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Elections And Asset Pricing: The Politically Sensitive Equity Of Us Military Contractors

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**ELECTIONS AND ASSET PRICING:
THE POLITICALLY SENSITIVE EQUITY OF US MILITARY CONTRACTORS**

by

MATTHEW MARK ROSS

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2014

**MAJOR: BUSINESS ADMINISTRATION
(Finance)**

Approved by:

Advisor

Date

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Chapter 1: Introduction

I examine the interplay between political uncertainty and equity volatility coincident with US elections. That financial markets are influenced by politics is apparent to all, while the nature and magnitude of the equity response to political uncertainty is hotly debated in society and academia. I explain how the expectation of exogenous political shocks created by US elections impact the equity volatility of firms. Utilizing the unique monopsony-oligopoly business environment of military contractors, I construct a sample with a strong link between politics and firm growth prospects.¹ My sample of military contractors is drawn from the Stockholm International Peace Research Institute (SIPRI) archival database, to produce a measure of cross-sectional exposure to the political uncertainty. I combine US military contractor firms' data, US political uncertainty data, and the US election calendar to illustrate the strong positive relationship between political uncertainty and equity volatility in the months surrounding US elections. My central research question can be broadly stated as; "Does electoral political uncertainty inform the equity volatility of military contractors?"

My extensive literature review links politics, equity volatility, and growth opportunities to provide a framework for the analysis. I structure a GARCH (1, 1) model with cross-sectionally correlated moments to produce daily firm-election specific volatility measures. This methodology facilitates daily firm-level volatility measurement for given a common event date. I use this to fit a parsimonious piecewise daily volatility function which produces a predictive model with an excellent fit.

¹ Politically neutral terminology is used to the extent possible in this research. Firms are referenced as military contractors rather than popular but connotation loaded terms such as arms sellers, defense firms, arms-producing and military services companies, military-industrial complex, etc... However, when referencing other research or publications the terminology originally employed by the author is maintained.

My findings link political uncertainty and equity volatility in the months surrounding US elections. I find evidence that the equity volatility of military contractors is significantly amplified in the months surrounding elections. I demonstrate that election categories: local, federal, presidential, midterm, peace-time, and war-time exhibit distinct effects on equity volatility, with magnitude of the volatility effect size determined by the election category. Specifically, local elections increase cumulative abnormal volatility (CAV) by 11%, midterms by 27%, and presidential by 43% above the benchmark level of volatility. This strongly suggests that political uncertainty surrounding midterm and even local elections substantially influence the equity volatility of military contractors. Furthermore, the Economic Policy Uncertainty Index produces a leading indicator of volatility in the four months around elections. My findings validate the utility of this newly developed data set for a practical finance application. The relationship between political uncertainty and equity volatility among military contractors shares some common features but also important differences with prior literature results.

My results contrast with the extant international evidence regarding equity response to elections. While Białkowski, Gottschalk, and Wisniewski (2008) find that markets cumulative abnormal volatility (CAV) can double in the weeks following a national election, my sample shows that the increase occurs before the election. This is likely the result of the different political structures in the US versus the largely parliamentary systems of the international samples. However, my results do coincide with the timing of the Pantzalis, Stangeland, and Turtle (2000) finding of a positive abnormal return during the two-week period prior to a national election week. I present evidence of the daily equity volatility dynamics present around US elections.

Collectively, my findings illustrate how political uncertainty dictates a substantial portion of equity volatility among military contractor firms. These findings have implications that extend beyond finance to the realm of political economy, facilitating new avenues of research in economics and political science. While extant literature focuses on presidential elections, my results indicate that local and Congressional political uncertainty also produce substantial equity volatility. My results provide a quantitative measure for the relative importance of US election categories to the firm. I provide direct evidence for the unique dynamics of a monopsony-oligopoly business environment. Ultimately, my equity volatility findings can be applied to research in political economy.

Chapter 2: Literature Review and Motivation

The literature review section motivates my hypotheses by developing three key concepts. First, I show that US military spending comprises a substantial portion of the US economy and is worthy of analysis separate from other industries. Next, I explain how the monopsony-oligopoly business environment of military contractors facilitates analysis of the links between policy uncertainty and equity volatility. Finally, I explore the extant literature concerning political uncertainty and equity markets to provide motivation for my hypotheses and context for my results. Together, these three conceptual topics motivation my hypotheses tests in section 3.

2.1. US Military Spending

“... War is not merely a political act, but also a real political instrument, a continuation of political commerce ...”

Carl von Clausewitz

Commander, Prussian War Academy, 1818-1830

War and politics are inseparable (Clausewitz (1908); Sun (1963)). Since preparation is an essential aspect of war, politics also dictates this component of war.² The United States officially spent \$706 billion dollars on military contracts in 2011, making it the largest military spender in the world. With a defense budget in excess of the next top 15 nations combined, the US was responsible for 43% of 2011 global military spending.³ As a result, the US has a robust military contractor industry which produces military goods and services for both domestic use and export to allied nations. US military spending is critically important to the domestic economy and a

² The military philosophy of Sun Tzu (circa 500 BCE) exhorts political leaders to prepare for all aspects of war. War preparation is re-emphasized time and again by successful military leaders.

³ SIPRI Military Expenditure Database, Stockholm International Peace Research Institute, <http://www.sipri.org/databases/milex> referenced 19FEB2013. The SIPRI Military Expenditure Database provides consistent time series on the military spending of 172 countries since 1988.

strong military provides insurance to protect the foreign assets of domestic and allied international corporations. The US military contractor industry comprised 4.7% of US GDP in 2011. Thus, the military contractor industry comprises a significant component of the economy and is historically much higher during periods of intense military conflict. Despite these seemingly large official figures, the actual total cost of military spending may be substantially greater because many indirect costs of defense spending are not reported in official government statistics.

Military contractors comprise a major segment of the US economy and are uniquely tied to the federal government to a greater extent than any other industry. Game theory helps explain this complex dynamic. Bar-El, Kagan, and Tishler (2010) present a theory of defense planning which results in a prisoner's dilemma solution whereby nations arrive at equilibrium overspending on the military. Golde and Tishler (2004) model determinants of military expenditures and conclude that, "... a highly concentrated oligopoly play[s] an important role in determining defense policies and procurement levels in the US and Europe." On the supply side, the military contractor industry exhibits properties of an oligopoly with only a few firms capable of producing a given product class of big-ticket military grade hardware. For example, Huntington Ingalls Industries is the sole contractor for nuclear aircraft carriers and one of two contractors for nuclear submarines. On the demand side, the US federal government functions as a monopsony by purchasing directly or regulating both domestic sales and exports of military goods and services. The military contractor cohort is therefore governed by a different set of politico-economic forces than any other industry. The uniquely close relationship between military contractors and the US federal government is the reason that military contractors present an attractive natural experiment.

Figure 1 presents the percentages of US military spending in relation to: the entire federal budget, US Gross Domestic Product (GDP), and global military spending. The GDP data is from the Federal Reserve Economic Data (FRED) and the federal budget data is provided by the Office of Management and Budget (OMB). While both the percentages of federal budget and GDP spent on the military trend lower over this period, this is primarily a result of increased federal non-defense spending and expanded US economic output rather than cuts to defense spending. The percentage of US market value (sum of the NYSE, AMEX, & NASDAQ) that is represented by these military contractors is also included. This percentage declines in nearly monotonic fashion from 11.2% of market value in 1989 to just 3.3% in 2011 as the military contractor industry becomes more concentrated. Specifically, this trend is largely a result of large companies, such as IBM and General Motors, exiting the military contractor business. This trend is consistent with the notion of increased oligopolistic activity among the military contractors. From 1989 to 2011, the US federal government maintains a dominant position as the most important demand agent, with mean annual purchases totaling 40% of global military spending. While this research only focuses on one sector of financial markets, it is a critically important component with a unique relationship to the political environment.

