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Contract Delays: The Impact of Department of Defense (DoD) Contractors' Wealth

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CONTRACT DELAYS: THE IMPACT ON DEPARTMENT OF DEFENSE (DOD) CONTRACTORS' WEALTH

THESIS

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Abstract

The monetary incentives used to motivate DoD contractors' schedule performance on Acquisition Category One programs afford them the opportunity as a whole to earn billions of dollars in addition to their contract award. These incentives are paid 85-90% of the time regardless of schedule performance. While these contractors are paid to avoid delays, there is an indication the delay increases the contractor's stock value. This research tested the theory that contract delays significantly impact the company's stock returns. The results found both positive and negative reactions to a firm's value. Delays caused by budget cuts tend to have a negative impact on a company's wealth, while delays for other reasons such as a restructure or redesign tend to have a positive impact. The findings illustrate that shareholders are aware the impact delays could have on a program and react accordingly and quickly to the market. Undeniably contractors cannot control the program's funding however; there is no incentive for a contractor to avoid other types of delays because of the wealth it generates for the company.

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This work is dedicated to my husband and best friend, who is my number one fan. He has always been there for me throughout my 18 year Air Force career. Without his support and encouragement, none of this would have been possible.

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CONTRACT DELAYS: THE IMPACT ON DEPARTMENT OF DEFENSE (DOD) CONTRACTORS' WEALTH

I. Introduction

Purpose

The purpose of this research was to evaluate whether or not DoD contract delays on selected major acquisitions weapon systems significantly impact a firm's stock return.

Previous Research

A recent study by Robert Carden (2006) provides a unique perspective on this issue, suggesting that shareholders may value contract delays. He hypothesized there is a market reaction to a contractual delay, which is reflected in the company's stock value. After analyzing the Army's development and procurement of the Comanche helicopter, he found that a contract delay maximized Boeing's wealth 7.1% and United Technology's 8.2% within 21 days after the delay announcement.

Nevertheless, Carden's (2006) effort analyzed only one delay in the Comanche program, while there were seven previous delays (Marc Selinger, 2002) in 14 years. Given that Carden (2006) examined one event, we want to extend his tested hypothesis with further investigation. As a result, this effort will build on Carden's (2006) findings and further explore this issue. More specifically, this research will test the extent to which contract delays significantly impact a firm's stock return by analyzing 26 major weapons system programs the GAO has reviewed annually since 2003 (GAO 2003-2006, 03-476, 04-248, 05-301, 06-391) to include a prime contractor for each program[1]. Additionally in an effort to illustrate the magnitude these findings could have on the DOD's acquisition process, contract incentives will also be investigated. If the results substantiate Carden's (2006) findings and contractor's do value contract delays, then the DoD is paying incentive payments for exceptional performance that the company does not value because the stock price increase out weighs any incentive the government can provide.

Contract Incentives

In order to motivate excellent contractor performance in areas determined critical to an acquisition program's success (i.e., avoid cost overruns, stay on schedule, and deliver the capabilities expected), the DoD offers its contractors incentive fees. As these monetary incentives afford contractors as a whole the opportunity to earn billions of dollars in addition to their signed contract amounts, it is important to understand the implications these incentives have on the contractor's performance and the conditions under which they are paid. The latter issue was examined, concluding the DoD paid billions of dollars in incentives to numerous contractors regardless of the acquisition outcomes. It concluded the government pays incentives 85-90% of the time. Incidentally, the GAO highlighted a few development programs in its report which were paid an incentive for poor performance (GAO, 2005, 06-66).

[1] Appendix A lists the programs with abbreviations, the respective prime contractors, and their ticker symbols.

For instance, the Army's Comanche attack helicopter contractor exceeded the research and development budget by 41.2% and exceeded the time allotted to fulfill contract obligations by 14.8%; yet, the contractor was paid 85% of the contract incentives totaling $202.5 million[2]. Similarly, the contractor responsible for the development of the Air Force's F/A-22 Raptor was paid 91% ($848.7 million) of its contract incentives after research and development costs were 47.3% over budget and took 13% longer than promised.

Collecting Data

In order to test whether a contract delay has a significant impact on a company's stock value, an econometric event study was conducted. Event studies look at a specific event and measure the impact it had on a company's value by analyzing financial market data (MacKinlay, 1999). For this research, the events were public announcements of contract delays in each program's acquisition process. Contract delay information was collected by analyzing major newspapers, magazine and journal articles, and business, finance and industry news indexed in the Lexis-Nexis database; we targeted delays of six months or greater. The DoD (2005) requires only delays of six months or greater to be reported, therefore this research did the same. News during the event window was researched ensuring there were no other announcements or incidents (e.g., stock splits or mergers) that may interfere with determining whether or not the market reaction was due to the delay. If there were any confounding events that occurred, the delay was omitted.

[2] The Comanche program was cancelled in 2004

Once the delays were identified, daily market values were observed for 200 days around the event which covered 188 days prior to the delay announcement and 11 days afterward. This timeline is consistent with other research, and it covered nearly two full weeks of trading and two full business quarters.

II. Literature Review

This study measured the impact major defense acquisitions' schedule delays had on its contractor's stock return. In addition, it reviewed contract incentives because DoD pays contractors incentives above the contract award amount to avoid delays. As a result, incentivizing could become difficult if the company's stock value increased after a delay and the incentive offered no additional motivation to remain on schedule. So to make this connection a bit more distinct, it is necessary for the reader to gain a basic understanding of both the incentive program as well as the methodology that has been selected to test this theory. The literature reviewed for this study included the GAO's assessments of 26 major weapon systems programs, a myriad of incentive contract material, the initial research conducted by Carden (2006) which hypothesized that contractors value delays, and the literature pertaining to the appropriate method for testing this study's hypothesis.

Weapon Systems Assessment

The Defense Acquisition University (2006) defines a major weapon system as a combination of elements functioning together and used by the Armed Forces to accomplish combat missions. According to the GAO (06-391), a weapon system is classified major if it has an estimated total expenditure for research, development, test, and evaluation of more than $365 million or procurement costs more than $2.19 billion[3]. The GAO has assessed numerous major weapon systems. These assessments include the

[3] FY 2000 constant dollars

26 programs analyzed during this study and have annually been reported by the GAO during the past four years (GAO, 2003-2006, 03-476, 04-248, 05-301, and 06-391). The studies were read to gain an understanding of each program's technology maturity, design stability, and other program issues, plus additional comments by the agency if necessary.

Contract Incentives

Incentive contracts are designed to motivate exceptional performance by monetarily rewarding contractors for lack of cost overruns, avoiding schedule delays, and delivering weapon systems with the required capabilities. If this study's findings also suggest a contractor's stock return increases during schedule delays, and the DoD is trying to monetarily incentivize him to avoid delays, there is a terrible disconnect. Although the theory that contractors value delays is new, incentive contracts have been utilized for years. Following is a history of incentive contracts which will give us a better understanding of how they have been used in the past.

History of Contract Incentives

Contract incentives date back to 1908 when the Army contracted the Wright brothers to build a "heavier-than-air" flying machine. The Army required the plane to fly a minimum of 40 miles per hour (mph); if this speed was reached, the contractor would receive a bonus payment. Even though it took three attempts to reach the desired performance, which caused a 10-month contract delay, the brothers eventually flew the machine 42.5 mph and were awarded the entire $5,000 incentive payment (Vernon Edwards, 2002).

These types of incentives were used again in World War I when the government offered performance incentives and capital investment to Bethlehem Steel for ship building. The War Department developed an evaluated-fee contract and made part of the fee dependent on the contractor's performance. The Navy's Bureau of Ships adopted this concept, except it made a percentage of the fee fixed and the rest varied as a bonus for reducing costs. In 1943 the Under Secretary of the Navy, James V. Forrestal, received minimal support when he tried to convert as many contracts as possible to incentive contracts. At that time, contractors were not proficient at cost estimating and there were too many changes to the contracts. If incentives were offered, these challenges would have hindered their ability to make a profit. The lesson learned from this was that incentives can be effective if they are used at the right time, place, and under certain conditions (Thomas Snyder, 2002).

The National Aeronautics and Space Administration (NASA) was able to successfully reintroduce this concept 20 years later. Initially, only NASA and the Navy used award-fee contracts. The Air Force and Army rejected the concept until Secretary of the Air Force Robert C. Seamans mandated its use in the 1970s for the B-1 and F-15 programs (Snyder, 2002). Today, all of DoD uses incentive contracts for major defense weapon system programs.

Previous Studies Conducted

Despite the fact that this contracting vehicle has been used consistently for major defense acquisitions since the 1960s, there have been studies conducted over the past 30 years, which suggested that contract incentives in this manner are ineffective at motivating contractors to perform efficiently. For instance, Frederick Scherer (1964) concluded contract incentives were ineffective in weapons development contracts and did not motivate cost efficiency. A few years later, Irving Fisher (1968) studied the effect contract incentives had on procurement costs for major defense weapon systems. Using statistical analysis, the evidence indicated that incentives did not motivate contractors to minimize costs and perform efficiently. After reviewing major defense incentive contracts between FY 1999 through FY 2003, the GAO (2005, 06-66) found the DoD paid 90% of the available incentive fees regardless of the contractor's performance. These results are important because they suggest the incentive program does not achieve results as it is intended, which is to motivate outstanding performance. Some examples include the C-17, F/A-22 Raptor, F/A-35 Joint Strike Fighter, and the Space Based Infrared Satellite System (SBIRS)-High, which are included in the next section of reading.

