Lockheed Martin Corp**	**0.544*** **	**3.803*** **	**0.455*** **	**3.812*** **
		(6.617)	**(4.487)**	**(2.947)**	**(4.444)**
(17)	Mercury Systems Inc	0.777***	2.838	0.729*	3.014
		(3.632)	(1.287)	(1.949)	(1.451)
(18)	Moog Inc	1.328***	1.880	1.404***	1.907
		(9.441)	(1.296)	(5.770)	(1.412)
(19)	National Presto Industries Inc	0.930***	0.232	1.168***	0.322
		(6.672)	(0.161)	(4.592)	(0.228)
(20)	**Northrop Grumman Corp**	**0.529*** **	**5.612*** **	**0.290**	**5.599*** **
		(4.044)	**(4.165)**	**(1.265)**	**(4.392)**
(21)	Parsons Corp	0.910***	1.504	1.088***	1.530
		(5.050)	(0.810)	(3.323)	(0.841)
(22)	Raytheon Co	0.672***	1.723	0.808***	1.761*
		(5.829)	(1.450)	(4.905)	(1.925)
(23)	Spirit AeroSystems Holdings Inc	0.839***	0.140	0.526*	0.0502
		(5.341)	(0.0864)	(1.913)	(0.0329)

Company		Length of estimation window: 160 days Rm	160 days D	80 days Rm	80 days D
(24)	Teledyne Technologies Inc	0.879***	0.974	0.566**	0.885
		(8.111)	(0.871)	(2.589)	(0.728)
(25)	Textron Inc	1.649***	-0.613	1.562***	-0.615
		(12.71)	(-0.458)	(6.870)	(-0.487)
(26)	**TransDigm Group Inc**	**1.083*** **	**2.245**	**0.876*** **	**2.169** **
		(7.740)	**(1.556)**	**(4.656)**	**(2.075)**
(27)	Triumph Group Inc	1.800***	3.585	2.133***	3.792
		(6.950)	(1.342)	(4.298)	(1.376)
(28)	Vectrus Inc	1.039***	1.799	0.728**	1.558
		(5.549)	(0.931)	(2.239)	(0.864)
(29)	**Aerospace & Defence sector**	**0.995*** **	**2.350*** **	**0.939*** **	**2.354*** **
		(16.33)	**(3.739)**	**(7.742)**	**(3.494)**

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.5: Regression results for variables Rm and D of the company-specific abnormal return model for all A&D companies, as well as the industry portfolio, using alternative estimation periods of 160 and 80 days. The regression model is defined as $R_{i,t} = \widehat{\alpha}_i + \widehat{\beta}_i * R_{m,t} + \gamma_i * D + \varepsilon_{i,t}$, where R_m is equal to the daily return of the MSCI USA index, and D is a dummy variable equal to 1 on the event date (capturing the abnormal return on the date).