[Figure 1 about here]

2.2. The Monopsony-Oligopoly Business Environment

“In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex. The potential for the disastrous rise of misplaced power exists and will persist.”

Dwight D. Eisenhower

1st Supreme Allied Commander Europe, 1951-1952

34th President of the United States, 1953-1961

The uniquely close relationship between military contractors and the US federal government remains strong half a century after President Eisenhower (1960) warned of this dynamic. Political connections influence government procurement, even in the US. Goldman, Rocholl, and So (2013) explain how firms with a politically connected board of directors are improve the allocation of government procurement contracts. In the 1994 Congressional election, firms that have boards with partisan connections to the winning (losing) party experience a significant and large increase (decrease) in procurement contracts after the election. The federal government has a near monopsony for military goods and services, making military contractor firms sensitive to political uncertainty.

Most recently, the 2013 Federal budget sequestration provides ample evidence that defense receives different treatment than other government spending priorities. Federal budget reporting reflects this dynamic where spending is routinely categorized as defense versus non-defense spending. The close relationship between the military contractor industry and the federal government gives rise to a unique incentive and regulatory environment (see e.g., Agapos and Gallaway (1970); Demski and Magee (1992); Rogerson (1989); Rogerson (1992); Rogerson (1994); Stigler and Friedland (1971) among others). Leitzel (1992) and Weidenbaum (1968) assert that defense procurement exhibits non-competitive characteristics, consistent with theory regarding a captured regulator. Responding to this notion, Ke and Gribbon (2009) present evidence that the Department of Defense (DOD) achieves its stated goal of targeting profits based on the risk level of the military contractor. However, explanations for this unusual dynamic in the accounting literature produce inconclusive results.

Defense firms may respond to the unique business environment by engaging in cost-shifting accounting practices (Lichtenberg (1992); Thomas and Tung (1992)) or even outright

fraud (Karpoff, Lee, and Vondryk (1999)). By contrast, McGowan and Vondryk (2002) do not find evidence of cost shifting, attributing unusually high defense contractor profits to non-accounting explanations. Due to the unique oligopoly-monopsony structure, military contractors may have a skewed reward paradigm, driven largely by political forces. Johnson (2005) provides an extreme example, asserting that Northrop Grumman supplies parts for the B-2 Stealth Bomber from all 50 states to ensure political support for the project. Spending on military contracts is highly political, with the goods and services produced often classified. This structure facilitates an opaque accounting environment that may shield politicians and military contractors from public scrutiny.

The finance literature is replete with examples of politics directly impacting firms' equity. Using a sample of Indonesian firms, Fisman (2001) shows that political connections can be extremely valuable but often amplify equity volatility when the connections are endangered. In the US, Cooper, Gulen, and Ovtchinnikov (2010) demonstrate that corporate political contributions to both parties and both chambers of Congress are associated with higher equity returns, while contributions to Democrats and House candidates provide information for stock returns above and beyond that provided in contributions to Republicans and Senate candidates. Faccio (2006) and Faccio, Masulis, and McConnell (2006) provide evidence supporting the view that politically sensitive industries are more likely to have political connections. Goldman, Rocholl, and So (2009) demonstrate that politically connected board members have a pervasive impact on the value of public companies even within the confine of the strong legal system in the United States. Since the equity response should be most pronounced for firms with the greatest political sensitivity, military contractors are an excellent choice.

Military contractor firms are among the most politically sensitive in the economy. Using data from the 1992 US presidential elections, Herron, Lavin, Cram, and Silver (1999) find that firms in the defense industry are extremely politically sensitive. Using the 2000 presidential election, Knight (2007) shows that policy platforms are capitalized into the equity prices of the very politically sensitive firms (7% of this sample are defense firms). Huang and Gao (2012) report that a greater percentage of defense firms employ lobbyists in Congress than does any other industry. The Lockheed Martin produces C-130 aircraft provides an extreme example of this the “pork barrel” connection between the military and Congress. From 1978 – 1998, the US Air Force requested only five airplanes while the US Congress ordered up 256.⁴ As such, there is strong evidence that military contractors belong to the most politically sensitive industry in the US economy.

Military contractors therefore provide an excellent sample of firms for testing the impact of politics on equity markets. Finance research has previously employed the natural experiment involving political shocks related to the defense industry to test finance theory. In fact, Goyal, Lehn, and Racic (2002) employ the defense industry to test capital structure theory precisely because of the exogenous effects on military spending that political shifts induce. Belin and Guille (2008) employ a similar approach with French defense firms, finding evidence that firms’ dependence on defense contracts influences financial structure. Taking inspiration from this prior work, I use data from the Stockholm International Peace Research Institute (SIPRI) to obtain annual firm level estimates of the percentage of total revenue derived from sales to the military.

⁴ Report to the Honorable John McCain, GAO B-274598 pg 6, <http://www.gao.gov/archive/1998/ns98108.pdf>

With this sample, I exploit the unique nature of military contractors to evaluate the impact of US federal electoral shocks on equity volatility.

2.3. Political Uncertainty

When political uncertainty involves military conflict, equity markets often show extreme reactions. Several studies focus on military-conflict induced equity price movements. Amihud and Wohl (2004) use “Saddam contracts” to determine how the invasion of Iraq impacted US equity markets. They find that the war significantly impacts the S&P 500 and selected industries but the study does not explicitly examine military contractors. Rigobon and Sack (2005) employ a heteroskedasticity-based estimation technique to demonstrate that “war risk” surrounding the invasion of Iraq amplified US equity market volatility. Wolfers and Zitzewitz (2009) use the ‘Saddam Security’ financial instrument to predict stock market and oil price responses to the Iraq War. They find the US stock market is extremely sensitive to changes in the probability of war. Bittlingmayer (1998) uses the political uncertainty in Germany leading up to WWII to gage the impact of politics on stock price volatility. He presents a convincing case that shows how political uncertainty drives market volatility, concluding that “Politics matter”. Ultimately, politics dictate a large portion of equity returns, particularly when the politics involve military conflict.

Presidential politics have received much attention in the finance and economics literature while Congressional politics are largely ignored. Niederhoffer, Gibbs, and Bullock (1970) assert that, “Hardly any topic in market folklore receives more attention than the relation between presidential elections and the stock market.” Riley and Luksetich (1980) find limited evidence that markets prefer Republican presidents, at least in the short run. By contrast, in US presidential elections, Santa-Clara and Valkanov (2003) provide evidence that the stock market

fares 9% better when the President of the United States is a Democrat rather than a Republican, with the difference being most apparent in smaller firms. They conclude that the performance differential stems from unexpected returns. Li and Born (2006) conclude that presidential political uncertainty is observed by and priced in the equity market. Mukherjee and Leblang (2007) show that US and UK partisan administrations do influence nominal interest rates and stock market volatility but do not statistically impact the mean level of stock prices. Leblang and Mukherjee (2005) present a model of speculative trading around national elections and find evidence that financial markets are highly sensitive to partisan (i.e. left vs. right) politics at the executive level (i.e. presidential or prime minister). This focus on presidential politics in the literature even extends to military contractors. Perhaps the military contractor industry maintains a partisan bias; consider the long-standing belief that Republican presidents are more closely aligned with the military than are Democrats. Homaifar, Randolph, Helms, and Haddad (1988) test this impact of presidential politics on the defense industry but find little evidence that price changes in defense industry stocks are associated with the political party of the president. There is a large volume of literature on the relationship between the executive branch of government (president/prime minister) and financial markets, but much less research investigates partisan Congressional uncertainty.