During the Air Force's reliability, maintainability, and availability (RM&A) evaluation of the C-17, the GAO assessed its results. The Air Force determined the C-17 was fully mission-capable and awarded the contractor a $5.91 million incentive payment. However, during the GAO's investigation, it found the aircraft was not functionally effective in aeromedical evacuation capability. As a result, the contractor was overpaid $750,000 (GAO, 1996, GAO/NSIAD 96-126). Although this may seem immaterial considering DoD's investment in the research, development, test, evaluation, and procurement of major weapon systems was $135 billion in FY 2004 (GAO, 2004, 04-248), this is not an isolated incident and seems to happen rather often with much larger monetary consequences[4]. For instance, the GAO (2005, 06-66) reviewed an F/A-22's incentive contract and found between fiscal years 1999 and 2003, the company earned 91% of its incentives, $848.7 million, even though it was 13.3% over its scheduled initial operation capability. DoD's single development program, the Joint Strike Fighter, (AAAS, 2006) experienced a 26+% increase in costs from its initial estimate (GAO, 2006, 06-585T). In addition, the aircraft has experienced development delays as well as significant cost increases and technical problems, yet the contractor still received 100% of its incentive fee totaling $494 million (GAO, 2005, 06-66). In an even more alarming discovery, the SBIRS-(High) received 74% ($160 million) of its available incentive fee while its research and development costs increased 99.5% over its baseline, experienced years of delays, and increased the per unit cost by 315% (GAO, 2006, 06-585T).

Again, these are not the exceptions; they appear to be the norm. The importance of these overpayments is well known to the GAO. It studied a population of 597 major weapon systems contracts from FY 1999 through FY 2003 and found incentive payments totaling over $8 billion were paid to contractors as a whole regardless of the acquisition outcome (GAO, 2005, 06-66). Definitely, there appears to be substantial evidence to state poor contractor performance is rewarded. Nevertheless, this research intends to maintain an unbiased view. To do so, possible criticisms have been addressed in the following paragraphs.

Rebuttal

An argument could be made that even though these reports indicate the

[4] 2004 Base Year dollars

government pays incentives for poor performance, the contractor did in fact perform above standards based on the program manager's interpretation of his work. For example, many reports show enormous schedule delays in programs, which lead a reader to believe the contractor is at fault and does not deserve an incentive fee. However, many of these reports do not indicate the cause of the delay. As a result, it may be unfair to immediately criticize the contractor's performance when in fact it may not have been his fault; obstacles such as governmental budget constraints will delay a program and are completely out of a contractor's control.

One could also refute the scrutiny the F/A-22 program has endured over the years. The aircraft's development began in 1986 and the contractor has been paid incentive fees at times throughout the program. Undeniably, it has taken an extremely long time to build this plane, for various reasons. For instance, the F/A-22's integrated avionics and stealth technologies were both late to mature. The jet was in product development nine years before the integrated avionics reached its maturity; consequently, it was a contributing factor to schedule delays and cost growth. In fact, from 1997 until its 2003 report, the cost of avionics software development increased over $800 million (GAO, 2003, 03-476). Contrary to the program's negativity, many reports do not highlight the fact the aircraft was designed and built for the Cold War. But that war ended, leaving the tactical fighter with capabilities no longer needed, while lacking those that are currently needed. At that point it had to be reconfigured with systems to defend against threats in the 21st century (Keith Ashdown, 2006). Consequently, the first initial operation capability aircraft was delivered 19 years after the program started (GAO, 2006, 06-391). Ironically, the military is encountering the same challenges today as the Wright brothers did nearly 100 years ago. That is to say, it is better to wait for a weapon system that will do the job it is intended for rather than one that was completed on time and does not perform to DoD specifications.

In contrast, there is a perception the government pays an incentive fee regardless if a contractor's performance deserves rewarding. In an attempt to understand how contractors view the incentive program, Snyder (2002) interviewed employees from some of the largest companies in the defense industry, as well as some moderate-sized companies who were all competing for government contracts[5]. He found contractors have started to count award fees as part of their total profit. The general consensus from the interviews was that contractors alter their proposals when an award fee is offered. They submit a low bid that cuts into the company's profit margin to stay competitive and win the contract. Although they do not depend on 100% of the fee, this strategy is still considered a moderate risk to them since they have never been denied a large percentage of the fee in the past. Typically 85-90% of incentive fees are awarded, which helps explain why contractors do not rate this strategy as high risk. However, this scheme is not done haphazardly; research is accomplished prior to bidding, such as reviewing historical records and conducting detailed analysis to estimate the probable fee (Snyder, 2002).

Based on much of the research conducted, it appears to show evidence the contract incentives do not incentivize. If the findings suggest a contractor's wealth increases because of a delay, but the DoD offers an incentive to avoid delays paying

[5] All participants were guaranteed nonattribution to themselves and their organizations.

nearly 100% of the available fee, the government could potentially see additional schedule delays and an enormous amount of incentives paid for little or no motivation on the contractor's part.

The motivation for this research is based on Carden's (2006) study which suggests shareholders may value contract delays in government contracts over the incentive payments that are garnered. In other words, the Department of Defense attempts to incentivize companies to avoid delays, when in fact the delay increases the company's wealth beyond any award fee amount the government could offer. He found the shareholders of the contractors that built the Comanche, Boeing and United Tech (which owns Sikorsky), increased their wealth by 7.1% and 8.2%, respectively. It appears it would be difficult for the DoD to monetarily incentivize a company if its stock returns increase significantly after a delay is announced. If in fact delays do cause contractors' returns to increase, they are benefiting two-fold. They receive an incentive regardless of their performance plus they increase company wealth at the same time.

At this point, the reader should understand the role contract incentives play in the concept of this study and know this research will continue testing Carden's (2006) hypothesis by adding 26 more programs to the study and all of the delays each program encounters. But the answer to the question, how will the impact delays have on a DoD contractor's stock price be measured, has not been explained; this methodology will be introduced next.

The most powerful and reliable tool available to measure this impact is event study methodology; it has been studied extensively and corroborates this assertion. The next several paragraphs will explain basic theory, define an event, illustrate disciplines where event studies have been applied and its evolution, give details why this method is the most applicable for this research, and end with general steps taken to conduct an event study.

Event Study Method

Event studies are based on the assumption that the marketplace is efficient (Eugene Fama, Lawrence Fisher, Michael Jensen, and Richard Roll, 1969). Gerald Dwyer (2001) defines an event as a change, development or announcement that could possibly produce a considerable change in the asset's price over some period of time. An event can be company specific, actions taken by the government, and is often information announced to share holders through financial news such as The Wall Street Journal or a corporate proxy statement. Some examples of an event are a merger, stock-split, earnings report, and an increase in dividends. The market then efficiently uses the information regarding the event and incorporates it into the stock price of the firm.

Up to and including the work of Eugene Fama, Lawrence Fischer, Michael Jensen, and Richard Roll, (1969) event studies were limited to studying the impact stock splits had on a company's financial position using data from monthly returns. But Stephen Brown and Jerold Warner's (1980) work introduced a new concept, testing the event's statistical significance with abnormal returns. An abnormal return measures the impact an event had on a stock price during the event window. It is equal to the difference between an actual return and a normal return. A normal return is defined as what the return would have been without the event. Brown and Warner (1980) studied and compared an event study's three general models to estimate the normal return: mean adjusted returns, market adjusted returns, and market and risk adjusted return; all three produced similar results.

With further research, they analyzed daily returns rather than monthly returns (Brown and Warner, 1984). Using their previous models as the foundation, the researchers introduced the mean adjusted returns model, market adjusted returns model, and ordinary least squares (OLS) market returns model to identify the impact of an event on the stock market. They found the market adjusted returns and OLS models produced similar results, were much more powerful with daily returns than monthly, and outperformed the mean adjusted returns model. Brown and Warner (1984) additionally found the exchange-listing used correlates with the power of the model. In other words, the New York Stock Exchange (NYSE) securities demonstrated a higher power than American Stock Exchange securities. Given these facts, their findings strongly suggest collecting data daily is more powerful than monthly.

As a result, a multitude of studies using daily returns have measured the impact an unexpected event has on the firm's value. A few examples that used the market returns model include a study conducted on a scandal involving Russia's most successful oil company, Yuko, 1982's Tylenol poisonings, and the airline industry's stock returns after September 11th. After Yuko's two founders were arrested for embezzlement and other illegal acts, the company's single day stock prices dropped 15% on the Russian Market (Alexei GorIaev and Konstantin Sonin, 2004)[6]. The study that tested the significance of the effects that the 1982's Tylenol poisonings had on Johnson and Johnson's market

[6] The Yuko affair attracted world-wide attention

value found a $1.24 billion wealth decline (Mark Mitchell, 1989). The catastrophic event of September 11th provided mixed reaction between small and large airlines with respect to the Air Transportation Safety and System Stabilization Act. The study provided evidence that major airlines benefited while smaller airlines did not (David Cart and Betty Simpkins, 2004).

These are a few examples of studies that used this method, but its use is much more widespread than these illustrations. Finance and accounting has used event study methodology to measure the impact of numerous corporate events such as mergers and acquisitions, economists have used it to measure the impact of policy changes, and it has been used in the field of law to measure class action litigations and tax law changes.

Although this method has been widely accepted in the business world, the literature has been select concerning DoD and the acquisition process. Nevertheless, this method is the most applicable tool to measure the market's reaction to schedule delays for several reasons. One, the selected government contractors for this research all trade in the stock market, which allows their returns to be observed. Two, shareholders can learn about the event (schedule delay) from information distributed to market participants through financial and business news media. Three, delays to these multibillion dollar contracts may materially affect a company's financial statement. At a minimum, upsets such as these trigger employee layoffs and assembly plant shut downs. Lastly, it has been validated by well respected scholars; Eugene Fama, Stephen Brown, and Jerold Warner, have extensively tested this empirical method.

Conducting an Event Study

Even though there is not a distinctive set of rules for conducting an event study, several studies throughout the literature provided general steps. Identify the event of interest and select the time periods. There are two windows that must be identified, the event period and estimation period. The researcher decides the length of both based on previous research, a time frame sensible to the study, and personal experience. At a minimum, the event period should be a 3-day window. Day 0 is the event day, one day prior (-1) captures leakage of information and the day following (+1) captures the market in case the market was closed before the announcement. Selecting only the day of the event (day 0) is not recommended because the researcher may not be able to capture the event's full impact. An event period is defined as either a predetermined number of days both before and after the event day (e.g., -5 to +5) or a selected number of days succeeding the event (e.g., +5). The estimation period is the time frame prior to the event (e.g., -1, -2,). According to the literature read during this review, estimation periods varied between approximately 200-250 days, while event periods were between 8 and 21 days. At this point, a market index (e.g., S & P 500, Dow Jones) should be identified as a benchmark.

Next, and very important, is to investigate any other potential events that took place simultaneously with the studied event and exclude those sample sets from the analysis. If these are not removed, it will not be possible to determine which event caused the impact. The normal return can be predicted using constant mean return model or market returns model (Craig MacKinlay 1997). Both produce similar results, but the market model is the most widely used. Lastly, test for significance by checking if the abnormal returns differ significantly from zero.

This should give the reader a general concept of this methodology. The next chapter will describe the methodology that will be used to accomplish this research.

III. Methodology

This chapter defines the procedures required to conduct the event study which measured the impact delays have on a company's stock return. It describes each step in the process including applicable formulas that were used. The actual calculations summary and result interpretations are found in Chapter 4.

Define the Event

This study's event is defined as publicly announced contract delays of six months or greater on major Acquisition Category I (ACAT I) weapon system contracts. As mentioned earlier, the DoD (2005) requires only delays of six months or greater to be reported, therefore this research will do the same. Schedule delays for each of the 26 programs in this research were collected by analyzing major newspapers, magazine and journal articles, and business, finance and industry news indexed in the LexisNexis database. All delays were analyzed regardless of the reason for the delay; this research was interested in measuring the impact a delay has on the company and not what caused the delay. Once the delay dates were identified, news surrounding the delay was researched ensuring there were no other announcements or incidents (e.g., stock splits) that may interfere with the determination if the market reaction was due to the delay announcement. This was done by evaluating news articles with respect to the company found in news media during the event window. If other events occurred, the delay was not measured because it is not possible to distensile the reaction to the contract announcement versus the potentially confounding event.

Day 0 labels the delay announcement; days prior to this are labeled -1, -2 (i.e., day one prior to the event, day two prior to the event) and so on; likewise days following the public release are labeled +1, +2 (i.e., one day after the event, two days after the event).

Estimation Procedure

There were 200 observations of each company's daily return and the market return with respect to the relevant delay. This duration is consistent with the other studies performed, such as Brown and Warner's research in 1980 and 1984. Even with the aerospace industry experiencing many events that could cause the market to fluctuate, this period covers two full business quarters. After reviewing the companies' quarterly reports and not observing numerous events that affected their stock prices, it was determined this duration provides a fair baseline to conduct the event study. These observations started at day -188 and ended at day +11. The first 186 days of observations (-188 to -3) defines the estimation period and it is used to establish what would be a normal return absent the event. The event window is (-2 to +11) and captures nearly two full weeks of open trading days. The two days prior to the event were chosen to capture abnormal returns before the event day caused by anticipation of a delay prior to the official announcement. The event windows are shown in Figure 1 below.

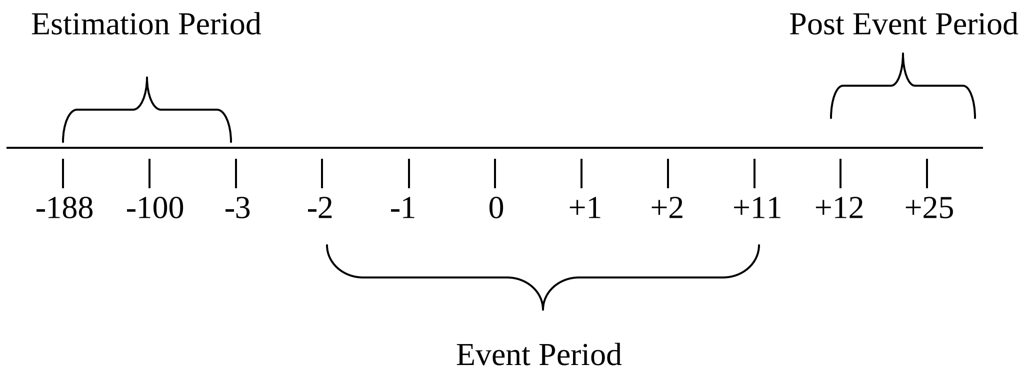

Figure 1. Event Window

Selection Criteria

DoD's top five contractors, Lockheed-Martin, Boeing, Northrop Grumman, General Dynamics and Raytheon, respectively, are primary contractors for the 26 programs that were analyzed. These acquisition programs encompass major weapon systems as reported by the GAO (03-476, 04-248, 05-301, and 06-391) since 2003. The companies' and the Russell 3000 index's daily closing returns were collected from Yahoo!Finances database and downloaded into an Excel spreadsheet.

Normal and Abnormal Returns

In order to determine what the firm's stock price would have been without the event, the normal return must be estimated; this can be done using either the constant mean return model or the market returns model. Both produce similar results; however Brown and Warner's (1984) market returns model, as shown in (1), is used predominantly throughout the literature and was selected for this research. The market returns model assumes a linear relationship between the company's stock return and an index. Using a firm's stock return as the dependent variable and the selected market index, Russell 3000, as the independent variable, an ordinary least squares regression was performed to estimate market returns. The market returns model is illustrated as formula (1).

$$\overline{R}_{it} = \alpha_i + \beta_i R_{mt} \qquad (1)$$

where:

$\overline{R}_{it}$ is the return for a given stock *(i)* at a specified time *(t)*

R_{mt} is the return for the given market index *(m)* at a specified time *(t)*

Once the normal return was estimated, abnormal returns were calculated. This is the actual return experienced during the event window less the normal return. This determined the impact of the event. This was computed using the abnormal returns model as shown below (2).

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \qquad (2)$$

where:

AR_{it} is the abnormal returns at a specified time *(t)*

R_{it} is the actual return of the given stock at the specified time *(t)*

$(\alpha_i+\beta_i R_{mt})$ is the expected normal return with regard to the market returns at a specified time (t)

In order to determine the significance, the cumulative abnormal returns for the post event period were summed and tested. In an efficient market, these returns have an expected value of zero. Therefore, the farther away the value is from zero, the greater the significance that the event had an effect on the company's stock price. If it is considerably greater than zero, the null hypothesis can be rejected.

H_o: Contract delay does not significantly impact the firm's returns.

H_a: Contract delay does significantly impact the firm's returns.

The significant value of the cumulative abnormal return was computed by dividing it by the estimated standard deviation as shown below in formula (3):

$$\overline{A_t} / \hat{S}(\overline{A_t}) \tag{3}$$

where:

$\overline{A_t}$ = Average abnormal return

$$\overline{A_t} = \frac{1}{N_t} \sum_{i=1}^{N_t} A_{i,t} \tag{4}$$

$\hat{S}(\overline{A_t})$ = Estimate of observation standard deviation (5)

$$\hat{S}(\overline{A_t}) = \sqrt{\frac{\left(\sum_{t=-188}^{t=-3} \left(\overline{A} - \overline{\overline{A}} \right)^2 \right)}{200}}$$

$\overline{\overline{A}}$ = Average abnormal return for observation period

$$\overline{\overline{A}} = \frac{1}{186} \sum_{t=-188}^{t=-3} \overline{A_t} \tag{6}$$

Summary

The research thus far leads one to consider there may be a correlation between delays and contractors' stock returns. It gives the impression continued investigating would be beneficial to both the DoD and taxpayers. If in fact a contractor's wealth increases significantly during a delay, the government will have difficulty motivating him. The benefit he receives from the delay through a stock increase far outweighs the incentive fee DoD could offer to avoid delays. As budgets become tighter and weapons systems costs become greater, it is imperative DoD dollars are scrutinized extensively to ensure the government does not over compensate its vendors.

IV. Results and Analysis

The top five government contractors experienced several contract delays among the 26 weapon systems programs analyzed for this research. Lockheed Martin led with 25 delays, of which 13 were considered clean; Boeing had 18 delays and three of them were clean; Northrop's 15 delays included seven that were considered clean, two of General Dynamics' four delays were clean events; and Raytheon experienced one delay announcement and it was clean. This provided a total of 26 contract delays (events). Table 1 illustrates the descriptive statistics for each of the company's clean events and the parameters estimated using the market model (formula 1). The research literature's r^2 values ranged from as low as .01 to as high as .72. As shown in Table 1, this research resulted in similar r^2 values as well. The α and β estimates were also similar to other event studies researched although this study did not have β estimates that reached above 1.0 as were seen in other studies. Based on these estimates, the abnormal returns for each event period were calculated using formula 2. The abnormal returns were summed to derive the cumulative abnormal returns and then tested for significance using formula 3. The cumulative abnormal returns and the significance level for each of the 26 delays can be found in Appendix B.