While presidential party politics is clearly an important channel that impacts equity, Congressional channels and the interaction between the branches of government play an essential role as well. Congress has the ultimate federal budget authority and the majority political party in each chamber appoints the various committee chairs who control the flow of legislation. This Congressional power dynamic impacts firms directly, regardless of the president's party. Since budgets originate in the legislature, national elections that change the party in control of one or

both chambers of Congress may materially impact federal spending priorities. Only recently does finance literature explore Congressional election impacts on stock price returns. Jones and Banning (2009) find no significant differences in monthly stock market returns based on party political control resulting from presidential and/or Congressional elections. Kim, Pantzalis, and Park (2012) present strong empirical evidence showing that firms benefit when their local Congressional officials are members of the president's party. While the president is the commander-in-chief of the military, Congress is responsible for military budget appropriations, thus partisan Congressional political uncertainty may also generate substantial equity volatility.⁵

Financial market volatility in relation to politics is documented in the finance and economics literature. Pantzalis et al. (2000) find a positive abnormal return during the two-week period prior to the election week. Snowberg, Wolfers, and Zitzewitz (2007) demonstrate that changing expectations about the winner of the 2004 presidential election moved equity prices. Several studies focus on the variance of abnormal returns over multiple election cycles. Using data from 27 OECD nations, Białkowski et al. (2008) find a pronounced increase in markets cumulative abnormal volatility (CAV) during the weeks around national elections. Boutchkova, Doshi, Durnev, and Molchanov (2012) examine industry effects of politics finding that industries show an asymmetric response to political events. However, since the industry assignments are made using SIC codes, there is no clearly defined defense industry effect in this sample. Goodell and Vähämaa (2013) study volatility around presidential elections and conclude that the presidential election process engenders market anxiety as investors form and revise their

⁵ See Mayer (1990) for an expansive reference.

expectations regarding future macroeconomic policy.⁶ This collection of recent financial literature presents strong evidence that political uncertainty directly impacts equity volatility. From this evidence, one might conclude that politics incite a great deal of uneasiness among financial markets.⁷

⁶ They construct empirical measures of political uncertainty and election uncertainty over five US presidential election cycles between 1992 and 2008.

⁷ Political shocks are exogenous and have the capacity to move financial markets.

Chapter 3: Hypotheses Development

I present several hypotheses focused on the relationship between the political calendar and equity volatility. For each hypothesis, I presented the null and conduct two-way alternative testing. My first hypothesis tests the notion that military contractors face increased volatility in each election category. The second hypothesis tests the proposition that the election category helps explain the magnitude of the CAV. I compare various election categories including one based on the time period. Federal elections are sub-divided into two election types to test the prevailing view that presidential politics are more important than Congressional politics. I execute a time period analysis split by the September 11th, 2001 terror attacks to test for changes due to war and peace. If there is a direct link between political uncertainty and equity volatility of military contractors, this relationship may depend on war versus peace. The national security hypothesis suggests that military contractor's equity volatility is amplified during periods of high uncertainty regarding national security and war policy. The final hypothesis uses the share of sales to the military as a proxy for political exposure to distinguish between two competing theories: regulatory capture and election risk. These hypotheses provide greater insight regarding the interaction between equity and political uncertainty.

3.1. US Elections Increase Volatility (H_1)

The political uncertainty surrounding elections likely produces systematic changes to growth opportunities of military contractor firms in two dimensions. First, there is uncertainty associated with which political party will win the election. Since the winning party in each house of Congress selects the chairperson of each Congressional committee, the winning party has outsized influence in decision making. In Presidential elections, the influence is even more extreme as the commander-in-chief has tremendous direct influence over the military and the

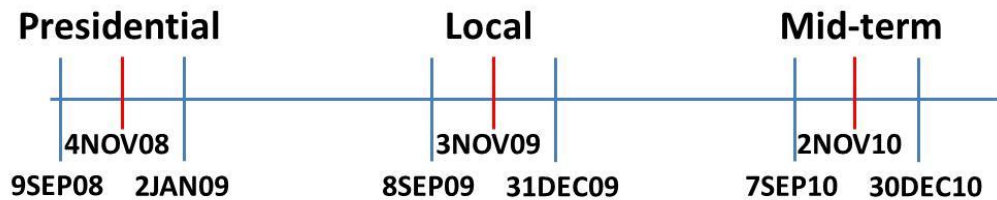
power to nominate key leaders such as the Secretary of Defense and the Chairman of the Joint Chiefs of Staff. Second, there is uncertainty about the differences between the parties in terms of national security and war policy. In some election years, the parties have similar priorities while others show substantial differences regarding military expenditures. The combination of these types of uncertainty dictates the systematic impact on expected growth opportunities of military contractor firms.

From an idiosyncratic standpoint, the influence of individual politicians may help determine individual firms' growth opportunities. Since individual politicians often directly lobby for military spending that benefits specific firms, they may play a substantial role in determining growth opportunities. Elections create uncertainty about which politicians will be in power, the committee assignments or political purview they enjoy, and their relationship to the majority party. Due to this, each election presents uncertainty for military contractors which may gain or lose valuable political connections. This individual political uncertainty translates to uncertainty about the set of growth opportunities faced by individual firms. This political uncertainty might be considered in terms of systematic and firm specific risk, with both types of risk substantially influencing equity volatility.

Prior literature suggests a positive relationship between elections and volatility. Using an international sample of elections involving a head of state, Białkowski et al. (2008) finds strong evidence that the volatility of national equity markets increases in the days around elections. Is this volatility increase apparent in a sample of US military contractors? Is this increase present in all election categories: local, midterm, presidential, peace and war? The first hypothesis tests the notion that the political uncertainty associated with elections influences equity volatility. The null hypothesis of no cumulative abnormal volatility can be expressed as follows:

$$H_1: \text{CAV}_c(n_1, n_2) = 0$$

This test can also provide an indication about the timing of a significant change in volatility. By adjusting the start date, n_1 , and the end date, n_2 , one can construct a variable CAV measurement. This is a useful tool to establish the timing of any change in volatility. An example of the (-40, 40) election window for these election categories is illustrated with the following:



3.2. Election Categories Impact Volatility (H_2)

The second hypothesis tests the proposition that the magnitude of equity volatility in the months around elections is determined by the election category. Since most literature focuses on presidential elections, it is important to determine to what extent other election categories impact equity markets. The motivation suggests that political uncertainty around Federal elections directly impacts military contractor firms. Since local elections do not typically involve Congressional or presidential political uncertainty these provide an excellent control group. The sample alternates between federal and local election years which facilitate comparison of the groups due to the similar number of observations and minimal time period effects or mean differences between group characteristics. Additionally, all elections occur the same time of year, from November 2nd through November 8th, always on Tuesdays, so no seasonal or day-of-the-week adjustment is required. These characteristics allow for calculation of differences in CAV that are tested using the empirical distribution as determined by steps IV – VI of the bootstrap algorithm. Political uncertainty associated with federal elections is expected to amplify

the volatility of military contractors' equity. The federal elections category CAV is tested against local elections category CAV as follows:

$$H_{2a}: CAV_{\text{Federal}} - CAV_{\text{Local}} = 0$$

This approach is extended to test the prevailing view that presidential election years matter more than midterm election years. Since presidential elections years typically have greater popular emphasis, turnout, and higher political stakes than midterm elections, equity volatility of military contractors could also be magnified. Additionally, presidential elections years have more total uncertainty since they typically involve many appointed positions with great influence (i.e. Secretary of Defense, Chairman of the Joint Chiefs of Staff, etc.). Since these officials must be confirmed by Congress and there may be obstacles to that process, the equity volatility of military contractors may reflect that uncertainty. The presidential elections category CAV is tested against midterm elections category CAV as follows:

$$H_{2b}: CAV_{\text{Presidential}} - CAV_{\text{Midterm}} = 0$$

Since the relationship between politics and military contractors is dynamic, the political environment during war likely alters the parameters. I create categories for war-time and peacetime elections.⁸ I define the post-Cold War era as peaceful years from 1989 – 2000 and the Global War on Terror era of military conflict in Afghanistan, Iraq, and other nations from 2001 - 2012. Of course, the precipitating event is the terrorist attacks of September 11th 2001 which are associated with a large increase in uncertainty. These attacks produce the largest daily equity