Table 1. Contract Delays' Descriptive Statistics

Company	Program	Event Date	alpha Estimate	beta estimate	R^2	Standard Error
Lockheed	AEHF	16-Aug-01	0.0014	0.1860	0.0158	0.0216
Lockheed	JSF	3-Jan-05	0.0007	0.6045	0.1458	0.0104
Lockheed	JSF	6-Jan-04	-0.0001	0.5808	0.1419	0.0126
Lockheed	Raptor	11-Jul-01	0.0009	0.2033	0.0193	0.0226
Lockheed	Raptor	8-Oct-99	-0.0009	0.6955	0.0934	0.0241
Lockheed	Raptor	19-Aug-98	-0.0002	0.4894	0.0944	0.0138
Lockheed	Raptor	12-Jan-94	0.0000	0.5845	0.0498	0.0120
Lockheed	Raptor	12-Apr-93	0.0018	0.8141	0.1068	0.0135
Lockheed	Raptor	15-Jul-90	-0.0024	0.8840	0.1346	0.0165
Lockheed	Raptor	27-Apr-90	-0.0017	0.7146	0.1050	0.0170
Lockheed	SIBRS	1-Jan-00	-0.0032	0.5104	0.0348	0.0283
Lockheed	SIBRS	12-Feb-99	-0.0049	0.5050	0.0252	0.0443
Lockheed	THAAD	7-Mar-96	0.0006	0.9039	0.1555	0.0122
Lockheed	THAAD	20-Feb-96	0.0008	0.8059	0.1198	0.0122
Boeing	EELV	17-Aug-05	0.0009	0.9381	0.2057	0.0122
Boeing	EELV	15-Aug-01	0.0001	0.6955	0.2007	0.0206
Boeing	Osprey	11-Feb-02	-0.0017	0.4543	0.0389	0.0269
Northrop	DD(X)	14-Nov-05	0.0001	0.6723	0.2596	0.0088
Northrop	DD(X)	9-Aug-04	-0.0017	0.2859	0.0031	0.0378
Northrop	DD(X)	28-Jun-04	-0.0016	0.3020	0.0037	0.0379
Northrop	Global Hawk	19-May-97	0.0006	0.4420	0.0871	0.0112
Northrop	NPOESS	9-Jun-06	0.0005	0.6626	0.2168	0.0086
Northrop	NPOESS	24-Feb-04	0.0002	0.5521	0.1434	0.0111
Northrop	NPOESS	21-Jun-96	0.0003	0.6751	0.1406	0.0109
General Dynamic	EFV	16-Nov-05	-0.0003	0.7177	0.3149	0.0075
General Dynamic	EFV	4-Aug-05	-0.0001	0.7326	0.2833	0.0078
Raytheon	Excalibur	22-May-06	0.0006	0.7575	0.1990	0.0099

Independent variable: Russell 3000 Index
Dependent variable: Respective Company

Data Analysis

There were a total of 26 events analyzed. Of these, 10 null hypotheses were accepted because the abnormal returns were not significantly different from zero. The other 16 events had CARs that were found to be statistically significant; therefore the null hypotheses were rejected. These are identified in Appendix B as well.

The events were segregated into four categories to determine if there were negative impacts for certain events and a positive reaction for others. The four categories were funding, redesign/restructure, delays caused by external sources, and development problems.

Results: Budget Related Delays

Budgetary constraints were the most prevalent reason for delays found in this study; 9 of the 12 budget related delays DoD contractors experienced resulted in a decline in each company's stock value. The programs that had negative delays included Boeing's Evolved Expendable Launch Vehicle (EELV), which delayed fielding in order to fund another program; the delivery of Northrop's Global Hawk was delayed at least one year in order to remain in the FY 97- FY 00 budgets; and the National Polar-Orbiting Operational Environmental Satellite System's (NPOESS) availability was delayed eight months during a budget cut. Milestone decision C for General Dynamics' Expeditionary Fighting Vehicle (EFV) was delayed nine months as well as the initial operational capability and full rate production award for two years. Lastly, Lockheed's Raptor program experienced several budget related delays, which included production and first flight delays, which caused a drop in the company's wealth.

Two contractors experienced an increase in their stock value after three separate delays. Northrop Grumman's wealth grew after the DD(X) Destroyer's system development and demonstration was delayed 7 months; and Lockheed Martin's stock value rose when its Space Based Infrared System-High (SBIRS) program was delayed in 1999 and its Joint Strike Fighter (JSF) program in Jan 2005. Table 2 exhibits the 12 budget related delays and the monetary impact of each one at different points during each delay's event window.

Table 2. Budget Related Delays

Program	Company	Max (peak of event)	Overall (entire window)	Avg (entire window)
EELV 15 Aug 01	*BA*	(13,218,552)	(12,283,995)	(7,872,354)
NPOESS 24 Feb 04	*NOC*	(9,148,157)	(6,226,095)	(4,998,524)
Raptor 8 Oct 99	*LMT*	(8,305,069)	(8,305,069)	(4,781,925)
EFV 16 Nov 05	*GD*	(6,923,539)	(464,781)	(1,900,534)
THAAD 20 Feb 96	*LMT*	(3,157,113)	(2,910,090)	(1,621,711)
Global Hawk 19 May 97	*NOC*	(1,990,014)	(1,990,014)	(1,255,763)
Raptor 12 Apr 93	*LMT*	(1,133,245)	(805,531)	(287,599)
Raptor 15 Jul 90	*LMT*	(847,361)	(496,566)	(210,685)
Raptor 12 Jan 94	*LMT*	(397,951)	(360,156)	(195,346)
JSF 3 Jan 05	*LMT*	8,168,032	6,003,616	1,984,931
SBIRS 12 Feb 99	*LMT*	6,767,481	6,266,901	3,729,168
DD(X) 16 Nov 05	*NOC*	1,814,094	1,362,384	1,025,977

Boeing's value slumped $13.3 million and suffered an overall decline of $12.3 million when its EELV program was delayed. The stock value gradually declined during the event window until day +10 when its value dropped to the lowest point of nearly 10%. The CARs were statistically significant to the <.01 level from day +3 until day +11.

Northrop's stock value gradually dropped until day +12 when it fell 7.2%. The following day its value started to climb again, which may be the point where the market started to stabilize and the shareholders no longer reacted to the delay announcement. The CARs were statistically significant from day 0 throughout the event window; overall Northrop's stock value declined 4.9%.

Lockheed Martin's stock value plummeted after the October 1999 announcement its Raptor program was delayed. This $8.3 million plunge equaled 31% of the company's stock value on 5 October, the day prior to the event period. Because Lockheed Martin was also having problems with its C130-J program during this time frame, some may argue it caused the company's stock decline. It is true the company announced in early November 1999 a 54% decline in its 2000 net per share expectations. However, this should not be associated with the stock value drop discussed here. This specifically measured the market's reaction of the Raptor's delay announcement on 8 October 1999. No other confounding events took place during the event window to cause doubt the decline was a result of a different event.

Even though General Dynamics' steepest drop was $6.9 million at one point during the event window, overall its stock value only decreased $464.8 thousand. Undeniably this amount is exceedingly small considering the company's value of $202.4 million on D-3. Nevertheless, it shows a negative impact to a company's stock value when a budget delay is announced.

The responsiveness to the stock market shown here after a contract delay announcement reflects intuitive shareholders; they are aware that funding for ACAT I programs is very competitive and often times programs are removed from future DoD budgets for an extended period of time or completely cancelled. It also makes a statement that shareholders are very cognizant of the impact a contract delay could have on the company's stock value. A negative impact may be explained by the likelihood investors are skeptical future funds will be available for the program, therefore forcing cancellation. In addition, long delays and uncertain future budgets could trigger the company to shut down the production line and layoff employees, all of which negatively impact the firm financially.

Although 75% of the data suggest funding delays negatively impact company wealth, 25% of the data contradict this theory by showing positive reactions for the JSF, SIBRS, and DD(X) Destroyer programs. There may be a logical explanation for the JSF's reaction and overall stock value increase of 1.7%. Funds were pulled from this program to place it outside of the six-year defense plan. The money freed from that move was approved for the Raptor to go from less than 100 aircraft back up to a fleet of 190-200 fighters. As a result of this increase in the Raptor's inventory, procurement would remain for the next three years and keep the production lines running for the following five years. It was believed this would buy time to plea for additional JSF funding. Because Lockheed Martin is the prime contractor of both major weapon systems, the company ultimately benefited from the JSF's delay (David Bond, 2005). This certainly would explain the positive impact associated with this funding related delay.

On the other hand, the SIBRS High positive reaction to a budget cut is not as understandable. The Air Force slipped the spaced based system deployment five years. As a result, a dramatic cost growth was expected and a two-year delay in fielding the system would result. At the same time the SIBRS Low demonstration program, which was supposed to be critical in reducing technical risk, was cancelled (Bond, 2005). Based on the theory that budget delays negatively impact a firm, there may have been other positive events unable to be captured in this study that explain the 10.1% increase in the company's stock value.

Also, Northrop's stock value rose slightly (2.7%) when the DD(X) Destroyer's system development and demonstration start was delayed. One possible reason for the positive rather than negative impact was because this delay was only for seven months; a relatively short period of time considering the average length for the other funding related delays was nearly two years. The shareholders may have been more confident this program was not in jeopardy. Again, reinforcing the impression share holders are aware the impact delays can have on a company's wealth.

Results: Redesign/Restructure Related Delays

The second leading reason for delays was caused by program redesign/restructures. Lockheed's Raptor and SBIRS programs fell under this category. The Raptor slipped one year because it re-designated its low rate initial production (LRIP) lot to production test vehicles, and re-designated its LRIP II lot as LRIP I. In addition, the SBIRS program slipped two years due to a restructure. Unlike the negative reaction funding issues appear to have on a company's wealth, these two delays showed a positive reaction. A possible explanation for this: a schedule slip offers investors the security knowing the program will continue and isn't threatened to be cancelled due to funding issues. It also reinforces Carden's (2006) hypothesis that the wealth of shareholders is significantly impacted by a DoD contractual delay. Table 3 shows the wealth generated during these two events.

Table 3. Redesign/Restructure Related Delays

Program	**Company**	**Value (peak of event)**	**Overall (entire window)**	**Avg (entire window)**
Raptor **19 Aug 98**	***Lockheed***	4,222,068	4,222,068	1,590,290
SBIRS **1 Jan 00**	***Lockheed***	3,166,095	2,614,561	2,191,877

It should be noted that when the Raptor's LRIP, contract award and first delivery slipped one year, it was declared that no cost changes would result. Likewise, Lockheed was awarded a $531 million contract modification to restructure the SIBRS program resulting in its two year delay. Lockheed's stock value notably increased after both of these delays were announced. During the Raptor delay overall its wealth increased 5.4%; as a result of the SIBRS delay its value jumped 10.7%. Ironically, funding was not an issue for either program, which reinforces the hypothesis that contractors value delays when they are not initiated by a funding constraint.

Results: External Source Related Delays

Lockheed's Terminal High Altitude Area Defense (THAAD) program was the only delay in this research caused by an external source. The lowest the firm's stock value declined was 4.1% after the announcement the THAAD program was delayed four years to foster a competitive fly-off between THAAD and the Navy's Theater Wide Defense System (TWDS). Because the two weapon systems have complementary roles, there was a threat that the THAAD program would be cancelled if its performance was inferior to the TWDS. This could possibly explain the decline in Lockheed's stock value. Table 4 reveals the reaction to Lockheed's wealth at different times during the event window.

Table 4. External Source Related Delays

Program	Company	Value (peak of event)	Overall (entire window)	Avg (entire window)
THAAD **7 Mar 96**	*Lockheed*	(1,936,060)	(704,465)	(1,100,310)

Lockheed's stock value showed a statistically significant decline from the announcement day and continued until D+ 4 when it dropped 4.1%. Beginning on D+5, the company's wealth started to rise again. This may indicate that the shareholders reacted immediately following the announcement, and after five days of trading, the market could have possibly started to stabilize.

Results: Development Related Delays

The last category, development problems, increased Boeing's wealth substantially when the Osprey was delayed for three years because of tilt rotor difficulties. Even though there were problems with the aircraft, a delay of this sort may have had a positive impact due to the fact the program will continue to progress. As shown earlier, if the shareholders are confident funds are available for programs to continue, they react positively to contract delays. The wealth increase throughout the event period is shown in Table 5 below.

Table 5. Development Related Delays

Program	Company	Max (peak of event)	Overall (entire window)	Avg (entire window)
Osprey 11 Feb 02	*Boeing*	13,242,776	13,242,776	7,917,430

Undeniably, the magnitude that Boeing's stock value increased was significant; the company was valued at $106.6 million the day prior to the event window and its stock value increased $13.2 million overall during the event window. Its wealth gradually rose during the event window. They may consider the three year delay as an extension to the program and not view it negatively.

Based on these findings, there is a strong indication contract delays both positively and negatively influence a company's wealth following an ACAT I contract delay. Delays resulting from budget constraints tend to decrease a company's value possibly because of the concern a program may remain unfunded for an indefinite period of time or the program will eventually be cancelled. As a result, the loss of millions and even billions of dollars is at stake. Delays such as redesigns/restructures or development problems appear to increase the stock value. When a program is delayed for such reasons, the program continues to strive and shareholders seem confident the program will continue to increase profits. These results also imply the companies' shareholders are aware of the impact each type of delay has on a program. As a result, they react very quickly and intelligently.

V. Discussion

Conclusion

Major weapon systems contract delays caused by budget cuts negatively affect the company's stock value significantly while delays for other reasons generate wealth for the shareholders.

Observations and Discussion

The findings of this research provide substantially more evidence that DoD contract delays significantly impact a firm's returns. While Carden's (2006) study revealed a positive impact when the Comanche's Engineering and Manufacturing Development (EMD) phase was delayed for 5 years, this study has discovered contract delays can have a positive or negative impact on the stock value and does not appear to be contractor specific.

This study extended Carden's (2006) research and analyzed five companies, 26 programs, and 63 separate contract delay announcements. However, the final data testable were four contractors, 10 programs and 16 events. Several events were discarded because other events took place during the same event window. If they had been included, it would not have been clear which event actually caused the market reaction. Some programs were newer, therefore did not have as many delays, and the null hypothesis was accepted for nearly half of the final events tested. Nevertheless, these findings are still substantial and support Carden's (2006) initial research that concluded shareholders value contract delays.

The two companies Carden (2006) observed in his study indicated the results are not company specific and this research came to the same conclusion with the observation of DoD's top five contractors. By extending Carden's research, these findings suggest contract delays caused by a budget cut decreased the company's value while delays for other reasons increased the company's stock value. In several instances, it was quite significant. The overall decreased value in regards to budget cuts ranged from as little as $360 thousand to as much as $12.2 million. In other instances, the company generated wealth after a delay and the amounts were also significant. The overall increase resulting from those delays ranged between $968.0 thousand and $13.0 million.

The market reaction time in this study was also similar to Carden's (2006) findings. He noted there was an observed reactionary delay of approximately 5 days. This research found there was observed reaction typically around day +4 to day +6. Several events had statistically significant CARs at the 1% and 5% level as soon as day one.

This study's intentions were not to determine the mechanism that increases the company's profit after a delay announcement. It was to substantiate Carden's (2006) hypothesis that contractors value delays and provide the groundwork that it is a widespread phenomenon; not just a one time incident. This is strictly a discussion of stock value and not that of corporate loss and earnings.

Follow up Research

Even though this research was much larger than the intial study, the number of events tested is rather small compared to the overall DoD acquisition process. But it does provide additional data to justify conducting more research and possibly addressing the findings with DoD decision makers.

Follow up research must continue to explore this issue. It may be beneficial to conduct research on older programs that date back many years. A comparison can be made between older programs and the ones currently active to see if there is a timeline trend. Comparisons should be made between incentives paid and wealth generated by delays; investigate whether or not more incentives are paid to contractors who have suffered financially due to funding issues. Also conduct research to see how a delay affects the subcontractors; are they affected by the delays in the same manner as the prime contractors?

Schedule delays and cost over runs have been investigated for a numerous number of years, but this type of study is the first to investigate delays using event study methodology. Thus far it has produced statistically significant data to aid in answering the question why our acquisition system suffers from so many delays. It may also provide answers as to why the DoD continues to incentivize contractors to stay on schedule when in fact the company experiences greater benefits when the program is delayed.

This research has shown the company's wealth increases significantly after a contract delay is announced; sometimes as high as 30%[7]. Additionally the contractor is paid an incentive fee, typically 5% of the original program budget, as motivation to avoid delays. In other words, the contractor receives an incentive fee to avoid delays yet the

[7]Delays caused by funding and external sources showed a negative impact to the company's wealth.

company's wealth increases when a program is delayed. It is a win-win situation for the contractor and costs the DoD billions of dollars each year. This compelling study may assist the decision makers and leadership to restructure contract incentives possibly leading to enormous cost savings to the DoD.

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Appendix A: Contractors' Ticker Symbols and Program Titles

Lockheed Martin (LMT)
Advanced Deployable System (ADS)
Advanced Extremely High Frequency Satellite (AEHF)
C-5 Avionics Modernization Program (AMP)
F/A-22 Raptor
F-35 Joint Strike Fighter
Space Based Infrared System-High (SIBRS)
Terminal High Altitude Area Defense (THAAD)

Boeing (BA)
Active Electronically Scanned Array Radar (AESA)
Airborne Laser (ABL)
CH-47F Improved Cargo Helicopter
Evolved Expendable Launch Vehicle (EELV)
Future Combat Systems (FCS)
Joint Tactical Radio System Cluster 1(JTRS)
V-22 Osprey

Northrop Grumman (NOC)
Advanced SEAL Delivery System (ASDS)
DD (X) Destroyer
Future Aircraft Carrier CVN-21
Global Hawk Unmanned Aerial Vehicle
National Polar-Orbiting Operational Environmental Satellite System (NPOESS)
Space Tracking and Surveillance System (STSS)

General Dynamics (GD)
Expeditionary Fighting Vehicle (EFV)
Joint Tactical Radio System Cluster 5 (JTRS)
Land Warrior
Warfighter Information Network-Tactical (WIN-T)

Raytheon (RTN)
Excalibur Precision Guided Extended Range Artillery Projectile
Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System

Appendix B: Cumulative Abnormal Returns and Significance

Lockheed Martin's cumulative abnormal returns and significance for each contract delay. ***p<.1; **p<.05***p<.01**

JSF 3 Jan 05					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	30-Dec-04	0.0053	0.5134	0.6083	
D-1	31-Dec-04	0.0045	0.4291	0.6684	
D	3-Jan-05	-0.0145	-1.3947	0.1648	
D+1	4-Jan-05	-0.0244	-2.3429	0.0202	**
D+2	5-Jan-05	0.0034	0.3273	0.7438	
D+3	6-Jan-05	-0.0016	-0.1575	0.8750	
D+4	7-Jan-05	0.0024	0.2290	0.8191	
D+5	10-Jan-05	0.0033	0.3148	0.7533	
D+6	11-Jan-05	0.0083	0.8015	0.4239	
D+7	12-Jan-05	0.0181	1.7344	0.0845	*
D+8	13-Jan-05	0.0138	1.3239	0.1872	
D+9	14-Jan-05	0.0207	1.9881	0.0483	**
D+10	18-Jan-05	0.0235	2.2590	0.0250	**
D+11	19-Jan-05	0.0173	1.6604	0.0985	*