⁸ I thank Dr. Dorn for pointing out the difficulty of selling this definition. Alternative terms to frame this period based analysis may be pre-terror versus post-terror, elective military conflicts versus responsive military engagement. More investigation of appropriate political science terminology is required.

volatility for military contractors from 1988-2012.⁹ I examine the peace versus war election categories to determine if 9/11 shock and resulting war alters the equity volatility dynamics around elections. The sample is almost evenly divided by 9/11, facilitating a test of CAV differences for military contractors' equity volatility. I test for this using elections conducted during a period of sustained peace, 1989-2000, against a period of sustained war, 2001-2012.¹⁰ Do military contractors have different equity volatility around elections due to altered political risk dynamics depending on the US being at war or peace? This hypothesis is tested as follows:

$$H_{2c}: CAV_{\text{War}} - CAV_{\text{Peace}} = 0$$

Political risk may be directly related to the freedom of politicians to decide military policy and therefore influence the growth opportunities of military contractors. Under this paradigm, a sole super-power at peace enjoys great discretion with regard to its military so political risk for military contractors could be high. Conversely, while at war, politicians are subject to additional constraints with regard to military spending, both systematic and firm-specific. The military budget, firm characteristics, and operating performance data presented in the descriptive figures and tables, indicates that substantial changes occur as a result of conflict. Fundamental political and economic forces may influence equity volatility around elections, based on the condition of war. As such, it is possible that the 9/11 attacks are associated with a structural break in the relationship between political uncertainty and the equity volatility of military contractors. However, there may be a positive relationship between equity volatility and

⁹ US financial markets reopened on September 17th, 2001.

¹⁰ These war vs. peace election categories are more vulnerable to criticism than the other election categories. The US was engaged in the Gulf War from August 2, 1990, through April 6, 1991, when Iraq officially accepted cease-fire terms. There were also a number of US military interventions for "peace keeping" mission from 1989-2000. During the war period, only the elections from 2003 – 2009 were held with US troops actively involved in Iraq. The most constant feature of the post-9/11 period is US involvement in Afghanistan.

military conflict due to the inherently unpredictable aspects of warfare. It is ultimately an empirical question that I answer using a test for CAV around elections.

3.3. National Security Uncertainty Increases Volatility (H₃)

Uncertainty about US national security is likely to impact the equity volatility of military contractors. This uncertainty is focused around elections in two dimensions. The first involves the uncertainty about which candidates will win. When political races are competitive (lopsided), election results are more (less) uncertain, resulting in elevated (decreased) equity volatility. The second dimension concerns the differences between the opposing candidate positions. When partisan military budget and regulation priorities are very similar (different), elections produce a minimal (substantial) change in firms' growth opportunities. For military contractors, the national security and war uncertainty index is a proxy for the joint interaction of competitiveness, priorities, and the national security environment. Changes to expected firm growth opportunities should translate to equity volatility via all three channels.

While all assets have systematic and idiosyncratic risk components, some portion of these risks are channeled to military contractors in the form of political risk. The political process dictates the overall environment and the level of spending for military contractors. This can be viewed as a systematic political risk component, which is determined by factors such as the percentage of GDP spent on the military and the budget priorities for purchase of goods and services between air, ground, and naval forces. The idiosyncratic political risk component includes "pet projects" and other forms of winner picking by powerful politicians. Both components of political risk could have a material impact on firm performance. To the extent that major newspapers publish stories on these topics, uncertainty stemming from both components of political risk is reflected in the Baker et al. (2013) national security and war

uncertainty index. If elections do resolve some of the uncertainty about the risks facing military contractors, this should be reflected in the equity volatility. High uncertainty index elections CAV is tested against low uncertainty index elections CAV as follows:

$$H_3: CAV_{\text{High Index}} - CAV_{\text{Low Index}} = 0$$

This hypothesis tests the notion that national security and war policy uncertainty in September helps to dictate military contractors' equity volatility around elections. September is selected since it is the first month of the traditional campaign season. There is a trade-off here: September is close enough to the election to produce media focus on key election issues but is far enough ahead to allow for uncertainty about the results. This timing makes the index value in September an appropriate leading indicator of CAV through the event period.

3.4. Share of Military Sales Determines Volatility (H₄)

Military contractor firms have a wide range of exposure to government purchasing and regulation. Some firms rely exclusively on sales to the military while others derive only a small portion of sales to the military. This sample includes military contractor firm-years with military sales ranging from ½% to 100% of overall sales. This range facilitates testing of two competing hypothesis regarding the share of sales to the military, the captured regulator hypothesis and the election risk hypothesis.

As noted in the motivation section, military contractors are commonly viewed as capturing government policy makers, as with the “military industrial complex” speech. Under the captured regulatory hypothesis, military contractors with a high share of sales will capture (or even bribe) the winning politicians, regardless of the party or ideology of the winner. Consequently, military contractors exhibit no change in equity volatility around elections. Conversely, firms with a low share of sales to the military have less power to capture

politicians.¹¹ These firms may gain or lose political connections based on the election results so they have elevated equity volatility around elections.

In contrast to the captured regulator hypothesis, political leaders may drastically influence the prospects of military contractors. Under the election risk hypothesis, military contractors with a high share of sales are the most exposed to both systematic and idiosyncratic political risk so exhibit greater volatility around elections. Conversely, under the election risk hypothesis, firms with a low share of sales have less reliance on military sales so exhibit lower volatility around elections. To test this hypothesis, I find the differences in CAV between the top and bottom quartiles of firms based on the share of sales to the military:

$$H_4: CAV_{\text{High Share}} - CAV_{\text{Low Share}} = 0$$

3.5. Daily Volatility Is Non-Linear Around Elections (H₅)

Do elections produce non-constant daily volatility for military contractor firms? If political uncertainty does drive equity volatility, we should observe increasing daily volatility pre-election, a substantial decline in daily volatility at the election, and non-positive volatility post-election. This hypothesis tests key values to illustrate how a daily equity volatility profile among military contractors is associated with political uncertainty around election categories. Using the simple volatility model (9), the seven volatility profile parameters shown in figure 4 can be tested. These include four time point measures of volatility, the volatility change on Election Day, and two time trend measures of volatility. The presence of abnormal fitted volatility on a day, t , is tested as follows:

¹¹ Dr. Dorn points out that it is not only the company's share of government sales that matter. The importance of a military contractor in individual politician's districts could substantially influence political decisions. While obtaining the data to investigate this is challenging the idea is interesting.

$$H_{5a}: \widehat{M}_{t,c} - 1 = 0$$

This test shows differences between the baseline level of volatility and actual daily volatility during the event window. I test for abnormal volatility at each of the four daily points illustrated in figure 4. Note that if the daily volatility measures at the beginning ($n_1 = -40$) and ending ($n_2 = 40$) points do not show abnormal volatility, the event window duration is sufficient to encapsulate a volatility profile. Also, since there are two points on the election date, we can observe the election date fitted volatility based on pre or post-election data. One might think of these values as the expected level of daily volatility before and after election results are released, respectively. This election date change in fitted daily volatility indicates how much daily volatility is resolved by each election category. The change in fitted volatility is tested as follows:

$$H_{5b}: \Delta \widehat{M}_{0,c} = 0$$

An insignificant value would indicate that elections do not directly impact the equity volatility of military contractors. A negative value is consistent with the idea that election results do resolve political uncertainty.