H_o rejected

JSF 6 Jan 04					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	2-Jan-04	-0.0124	-0.9888	0.3241	
D-1	5-Jan-04	-0.0313	-2.4985	0.0133	**
D	6-Jan-04	-0.0349	-2.7811	0.0060	***
D+1	7-Jan-04	-0.0335	-2.6738	0.0082	***
D+2	8-Jan-04	-0.0134	-1.0729	0.2847	
D+3	9-Jan-04	-0.0029	-0.2343	0.8150	
D+4	12-Jan-04	-0.0159	-1.2654	0.2073	
D+5	13-Jan-04	-0.0123	-0.9838	0.3265	
D+6	14-Jan-04	-0.0055	-0.4388	0.6614	
D+7	15-Jan-04	-0.0116	-0.9289	0.3542	
D+8	16-Jan-04	-0.0096	-0.7690	0.4429	
D+9	20-Jan-04	-0.0249	-1.9901	0.0480	**
D+10	21-Jan-04	-0.0162	-1.2916	0.1981	
D+11	22-Jan-04	-0.0221	-1.7627	0.0796	*

H_o accepted

Raptor 11 Jul 01					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	9-Jul-01	-0.0213	-0.9460	0.3454	
D-1	10-Jul-01	0.0000	-0.0008	0.9994	
D	11-Jul-01	-0.0099	-0.4376	0.6622	
D+1	12-Jul-01	0.0051	0.2239	0.8231	
D+2	13-Jul-01	-0.0017	-0.0734	0.9416	
D+3	16-Jul-01	-0.0057	-0.2519	0.8014	
D+4	17-Jul-01	-0.0003	-0.0144	0.9885	
D+5	18-Jul-01	0.0093	0.4122	0.6806	
D+6	19-Jul-01	0.0286	1.2662	0.2070	
D+7	20-Jul-01	0.0177	0.7829	0.4347	
D+8	23-Jul-01	0.0105	0.4653	0.6423	
D+9	24-Jul-01	0.0157	0.6961	0.4873	
D+10	25-Jul-01	0.0149	0.6592	0.5106	
D+11	26-Jul-01	0.0516	2.2892	0.0232	**

H_o accepted

SBIRS 1 Jan 00					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	30-Dec-99	0.0252	0.8917	0.3737	
D-1	31-Dec-99	0.1031	3.6560	0.0003	***
D	3-Jan-00	0.0368	1.3059	0.1932	
D+1	4-Jan-00	0.0938	3.3263	0.0011	***
D+2	5-Jan-00	0.1019	3.6118	0.0004	***
D+3	6-Jan-00	0.1201	4.2554	0.0000	***
D+4	7-Jan-00	0.1265	4.4848	0.0000	***
D+5	10-Jan-00	0.0836	2.9624	0.0035	***
D+6	11-Jan-00	0.0613	2.1734	0.0310	**
D+7	12-Jan-00	0.1292	4.5779	0.0000	***
D+8	13-Jan-00	0.1039	3.6840	0.0003	***
D+9	14-Jan-00	0.0891	3.1574	0.0019	***
D+10	18-Jan-00	0.0706	2.5019	0.0132	**
D+11	19-Jan-00	0.1067	3.7804	0.0002	***

Ho rejected

Raptor 8 Oct 99					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	6-Oct-99	-0.0641	-2.6707	0.0082	***
D-1	7-Oct-99	-0.0247	-1.0301	0.3043	
D	8-Oct-99	-0.0553	-2.3047	0.0223	**
D+1	11-Oct-99	-0.0697	-2.9034	0.0041	***
D+2	12-Oct-99	-0.1123	-4.6790	0.0000	***
D+3	13-Oct-99	-0.1349	-5.6187	0.0000	***
D+4	14-Oct-99	-0.1926	-8.0239	0.0000	***
D+5	15-Oct-99	-0.2456	-10.2304	0.0000	***
D+6	18-Oct-99	-0.2385	-9.9335	0.0000	***
D+7	19-Oct-99	-0.2243	-9.3420	0.0000	***
D+8	20-Oct-99	-0.2675	-11.1436	0.0000	***
D+9	21-Oct-99	-0.2740	-11.4132	0.0000	***
D+10	22-Oct-99	-0.2825	-11.7670	0.0000	***
D+11	25-Oct-99	-0.3096	-12.8962	0.0000	***

Ho rejected

SBIRS 12 Feb 99					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	10-Feb-99	0.0327	0.7404	0.4600	
D-1	11-Feb-99	0.0151	0.3406	0.7338	
D	12-Feb-99	0.0159	0.3592	0.7199	
D+1	16-Feb-99	0.0392	0.8870	0.3762	
D+2	17-Feb-99	0.0259	0.5860	0.5586	
D+3	18-Feb-99	0.0325	0.7346	0.4635	
D+4	19-Feb-99	0.0426	0.9642	0.3362	
D+5	22-Feb-99	0.0725	1.6399	0.1027	
D+6	23-Feb-99	0.0743	1.6800	0.0946	*
D+7	24-Feb-99	0.1021	2.3101	0.0220	**
D+8	25-Feb-99	0.1091	2.4685	0.0145	**
D+9	26-Feb-99	0.1019	2.3056	0.0222	**
D+10	1-Mar-99	0.0770	1.7415	0.0833	*
D+11	2-Mar-99	0.1010	2.2859	0.0234	**

Ho rejected

Raptor 19 Aug 98					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	17-Aug-98	-0.0132	-0.9644	0.3361	
D-1	18-Aug-98	-0.0127	-0.9286	0.3543	
D	19-Aug-98	0.0057	0.4187	0.6759	
D+1	20-Aug-98	0.0332	2.4206	0.0165	**
D+2	21-Aug-98	0.0516	3.7657	0.0002	***
D+3	24-Aug-98	0.0272	1.9846	0.0487	**
D+4	25-Aug-98	0.0450	3.2856	0.0012	***
D+5	26-Aug-98	0.0330	2.4051	0.0172	**
D+6	27-Aug-98	0.0020	0.1488	0.8819	
D+7	28-Aug-98	-0.0032	-0.2345	0.8149	
D+8	31-Aug-98	0.0044	0.3225	0.7474	
D+9	1-Sep-98	0.0168	1.2285	0.2208	
D+10	2-Sep-98	0.0399	2.9103	0.0041	***
D+11	3-Sep-98	0.0538	3.9227	0.0001	***

Ho rejected

THAAD 7 Mar 96					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	5-Mar-96	-0.0101	-0.8400	0.4020	
D-1	6-Mar-96	-0.0162	-1.3477	0.1794	
D	7-Mar-96	-0.0315	-2.6177	0.0096	***
D+1	8-Mar-96	-0.0248	-2.0637	0.0404	**
D+2	11-Mar-96	-0.0304	-2.5229	0.0125	**
D+3	12-Mar-96	-0.0350	-2.9098	0.0041	***
D+4	13-Mar-96	-0.0405	-3.3680	0.0009	***
D+5	14-Mar-96	-0.0343	-2.8533	0.0048	***
D+6	15-Mar-96	-0.0264	-2.1918	0.0296	**
D+7	18-Mar-96	-0.0202	-1.6804	0.0946	*
D+8	19-Mar-96	-0.0129	-1.0756	0.2835	
D+9	20-Mar-96	-0.0032	-0.2670	0.7898	
D+10	21-Mar-96	-0.0221	-1.8346	0.0682	*
D+11	22-Mar-96	-0.0147	-1.2255	0.2219	

Ho rejected

THAAD 20 Feb 96					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	15-Feb-96	-0.0009	-0.0705	0.9439	
D-1	16-Feb-96	-0.0093	-0.7607	0.4478	
D	20-Feb-96	-0.0048	-0.3935	0.6944	
D+1	21-Feb-96	-0.0030	-0.2483	0.8042	
D+2	22-Feb-96	-0.0089	-0.7337	0.4641	
D+3	23-Feb-96	-0.0118	-0.9652	0.3357	
D+4	26-Feb-96	-0.0362	-2.9687	0.0034	***
D+5	27-Feb-96	-0.0350	-2.8704	0.0046	***
D+6	28-Feb-96	-0.0372	-3.0550	0.0026	***
D+7	29-Feb-96	-0.0492	-4.0349	0.0001	***
D+8	1-Mar-96	-0.0448	-3.6720	0.0003	***
D+9	4-Mar-96	-0.0288	-2.3646	0.0191	**
D+10	5-Mar-96	-0.0385	-3.1598	0.0018	***
D+11	6-Mar-96	-0.0453	-3.7192	0.0003	***

Ho rejected

Raptor 12 Jan 94					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	10-Jan-94	-0.0074	-0.6225	0.5344	
D-1	11-Jan-94	-0.0025	-0.2128	0.8317	
D	12-Jan-94	0.0067	0.5600	0.5762	
D+1	13-Jan-94	0.0005	0.0389	0.969	
D+2	14-Jan-94	-0.0155	-1.2991	0.1955	
D+3	17-Jan-94	-0.0254	-2.1230	0.0351	**
D+4	18-Jan-94	-0.0156	-1.3067	0.1929	
D+5	19-Jan-94	-0.0249	-2.0783	0.0391	**
D+6	20-Jan-94	-0.0260	-2.1716	0.0312	**
D+7	21-Jan-94	-0.0393	-3.2866	0.0012	***
D+8	24-Jan-94	-0.0441	-3.6857	0.0003	***
D+9	25-Jan-94	-0.0465	-3.8857	0.0001	***
D+10	26-Jan-94	-0.0373	-3.1138	0.0021	***
D+11	27-Jan-94	-0.0421	-3.5166	0.0005	***