The last two sub-hypotheses tests are designed to indicate changing daily volatility in the months before and after elections. The daily increase in pre-election fitted volatility is tested as follows:

$$H_{5c}: \beta_{t \leq T_0} = 0$$

An insignificant slope indicates that daily equity volatility is not a function of the days until the election date. A positive slope is consistent with the idea that daily volatility increases

over the weeks prior to elections. The daily increase in post-election fitted volatility is tested as follows:

$$H_{5d}: \beta_{T_0 < t} = 0$$

The H_{5d} test indicates if fitted daily volatility is a function of the time following the election date. An insignificant slope indicates that daily equity volatility is not a function of the days since the election date. A negative slope is consistent with the idea that daily volatility diminishes in the weeks following the election date.

If political risk drives equity volatility and elections are associated with a dynamic revision of political risk, equity volatility will be non-constant over the event period. Specifically, if firms are politically sensitive, equity volatility should increase prior to the election, diminish sharply when election results are revealed, and then display a non-positive volatility time trend following the election.¹²

¹² These three key profile parameters could be referenced as the volatility election profile parameters (VEPP).

Chapter 4: Methodology

The primary focus of this research is to quantify the impact of the electoral calendar on equity volatility. This is ultimately an empirical question which can be tested using a response to the exogenous political shocks associated with elections. The foundation of this approach is the Bollerslev (1986) GARCH (1, 1) model, which facilitates measurement of conditional equity volatility. My approach extends the methodology detailed by Białkowski et al. (2008) to capture firm-level volatility. Ultimately, this methodology allows testing hypotheses leading to the central research question; “How does political uncertainty impact equity volatility?”

The methodology section explains how I construct the equity volatility measures. Since cross correlation of abnormal returns can produce badly skewed test statistics (Kolari and Pynnönen (2010)), I checked for average correlation of abnormal moments to help identify the appropriate methodology. The evidence shown in figures 2 and 3 indicates 6.8% mean abnormal returns and mean 6.3% abnormal volatility, with several years showing greatly elevated correlation. The September 11th, 2001 terror attacks produce extremely high correlation of unconditional volatility with a mean value of 39.5% in 2001. Due to the substantial cross sectional correlation, the Boehmer, Musumeci, and Poulsen (1991), Brown and Warner (1980), and the Patell (1976) t-test statistics are invalid. Savickas (2003) finds that the GARCH-based test presents a superior alternative given evidence of correlation in both the first and second moments. My extension of the Białkowski et al. (2008) methodology produces firm-level volatility measures that are robust to the challenges presented by cross sectional correlation.

[Figures 2 & 3 about here]

I examine the period around US elections due to their consistent rules, predictable timing, and exogenous shock to the set of political decision-makers. My selection of a (-40, 40) event

window is based on the US political calendar as it covers the period of elevated political uncertainty surrounding elections. Forty trading days equates to about two months in calendar days. My event period begins in early September, close to Labor Day. Major-party Presidential campaigns traditionally begin on Labor Day (Pearson (2013)) and, therefore, last approximately two months. My event period ends in early January, close to the beginning of a new session of Congress. This four month window covers the period of changing expectations due to campaigning and aftermath of the elections before the new set of political decision-makers are sworn into office. In contrast to the international election study by Białkowski et al. (2008) with elections held with shorter notice and at different times of the year, my sample employs only US elections so the political calendar is a constant.

4.1. GARCH (1, 1) Conditional Volatility Measures

The volatility methodology follows the approach detailed by Białkowski et al. (2008). Consistent with their estimation and event periods, 500 daily returns in the estimation period are used, starting at trading day -540 and ending at trading day -41 relative to the election date. To ensure each year has a full-rank matrix for the GARCH model, I require the full 500-day estimation window for each firm.¹³ The firm-election specific component of variance is isolated using the following GARCH (1, 1) model:

$$R_{i,t,y} = \alpha_{i,y} + \beta_{i,y} R_{m,t,y} + \varepsilon_{i,t,y}, \quad \varepsilon_{i,t,y} \sim N(0, h_{i,t,y}) \quad (1)$$

$$h_{i,t,y} = \gamma_{0,y} + \gamma_{1,y} h_{i,t-1,y} + \gamma_{2,y} \varepsilon_{i,t-1,y}^2 \quad (2)$$

¹³ The 250-day estimation period of Brown and Warner (1985) may be insufficient to produce well-specified GARCH (1,1) parameters. Guided by extant work, I select a 500-day estimation period.

where $R_{i,t,y}$ and $R_{m,t,y}$ are the daily stock returns on firm i at day t for election year y and the value weighted US market return on day t for year y , respectively. $\varepsilon_{i,t,y}$ is the residual idiosyncratic firm-specific component of returns, while $h_{i,t,y}$ represents conditional variance. The residual term, $\varepsilon_{i,t,y}$, is typically referred to as an abnormal return in the finance literature and is referenced as such from this point on. The maximum-likelihood estimation (MLE) jointly generates the parameters for (1) and (2) over the estimation period.

Measurement of abnormal volatility requires that variation in $\varepsilon_{i,t,y}$ around the event date is considered relative to non-event levels. A single adjustment is required for (1) to eliminate the idiosyncratic component of returns. The parameter $\alpha_{i,y}$ is included during the estimation period, but only the systematic component of returns can be predicted so $\alpha_{i,y}$ is set to zero during the event period. In other words, the idiosyncratic component of returns is accounted for during the estimation period but is not applied to the event period.

The GARCH (1, 1) model is employed to indicate what the conditional variance would have been, without an election.¹⁴ However, the election dates are known years ahead of time. The one-day-ahead forecast of (2) will obviously not produce an event-independent result. This issue is resolved by conditionalizing the volatility forecast on the information set available well before the event.¹⁵ The volatility benchmark for the k -th day of the event window is defined as a k -step- ahead forecast of the conditional variance based on the information set available on the

¹⁴ Selection of the GARCH (1, 1) model presents some potential specification problems for the conditional variance of individual firms. While each the abnormal returns and conditional variance of each firm could be individually specified using a GARCH (p, q) model, this significantly complicates the analysis and breaks with the well established practice of employing GARCH (1, 1) to model equity returns.

¹⁵ The selection of an estimation period ending 41 trading days before each election is arbitrary to some extent as there is no clear beginning or end to the election cycle. As noted earlier in the paper, I selected the end of the estimation period to coincide with the traditional kick-off to campaigning season, Labor Day Weekend.

last day of the estimation window t^* . The volatility benchmark is defined as a forecast of conditional variance using the information available on the final day of the estimation window, namely $h_{i,t^*,y}$ and $\varepsilon_{i,t^*,y}^2$:

$$E[h_{i,t^*+k,y}|\Omega_{t^*,y}] = \hat{\gamma}_0 \sum_{j=0}^{k-1} (\hat{\gamma}_1 + \hat{\gamma}_2)^j + (\hat{\gamma}_1 h_{i,t^*+k,y} + \hat{\gamma}_2 \varepsilon_{i,t^*+k,y}^2)(\hat{\gamma}_1 + \hat{\gamma}_2)^{k-1} \quad (3)$$

where $\Omega_{t^*,y}$ is a full-rank matrix for each year included in the sample. This full-rank requirement ensures that estimation quality remains constant across firms, i , and years, y . The values for $\hat{\gamma}_{x,i,y}$ are parameters determined during the estimation period. The event period distribution of residuals is described by $\varepsilon_{i,t,y} \sim N(AR_{i,t,y}, M_{t,y} E[h_{i,t,y}|\Omega_{t^*,y}])$, where $AR_{i,t,y}$ is the event-induced abnormal return, $M_{t,y}$ is the multiplicative effect of the event on volatility, and $t > t^*$.¹⁶ Under a null hypothesis that elections do not alter volatility, the value of $M_{t,y}$ is one. However, under the assumption of residual orthogonality, the residual variance would be:

$$\begin{aligned} \text{var} \left(\varepsilon_{i,t,y} - \frac{1}{N_y} \sum_{i=1}^{N_y} \varepsilon_{i,t,y} \right) \\ = M_{t,y} \left[\frac{N_y - 2}{N_y} \cdot E[h_{i,t^*+k,y}|\Omega_{t^*,y}] + \frac{1}{N_y^2} \sum_{j=1}^{N_y} E[h_{j,t^*+k,y}|\Omega_{t^*,y}] \right] \\ = M_{t,y} \cdot EIDRV_{i,t,y} \end{aligned} \quad (4)$$

¹⁶ If residuals were demeaned using the cross-section average, they would be normally distributed with zero mean.

where $EIDRV_{i,t,y}$ is the event-independent demeaned residual variance and N_y is the number of firms included in the sample each year, y . At the firm-election level, volatility is modeled as follows:

$$\hat{Q}_{i,t,y} = \left(N_y \cdot \hat{\varepsilon}_{i,t,y} - \sum_{j=1}^{N_y} \hat{\varepsilon}_{j,t,y} \right)^2 (N_y^2 \cdot EIDRV_{i,t,y})^{-1} \quad (5)$$

where $\hat{\varepsilon}_{i,t,y} = R_{i,t,y} - \hat{\beta}_{i,y} \cdot R_{m,t,y}$ and $t > t^*$. Under a null hypothesis of no change in volatility due to elections, the demeaned standardized residuals follow a normal distribution because $Q_{i,t,y}$ equals one. Since the research intent is to quantify the effect of United States elections on equity volatility, M_t is the primary test parameter.¹⁷ Election categories, c , are defined by type or time period using years, y , to produce multiplicative event volatility, $\hat{M}_{t,c}$, for each category of elections. A category of election-observations can be defined using any unique characteristic. Consequently, this firm-level analysis produces the multiplicative effect on volatility by event category:¹⁸

$$\hat{M}_{t,c} = \sum_{y=1}^{Y_c} \sum_{i=1}^{N_y} \hat{Q}_{i,t,y} \cdot \left(\sum_{y=1}^{Y_c} N_y - 1 \right) \quad (6)$$

where Y_c is the number of years for an election category, c , and N_y is the number of firms included in the sample each year, y .

¹⁷ See Boehmer et al. (1991) and Hilliard and Savickas (2002) for the basis of this approach.

¹⁸ This volatility measure could be referenced as the MEVEC.

4.2. Cumulative Abnormal Volatility (CAV)

If elections do not impact volatility, the demeaned standardized residuals follow a standard normal distribution because $M_{t,c}$ equals one. Therefore, abnormal changes in volatility on any day t during the event window (n_1, n_2) are given by $(\hat{M}_{t,c} - 1)$. The cumulative abnormal volatility (CAV) for any election category, c , can be calculated as follows:

$$CAV_c(n_1, n_2) = \sum_{t=n_1}^{n_2} \hat{M}_{t,c} - (n_2 - n_1 + 1) \quad (7)$$

where n_1 is the beginning day of the event and n_2 is the concluding day of the event. The election category CAV is therefore the sum of excess daily volatility from day n_1 through day n_2 . Under the assumption of no cross correlation of abnormal returns, the test statistic for CAV_c is:

$$\phi_c(n_1, n_2) = \left(\sum_{y=1}^{Y_c} N_y - 1 \right) \sum_{t=n_1}^{n_2} \hat{M}_{t,c} \sim \chi^2_{\left(\sum_{y=1}^{Y_c} N_y - 1 \right) (n_2 - n_1 + 1)} \quad (8)$$

However, figure 2 presents clear evidence that this assumption does not hold. As such, I bootstrap the distribution of returns to produce a valid test statistic.

4.2.1. Bootstrap Algorithm

The soundness of the results of the theoretical tests hinge on the assumptions of the econometric model. Non-normality, cross-sectional dependence, or autocorrelation of the regression residuals, $\varepsilon_{i,t,y}$ are all potentially complicating factors. These issues are circumvented using the Efron (1979) bootstrapping methodology to define statistical significance. Event period CAV for various election categories are compared to the empirical distribution of CAV during

the whole sample period, as simulated under the null hypothesis.¹⁹ When the difference between CAV for various election categories is calculated, the results follow a different distribution than the original. The following algorithm generates both of these empirical distributions:

- I) Randomly draw $(n_2 - n_1 + 1)$ estimation period M values with replacement.
- II) Compute the CAV using equation (7) for the randomly generated sample over the $(n_2 - n_1 + 1)$ day long window.
- III) Repeat steps I and II 10,000 times. Sort the collection of resulting CAVs in ascending order to obtain the empirical distribution. The bootstrapped p-value is defined as the number of bootstrapped CAVs that exceed the CAV calculated for the original election sample, divided by the number of replications (i.e. 10,000).
- IV) Randomly divide the CAV results from step III into two equal groups.
- V) Compute $CAV_1 - CAV_2$ for each of the 5000 pairs.
- VI) Sort the collection of resulting differences in ascending order to obtain the empirical distribution. The bootstrapped p-value is defined as the number of bootstrapped differences that exceed the differences calculated for the various election categories in the original sample, divided by the number of replications (i.e. 5,000).

4.2.2. Daily Volatility Modeling

I construct a parsimonious model of daily equity volatility to illustrate the relationship between political uncertainty and equity volatility around elections. The election date is defined as event day zero. However, since markets close in the afternoon while US election results are not made public until evening, the pre-election period contains day zero. I run segmented

¹⁹ This requires a calculation of the daily volatility (M_t) for each of the $24 \times 250 = 6000$ days in the sample.

regressions on the daily multiplicative effect of volatility to produce fitted volatility models. The fitted volatility model²⁰ is stated as a piecewise function:

$$\tilde{M}_{t,c} = \begin{cases} \alpha_{t \leq T_0} + \beta_{t \leq T_0} t + e_t & , \quad n_1 \leq t \leq T_0 \\ \alpha_{T_0 < t} + \beta_{T_0 < t} t + e_t & , \quad T_0 < t \leq n_2 \end{cases} \quad (9)$$

where α terms are volatility intercepts at the beginning of the event period, n_1 , and on the election date, T_0 , respectively. The β terms allow non-constant volatility both pre and post-election. t is the number of days relative to the election date and e_t represents the error term in the regression. I model the 41 day period (-40, 0) as pre-election results and the 40 day period (1, 40) as the post-election results period. This simple model of fitted volatility facilitates testing of seven volatility parameters as shown in figure 4.

[Figure 4 about here]

²⁰ As suggested by Dr. Wada, an alternate model can be stated in a single equation using time dependant dummy variables. This alternate model facilitates the econometric tests but is more difficult to code in SAS. This alternate specification will be investigated further following the dissertation defense.

Chapter 5: Data

Several disparate data sources are leveraged for this research. The primary source is the SIPRI database on arms-producing and military services companies, which provides the list of military contractors. This data set is used to identify US public firms with large military contracts. The SIPRI data is augmented with financial information extracted from both CRSP and Compustat. Baker et al. (2013) provide an index for national security and war uncertainty. Election dates are always the first Tuesday after the first Monday in November, as required by law. The US Senate maintains a list of these election dates. Table I lists the variables and acronyms in this paper. Some of these are extracted from other sources and use the terminology of the original reference to the extent possible. The data from each source is explained in more detail throughout this section.