Ho rejected

Raptor 12 Apr 93					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	7-Apr-93	-0.0067	-0.5019	0.6163	
D-1	8-Apr-93	-0.0106	-0.7878	0.4318	
D	12-Apr-93	-0.0013	-0.0951	0.9244	
D+1	13-Apr-93	-0.0137	-1.0249	0.3067	
D+2	14-Apr-93	0.0026	0.1957	0.8451	
D+3	15-Apr-93	0.0058	0.4292	0.6683	
D+4	16-Apr-93	-0.0017	-0.1272	0.8989	
D+5	19-Apr-93	0.0014	0.1011	0.4598	
D+6	20-Apr-93	-0.0097	-0.7204	0.4722	
D+7	21-Apr-93	-0.0213	-1.5880	0.1140	
D+8	22-Apr-93	-0.0480	-3.5843	0.0004	***
D+9	23-Apr-93	-0.0551	-4.1087	0.0001	***
D+10	26-Apr-93	-0.0859	-6.4122	0.0000	***
D+11	27-Apr-93	-0.0611	-4.5579	0.0000	***

Ho rejected

Raptor 15 Jul 90					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	12-Jul-90	0.0009	0.0542	0.9568	
D-1	13-Jul-90	-0.0167	-1.0422	0.2987	
D	16-Jul-90	-0.0017	-0.1033	0.9179	
D+1	17-Jul-90	0.0207	1.2860	0.2001	
D+2	18-Jul-90	0.0112	0.6975	0.4863	
D+3	19-Jul-90	0.0202	1.2568	0.2104	
D+4	20-Jul-90	0.0185	1.1517	0.2509	
D+5	23-Jul-90	-0.0027	-0.1704	0.8649	
D+6	24-Jul-90	-0.0421	-2.6230	0.0094	***
D+7	25-Jul-90	-0.1374	-8.5562	0.0000	***
D+8	26-Jul-90	-0.0995	-6.1940	0.0000	***
D+9	27-Jul-90	-0.1003	-6.2455	0.0000	***
D+10	30-Jul-90	-0.0687	-4.2809	0.0000	***
D+11	31-Jul-90	-0.0805	-5.0141	0.0000	***

Ho rejected

Raptor 27 Apr 90					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	25-Apr-90	0.0033	0.1768	0.8598	
D-1	26-Apr-90	-0.0171	-0.9183	0.3597	
D	27-Apr-90	-0.0200	-1.0765	0.2831	
D+1	30-Apr-90	0.0082	0.4395	0.6608	
D+2	1-May-90	-0.0045	-0.2432	0.8081	
D+3	2-May-90	-0.0098	-0.5287	0.5977	
D+4	3-May-90	0.0063	0.3390	0.7350	
D+5	4-May-90	0.0004	0.0215	0.9829	
D+6	7-May-90	-0.0146	-0.7865	0.4326	
D+7	8-May-90	-0.0057	-0.3065	0.7596	
D+8	9-May-90	-0.0027	-0.1464	0.8838	
D+9	10-May-90	0.0013	0.0700	0.9442	
D+10	11-May-90	0.0196	1.0531	0.2937	
D+11	14-May-90	0.0136	0.7294	0.4667	

Ho accepted

Boeing's cumulative abnormal returns and significance for each contract delay.
p<.1; **p<.05p<.01**

EELV 17 Aug 05					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	15-Aug-05	0.0099	0.8103	0.4188	
D-1	16-Aug-05	0.0024	0.1949	0.8457	
D	17-Aug-05	0.0124	1.0136	0.3121	
D+1	18-Aug-05	0.0072	0.5885	0.5569	
D+2	19-Aug-05	0.0134	1.1026	0.2716	
D+3	22-Aug-05	0.0200	1.6415	0.1024	
D+4	23-Aug-05	0.0138	1.1326	0.2589	
D+5	24-Aug-05	0.0136	1.1143	0.2666	
D+6	25-Aug-05	0.0116	0.9473	0.3447	
D+7	26-Aug-05	0.0037	0.3023	0.7628	
D+8	29-Aug-05	0.0159	1.3069	0.1929	
D+9	30-Aug-05	0.0053	0.4359	0.6634	
D+10	31-Aug-05	-0.0019	-0.1597	0.8733	
D+11	1-Sep-05	-0.0196	-1.6066	0.1098	

Ho accepted

Osprey 11 Feb 02					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	7-Feb-02	0.0056	0.2078	0.8356	
D-1	8-Feb-02	0.0158	0.5881	0.5572	
D	11-Feb-02	0.0425	1.5818	0.1154	
D+1	12-Feb-02	0.0491	1.8291	0.0690	*
D+2	13-Feb-02	0.0870	3.2389	0.0014	***
D+3	14-Feb-02	0.0869	3.2361	0.0014	***
D+4	15-Feb-02	0.0915	3.4088	0.0008	***
D+5	19-Feb-02	0.0755	2.8105	0.0055	***
D+6	20-Feb-02	0.0619	2.3036	0.0224	**
D+7	21-Feb-02	0.0915	3.4073	0.0008	***
D+8	22-Feb-02	0.1019	3.7963	0.0002	***
D+9	25-Feb-02	0.1000	3.7243	0.0003	***
D+10	26-Feb-02	0.1061	3.9519	0.0001	***
D+11	27-Feb-02	0.1242	4.6247	0.0000	***

Ho rejected

EELV 15 Aug 01					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	13-Aug-01	-0.0086	-0.4207	0.6744	
D-1	14-Aug-01	-0.0166	-0.8081	0.4201	
D	15-Aug-01	-0.0375	-1.8267	0.0694	*
D+1	16-Aug-01	-0.0266	-1.2959	0.1966	
D+2	17-Aug-01	-0.0360	-1.7551	0.0809	*
D+3	20-Aug-01	-0.0535	-2.6059	0.0099	***
D+4	21-Aug-01	-0.0799	-3.8902	0.0001	***
D+5	22-Aug-01	-0.0782	-3.8066	0.0002	***
D+6	23-Aug-01	-0.0788	-3.8382	0.0002	***
D+7	24-Aug-01	-0.0638	-3.1052	0.0022	***
D+8	27-Aug-01	-0.0716	-3.4864	0.0006	***
D+9	28-Aug-01	-0.0883	-4.2988	0.0000	***
D+10	29-Aug-01	-0.0998	-4.8589	0.0000	***
D+11	30-Aug-01	-0.0927	-4.5154	0.0000	***

Ho rejected

Northrop's cumulative abnormal returns and significance for each contract delay.
*p<.1; **p<.05***p<.01

NPOESS 9 Jun 06					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	7-Jun-06	-0.0055	-0.6459	0.5191	
D-1	8-Jun-06	-0.0024	-0.2769	0.7821	
D	9-Jun-06	0.0002	0.0224	0.9822	
D+1	12-Jun-06	-0.0059	-0.6951	0.4879	
D+2	13-Jun-06	0.0028	0.3220	0.7478	
D+3	14-Jun-06	-0.0133	-1.5582	0.1209	
D+4	15-Jun-06	-0.0011	-0.1320	0.8952	
D+5	16-Jun-06	0.0010	0.1140	0.4547	
D+6	19-Jun-06	-0.0012	-0.1379	0.8905	
D+7	20-Jun-06	-0.0050	-0.5793	0.5631	
D+8	21-Jun-06	-0.0064	-0.7537	0.4520	
D+9	22-Jun-06	-0.0042	-0.4949	0.6212	
D+10	23-Jun-06	-0.0101	-1.1846	0.2377	
D+11	26-Jun-06	-0.0158	-1.8496	0.0660	*

Ho accepted

NPOESS 24 Feb 04					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	20-Feb-04	0.0016	0.1501	0.8809	
D-1	23-Feb-04	-0.0180	-1.6532	0.1000	
D	24-Feb-04	-0.0332	-3.0456	0.0027	***
D+1	25-Feb-04	-0.0202	-1.8530	0.0655	*
D+2	26-Feb-04	-0.0269	-2.4631	0.0147	**
D+3	27-Feb-04	-0.0307	-2.8172	0.0054	***
D+4	1-Mar-04	-0.0205	-1.8784	0.0619	*
D+5	2-Mar-04	-0.0407	-3.7280	0.0003	***
D+6	3-Mar-04	-0.0447	-4.0994	0.0001	***
D+7	4-Mar-04	-0.0654	-5.9923	0.0000	***
D+8	5-Mar-04	-0.0656	-6.0137	0.0000	***
D+9	8-Mar-04	-0.0719	-6.5879	0.0000	***
D+10	9-Mar-04	-0.0647	-5.9294	0.0000	***
D+11	10-Mar-04	-0.0489	-4.4836	0.0000	***

Ho rejected

Global Hawk 19 May 97					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	15-May-97	-0.0255	-2.2866	0.0234	**
D-1	16-May-97	-0.0325	-2.9161	0.0040	***
D	19-May-97	-0.0347	-3.1088	0.0022	***
D+1	20-May-97	-0.0243	-2.1804	0.0305	**
D+2	21-May-97	-0.0109	-0.9784	0.3292	
D+3	22-May-97	-0.0187	-1.6790	0.0948	*
D+4	23-May-97	-0.0149	-1.3384	0.1824	
D+5	27-May-97	-0.0141	-1.2618	0.2086	
D+6	28-May-97	-0.0242	-2.1670	0.0315	**
D+7	29-May-97	-0.0186	-1.6653	0.0976	*
D+8	30-May-97	-0.0173	-1.5489	0.1231	
D+9	2-Jun-97	-0.0308	-2.7662	0.0062	***
D+10	3-Jun-97	-0.0323	-2.8993	0.0042	***
D+11	4-Jun-97	-0.0381	-3.4203	0.0008	***