[Table I about here]

5.1. US Public Military Contractor Firms

The “defense industry” is difficult to define as military contractors span a wide range of SIC codes. Military contractors vary greatly in their percentage of sales to the military, both by time and firm. To better define the industry, I use the SIPRI database of arms-producing and military services companies from 1989 through 2012 to identify US public military contractor firms (SIPRI (2013)).²¹ Moving beyond mere identification, SIPRI estimates a key variable for measuring the military focus of each firm: the percentage of firm revenue derived from sales to the military, *share*. Arms sales are defined by SIPRI as sales of military goods and services to

²¹ Many thanks to Dr. Sam Perlo-Freeman for extracting this data from the SIPRI archival database. This SIPRI dataset includes unpublished information since only the Top 100 arms-producing and military services companies in the world are included in the SIPRI yearbook.

military customers, including both sales for domestic procurement and sales for export. Military goods and services are those that are designed specifically for military purposes and the technologies related to such goods and services.²² The filters for inclusion in the sample require that each firm-year observation meets the following:

- I) US headquartered firm included in the annual SIPRI database among the Top 300 arms-producing and military services companies in the world. This must include the SIPRI variable, $share_{i,y}$ (arms sales over total firm sales). (1494 observations)
- II) Public firm with Compustat data and common equity (CEQ) greater than zero. (1238 observations)
- III) Complete CRSP record of daily stock prices over a 600 trading day window (-550, 50). (1165 observations)

International firms are not included as they may be less directly impacted by political shocks in the United States. Subsidiaries, non-profits, and private firms are eliminated from consideration due to the lack of available data.

Table II presents a comprehensive list of the 121 US public military contractor firms including their industry categories. One striking result is that only 7.1% of these military contractor firm-year observations belong to the Fama-French 48 industry group “Defense”. As extreme examples, two firms that derive 100% of their revenues from sales to the military, United Defense Industries and Force Protection, Inc., belong to the industry group “Automobiles and Trucks” rather than “Defense”. To my knowledge, my sample of military contractor firms,

²² The SIPRI definition of arms sales serves as a guideline; application of these principles requires judgment. SIPRI provides a comprehensive explanation of the definitions and methodology on their website.

derived from the SIPRI database, is the more accurate and comprehensive collection of publicly traded US military contractor firms employed in academic research.

[Table II about here]

5.2. National Security and War Uncertainty

A component of the Economic Policy Uncertainty Index developed by Baker, Bloom, and Davis (2013) measures uncertainty related to national security.²³ They construct an uncertainty index based on keyword search results from 10 large newspapers using month-by-month searches. The newspapers included in the index are: USA Today, the Miami Herald, the Chicago Tribune, the Washington Post, the Los Angeles Times, the Boston Globe, the San Francisco Chronicle, the Dallas Morning News, the New York Times, and the Wall Street Journal. They require that articles contain the term ‘uncertainty’ or ‘uncertain’, the terms ‘economic’ or ‘economy’ and one or more of the following terms: ‘congress’, ‘deficit’, ‘federal reserve’, ‘legislation’, ‘regulation’ or ‘white house’ (or related terms like ‘regulatory’ or ‘the fed’). To meet the criteria for inclusion the article must include terms in all three categories pertaining to uncertainty, the economy, and policy with the goal being to select articles in US news sources that discuss something about uncertainty over economic policy. The overall index contains a sub-index regarding news coverage about policy-related economic uncertainty.

They count the number of articles that satisfy the search criteria each month, giving a monthly series for each paper. From these papers, Baker et al. (2013) create a normalized index of the volume of news articles discussing economic policy uncertainty. They apply a second

²³ This national security and war uncertainty data is summarized in table II of the working paper. It is not yet published on their excellent website www.policyuncertainty.com This data covers 1985 to 2012 and was generously shared via email by the authors.

filter to create the national security and war uncertainty index when the article contains one or more of the following terms: "national security", "war", "military conflict", "terrorism", "terror", "9/11", "defense spending", "military spending", "police action", "armed forces", "base closure", "military procurement", "saber rattling", "naval blockade", "military embargo", "no-fly zone", "military invasion". The result is a monthly index that proxies for the degree of political uncertainty which military contractors face.

I use the national security & war uncertainty data monthly data beginning in January 1989. It is presented in figure 5 with the raw index value normalized to 100. As one might expect, periods of great national security and war uncertainty produce large spikes. Each of the three most uncertain months coincides with the beginning of a war: Operation Desert Storm, January 1991; the Al-Qaeda Terror Attacks, September 2001; and Operation Iraqi Freedom, March 2003. There are also smaller spikes that often occur in the months prior to federal elections. Some examples of this include the Clinton win in 1992, the Obama win in 2008 and the GOP takeover of the House of Representatives in 2010. The index values presented in figure 5 are analyzed to produce the data presented in Table III.

[Figure 5 about here]

Table III presents monthly national security & war uncertainty from January 1985 through October 2012. Policy is the overall economic policy uncertainty index value. News-based is the uncertainty component from newspapers, and it comprises 50% of the overall economic policy uncertainty index. National Security is the uncertainty component from newspapers that deals with security and war. All t-stats are calculated using the Satterthwaite method for unequal variances.

Table III, Panel A presents uncertainty metrics by periods in order to show how uncertainty changes. There is a stark contrast between all metrics separated by the events of September 11th, 2001 that suggests a major shift in US emphasis on national security and war uncertainty. For policy, news, and national security based uncertainty, there is a large and long-lasting increase in uncertainty associated with 9/11, significant at 1%. This may mean that the shift in national security and war uncertainty propagated throughout the national debate and impacted all types of economic uncertainty. These findings are consistent with the idea that the 9/11 terrorist attacks increased media emphasis regarding national security and war.

In addition to the terrorist attacks, I check for the effect of the more existential threat of global catastrophe as measured by the Bulletin of the Atomic Scientists. They keep the Doomsday Clock, which uses the number of minutes to midnight as an indicator of the probability of a global catastrophic event. When introduced, the initial setting was seven minutes to midnight; since the sample is well divided by this setting, seven minutes serves as the break point. From 1985 through 1989 and again beginning in 2002, the Doomsday Clock was set at seven minutes or less to midnight. While overall economic uncertainty is significantly different, I do not ascribe a reason for the difference, since no significance is found in national security and war uncertainty. As such, the proxy for risk of global catastrophe did not significantly alter the uncertainty reported by newspapers.

[Table III about here]

Table III, Panel B presents the differences between years (even) with a US federal election and years (odd) without federal elections. The six highest and six lowest values of the national security and war index were dropped to produce the 2% truncated values. From highest to lowest, the high value truncated months are: January 1991 – Operation Desert Storm; March

2003 – Invasion of Iraq; September 2001 – 9/11 Terrorist Attacks; February 2003 – Build-up to the Invasion of Iraq; November 2001 – Response to 9/11 and Operations in Afghanistan; and January 2003 – Build-up to the invasion of Iraq. From lowest to highest, the low value truncated months are October 2009, July 2000, February 2000, September 1997, October 1997, and August 2001. It is difficult to ascribe reasons for these observations as low values are due to the absence of focus on national security and war events. These findings are consistent with the proposition that the national media focus shifts more heavily towards uncertainty regarding national security and war in the months leading up to a US federal election.

The US political uncertainty index shows a distinct election year pattern. National security and war uncertainty index is 33% amplified in August through November of US federal election years compared to local election years. This difference is significant at the 5% level and most likely reflects the increased debate regarding military defense policy associated with political campaigns for US federal elections. When the data is truncated at 2% to remove confounding events, the difference is significant at the 1% level. This is strong evidence that public discourse focuses on the relationship between political uncertainty surrounding US federal elections and uncertainty about the military.

Table III, Panel C details differences between midterm elections and presidential elections. While prior academic research has heavily focused on presidential politics, these findings show that national security and war debate around presidential elections is not significantly greater than the debate around midterm elections. This absence of a significant difference between presidential and midterm elections suggest that both executive and legislative channels are important factors influencing the national security and war debate.