Ho rejected

NPOESS 21 Jun 96					
Window	**Date**	**CAR**	**T-Statistic**	**T-Crit**	**Prob**
D-2	19-Jun-96	-0.0108	-0.9903	0.3233	
D-1	20-Jun-96	-0.0045	-0.4097	0.6825	
D	21-Jun-96	-0.0051	-0.4670	0.6411	
D+1	24-Jun-96	-0.0038	-0.3475	0.7286	
D+2	25-Jun-96	-0.0012	-0.1066	0.9152	
D+3	26-Jun-96	0.0037	0.3382	0.7356	
D+4	27-Jun-96	-0.0022	-0.2020	0.8401	
D+5	28-Jun-96	-0.0043	-0.3935	0.6944	
D+6	1-Jul-96	-0.0100	-0.9177	0.3600	
D+7	2-Jul-96	-0.0044	-0.4042	0.6866	
D+8	3-Jul-96	-0.0027	-0.2457	0.8062	
D+9	5-Jul-96	-0.0035	-0.3258	0.7449	
D+10	8-Jul-96	0.0055	0.5061	0.6134	
D+11	9-Jul-96	0.0103	0.9471	0.1724	

Ho accepted

DD(X) 16 Nov 05					
Window	Date	CAR	T-Stat	T-Crit	Prob
D-2	14-Nov-05	0.0202	2.5211	0.0125	***
D-1	15-Nov-05	0.0251	3.1339	0.0020	***
D	16-Nov-05	0.0268	3.3570	0.0010	***
D+1	17-Nov-05	0.0215	2.6910	0.0078	*
D+2	18-Nov-05	0.0131	1.6317	0.1044	
D+3	21-Nov-05	0.0089	1.1160	0.2659	
D+4	22-Nov-05	0.0034	0.4218	0.6736	
D+5	23-Nov-05	0.0130	1.6307	0.1046	
D+6	25-Nov-05	0.0084	1.0470	0.2965	
D+7	28-Nov-05	0.0030	0.3689	0.7126	
D+8	29-Nov-05	0.0152	1.9024	0.0587	**
D+9	30-Nov-05	0.0243	3.0331	0.0028	***
D+10	1-Dec-05	0.0146	1.8268	0.0693	***
D+11	2-Dec-05	0.0122	1.5244	0.1291	

Ho rejected

DD(X) 9 Aug 04					
Window	Date	CAR	T-Stat	T-Crit	Prob
D-2	5-Aug-04	-0.0102	-0.2714	0.7864	
D-1	6-Aug-04	-0.0149	-0.3945	0.6937	
D	9-Aug-04	-0.0163	-0.4321	0.6662	
D+1	10-Aug-04	-0.0197	-0.5231	0.6015	
D+2	11-Aug-04	-0.0215	-0.5697	0.5696	
D+3	12-Aug-04	-0.0159	-0.4205	0.6746	
D+4	13-Aug-04	-0.0160	-0.4241	0.6720	
D+5	16-Aug-04	-0.0221	-0.5847	0.5595	
D+6	17-Aug-04	-0.0287	-0.7610	0.4476	
D+7	18-Aug-04	-0.0124	-0.3278	0.7435	
D+8	19-Aug-04	-0.0135	-0.3507	0.7215	
D+9	20-Aug-04	-0.0173	-0.4574	0.6479	
D+10	23-Aug-04	-0.0149	-0.3956	0.6929	
D+11	24-Aug-04	0.00064	0.01703	0.9864	

Ho accepted

DD(X) 28 Jun 04					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	24-Jun-04	-0.0009	-0.0234	0.5093	
D-1	25-Jun-04	0.0023	0.0604	0.9519	
D	28-Jun-04	0.0003	0.0075	0.9940	
D+1	29-Jun-04	0.0134	0.3557	0.7224	
D+2	30-Jun-04	0.0184	0.4866	0.6271	
D+3	1-Jul-04	0.0231	0.6127	0.5408	
D+4	2-Jul-04	0.0164	0.4348	0.6642	
D+5	6-Jul-04	0.0249	0.6587	0.5109	
D+6	7-Jul-04	0.0391	1.0346	0.3022	
D+7	8-Jul-04	0.0420	1.1115	0.2678	
D+8	9-Jul-04	0.0507	1.3440	0.1806	
D+9	12-Jul-04	0.0557	1.4756	0.1418	
D+10	13-Jul-04	0.0453	1.2004	0.2315	
D+11	14-Jul-04	0.0389	1.0302	0.3043	

Ho accepted

Raytheon's cumulative abnormal returns and significance for each contract delay
*p<.1; **p<.05***p<.01

Excal 22 May 06					
Window	**Date**	**CAR**	**T-Stat**	**T-Crit**	**Prob**
D-2	18-May-06	0.0051	0.5169	0.3029	
D-1	19-May-06	0.0082	0.8356	0.2022	
D	22-May-06	0.0127	1.2869	0.1997	
D+1	23-May-06	0.0012	0.1206	0.4521	
D+2	24-May-06	-0.0087	-0.8799	0.8100	
D+3	25-May-06	-0.0141	-1.4313	0.1540	
D+4	26-May-06	-0.0161	-1.6292	0.1050	
D+5	30-May-06	-0.0080	-0.8129	0.7913	
D+6	31-May-06	0.0027	0.2729	0.3926	
D+7	1-Jun-06	0.0006	0.0589	0.4765	
D+8	2-Jun-06	-0.0121	-1.2229	0.2229	
D+9	5-Jun-06	-0.0036	-0.3684	0.7130	
D+10	6-Jun-06	-0.0227	-2.3003	0.0225	**
D+11	7-Jun-06	-0.0296	-3.0028	0.0030	***

Ho accepted

General Dynamics cumulative abnormal returns and significance for each contract delay
*p<.1; **p<.05***p<.01

EFV 16 Nov 05_					
Window	Date	CAR	T-Stat	T-Crit	Prob
D-2	14-Nov-05	-0.0342	-4.5291	0.0000	***
D-1	15-Nov-05	-0.0152	-2.0138	0.0455	**
D	16-Nov-05	-0.0190	-2.5129	0.0128	**
D+1	17-Nov-05	-0.0144	-1.9012	0.0588	*
D+2	18-Nov-05	-0.0165	-2.1868	0.0300	*
D+3	21-Nov-05	-0.0166	-2.1924	0.0296	**
D+4	22-Nov-05	-0.0131	-1.7372	0.0840	*
D+5	23-Nov-05	-0.0113	-1.4938	0.1369	
D+6	25-Nov-05	-0.0043	-0.5641	0.5734	
D+7	28-Nov-05	0.0016	0.2098	0.4170	
D+8	29-Nov-05	0.0120	1.5855	0.1146	
D+9	30-Nov-05	0.0044	0.5775	0.2822	
D+10	1-Dec-05	-0.0026	-0.3432	0.6341	
D+11	2-Dec-05	-0.0023	-0.3040	0.6193	

Ho rejected

EFV 4 Aug 05_					
Window	Date	CAR	T-Stat	T-Crit	Prob
D-2	2-Aug-05	0.0003	0.0439	0.4825	
D-1	3-Aug-05	-0.0002	-0.0289	0.5115	
D	4-Aug-05	0.0005	0.0699	0.4722	
D+1	5-Aug-05	-0.0014	-0.1746	0.5692	
D+2	8-Aug-05	0.0081	1.0505	0.2949	
D+3	9-Aug-05	0.0056	0.7262	0.2343	
D+4	10-Aug-05	0.0065	0.8377	0.2016	
D+5	11-Aug-05	0.0112	1.4402	0.1515	
D+6	12-Aug-05	0.0097	1.2453	0.2146	
D+7	15-Aug-05	0.0081	1.0491	0.2955	
D+8	16-Aug-05	0.0123	1.5862	0.1144	
D+9	17-Aug-05	0.0128	1.6533	0.1000	
D+10	18-Aug-05	0.0131	1.6897	0.0928	*
D+11	19-Aug-05	0.0160	2.0644	0.0404	**

Ho accepted

Vita

Capt Leskowich graduated from Elkton-Pigeon-Bay Port High School Pigeon, Michigan in 1988 and entered the Air Force the following year. Her first assignment was to the 842nd Bomb Wing at Grand Forks AFB, North Dakota as a Production Control Apprentice. While in North Dakota, she deployed to Saudi Arabia in support of Operations DESERT SHIELD and DESERT STORM. In 1996, she was reassigned to Scott AFB, as a member of the 319th Civil Engineer Squadron and deployed from there to support Operations NORTHERN WATCH, SOUTHERN WATCH, and PROVIDE COMFORT. In August of 2000, she was assigned to the 554th RED HORSE Detachment, Kadena AB, Japan as an instructor at the Silver Flag Contingency Training Site. In February 2003, Capt Leskowich received her commission as a 2Lt following attendance at Air Force Officer Training School (OTS), Maxwell AFB, Alabama. Upon her commission, she was assigned to the 28th Comptroller Squadron, Ellsworth AFB, South Dakota and served as Financial Services Officer and Budget Analyst. In 2005, Capt Leskowich was accepted to the Air Force Institute of Technology Graduate Program at Wright Patterson AB, Ohio where she is currently seeking her Masters Degree in Cost Analysis. Upon graduation she will be assigned to 303 Aeronautical Systems Group, Wright Patterson AFB, Ohio.

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14. ABSTRACT
The monetary incentives used to motivate DoD contractors' schedule performance on Acquisition Category One programs afford them the opportunity as a whole to earn billions of dollars in addition to their contract award. These incentives are paid 85-90% of the time regardless of schedule performance. While these contractors are paid to avoid delays, there is an indication the delay increases the contractor's stock value. This research tested the theory that contract delays significantly impact the company's stock returns. The results found both positive and negative reactions to a firm's value. Delays caused by budget cuts tend to have a negative impact on a company's wealth, while delays for other reasons such as a restructure or redesign tend to have a positive impact. The findings illustrate that shareholders are aware the impact delays could have on a program and react accordingly and quickly to the market. Undeniably contractors cannot control the program's funding however; there is no incentive for a contractor to avoid other types of delays because of the wealth it generates for the company.

15. SUBJECT TERMS
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