Chapter 6: Results

This section presents the major results of this research in three sub-sections. The descriptive results provide summary and descriptive information about the data. Descriptive results help to define the data but contribute only indirectly to the conclusions of this research. The hypotheses results present evidence to support the five hypothesis tests which leads directly to the conclusions. The robustness results provide additional evidence to reinforce the findings of the hypotheses results. The robustness section details additional testing to reinforce the veracity of the main conclusions. Collectively, the results presented in these three sub-sections answer the central question of this research; how does political uncertainty impact equity volatility?

6.1. Descriptive Results

The descriptive results include operating performance, model specification, and CAV critical value information. Descriptive statistics and operating performance metrics are presented to provide an overview of the business environment of military contractors. GARCH (1, 1) model results are shown to demonstrate that my methodology adequately models conditional variance. The CAV critical values are presented to clarify how my bootstrapping procedure yields valid test statistics.

6.1.1. Descriptive and Operating Performance Measures

The descriptive statistics in Table IV provide characteristics of military contractors and operating performance measures. My sample of US public military contractor firms are typically larger than the average international arms-producing and military services companies with a mean (median) rank of 82.6 (77). The mean (median) US firm derives 40.5% (35.0%) of total sales from arms since smaller firms are more likely to be specialized military contractors. The

military contractors firms are generally profitable with a mean (median) ROE of 16.2% (12.4%) and ROA of 4.2% (4.9%).²⁴ More than 80% of firm-year observations have positive values for all operating performance variables. These results are consistent with the notion that US military contractors are powerful and profitable firms.

[Table IV about here]

There is substantial variability of the various metrics from 1989 through 2012 so plots are included to depict the shifting performance of the military contractor industry. Figure 6 shows that operating performance measures exhibit time dependent variability that is consistent with US federal government military spending patterns. Ratios are depressed during the period of military draw downs (1991-94) following the end of the Cold War. The operating performance ratios show a smaller decline in 2000 with a rebound again following military budget increases associated with the 2003 invasion of Iraq. These results demonstrate a linkage between the operating performance of military contractors and the changes in US Federal Government spending due to the status of military conflicts.

[Figure 6 about here].

Growth opportunities of military contractor firms are tied to US military posture. Figure 7 presents the sample mean market to book ratio as the simple Tobin's Q and the more complex Tobin's Q provided by Chung and Pruitt (1994). The mean market to book ratio of sample firms shows a large degree of variability ranging from 0.43 at the end of the Cold War to 1.34 during the Global War on Terror. While the military contractors exhibit Tobin's Q values that are similar to the overall market, they did appear to underperform during the dot.com bubble (1997-

²⁴ The extreme outliers for ROE are: -604% for Morrison Knudsen in 1994 and 7038% for Lockheed Martin in 2012.

2000) and outperform for the Global War on Terror years following the attacks of September 11th, 2001. This evidence suggests a link between the political environment and the growth opportunities of military contractors, generally consistent with the findings of Goyal et al. (2002). This link between US foreign policy regarding military conflict and the growth opportunities of the domestic military contractor industry is not surprising.

[Figure 7 about here]

Figure 8 shows that military contractor characteristics also shift over the sample period. The mean share of sales to the military is 36.7% before the terror attacks of 9/11 and 43.8% after the attacks. This indicates that US military contractors may be more specialized arms-producing and military services companies in the later years of the sample. The mean global ranking of US military contractors based on the SIPRI definition of arms-producing and military services companies increased from a low ranking of 106th in 1995 to a high of 63th in 2011. This indicates that the average size of US military contractors relative to foreign military contractors is time dependent. In connection with H_{2c} , this growth after 9/11 suggests that war may alter the characteristics of contractors.

[Figure 8 about here]

Figure 9 presents the number of firms in the sample each year and provides the annual industry diversity of military contractors. The list of military contractors ranges from 40 to 61 firms in any given year, exhibiting a generally stationary trend. The diversity of industries in the sample ranges from 12 to 18 Fama French industry groups or 21 to 32 SIC codes. Again, the diversity of industries appears to exhibit stationarity. The stationarity of the data suggests that comparison between years without adjustments is valid.

[Figure 9 about here]

6.1.2. GARCH (1, 1) Model Parameters

The GARCH (1, 1) model parameters presented in Table V provide key indications of the nature of military contractors' equity volatility. In each of the 1165 firm-year observations, 500 trading days were used in the estimation period so there is overlap year-on-year. Panel A shows the estimation period parameters used to calculate the event period abnormal returns and conditional volatility. The mean (median) $\alpha = 0.03\%$ (0.03%), with both the t-test and Wilcoxon test significant at the 1% level, indicating that these military contractor firms outperformed the market over the 24-year sample period. However, the economic significance of this excess return is marginal. Additionally, with a mean (median) $\beta = 0.93$ (0.92), these firms typically exhibit below-average systematic risk, with both the t-test and Wilcoxon test significant at the 1% level. This low β suggests that military contractors are typically less volatility than the overall market. The relative stability of military contracts is likely the reason for this dampened equity volatility. Both of these parameter values for abnormal returns from (1) are plausible given the nature of the sample.

The volatility parameters from (2) also produce sensible values. The parameter $\gamma_0 = 0.00018$ defines the mean level of minimum volatility, while γ_1 indicates that 45% of conditional variance is carried over from the prior day. The parameter γ_2 indicates that 18% of conditional variance is comprised of the mean lagged unconditional variance. Taken together, these three parameters indicate that most firm-years are well modeled using GARCH (1, 1). However, some firm-years have γ_1 or γ_2 values that approach unity or zero. In these cases the GARCH (1,1) model collapses to a moving average (MA) or auto-regressive (AR) model. Ultimately, the parameters show that the GARCH (1,1) model adequately fits the equity volatility of this sample of military contractors.

[Table V about here]

As suggested by the non-constant annual operating performance, it is clear that military contractors' model parameters also change substantially from 1989 through 2012. Figure 10 presents annual α and β values from (1). The $\alpha > 0.1\%$ values are noticeably elevated in the first years of the George W. Bush presidency, indicating that military contractors outperformed the market. However, even the best estimation period year (2002) for military contractors, while significant at 1%, only resulted in market outperformance of 0.185%. The beta of military contractors ranges from a low of 0.54 in 2000 to a high of 1.23 in 2006 but is generally higher in the post-9/11 period. This demonstrates that both operating performance and the parameters for abnormal returns varied over the sample period.

[Figure 10 about here]

Figure 11 presents the mean γ_0 parameter used to establish the minimum conditional variance in the GARCH (1, 1) model. An interesting feature of this figure is the $\gamma_0 > 0.0003$ elevated mean minimum volatility during the first years of the George W. Bush presidency. This may suggest an elevated level of uncertainty about the future of military contractor firms, coincident with the highest α values. This is suggestive of a stable *ex post* Sharpe Ratio.²⁵ The minimum variance parameter appears stationary and exhibits plausible values.

[Figures 11 about here]

Figure 12 presents the mean parameters for γ_1 and γ_2 for conditional variance in the GARCH (1, 1) model. Both parameters exhibit properties of stationarity and yield plausible values.

²⁵ Of course, the minimum variance is only part of the story. Nevertheless, a quasi-Sharpe Ratio constructed using α and the minimum σ of the military contractors could be instructive.

[Figure 12 about here]

I display event period values from (1), (2), and (5) in Table V, Panel B. The mean (median) event period abnormal return, $\varepsilon = 0.03\%$ (-0.03%), with both the t-test and Wilcoxon test significant at 1%, showing that the mean (median) firm continues to outperform (underperform) the market during the event period. Again the economic significance of these results is negligible. The daily firm-level conditional volatility, h , and the normalized volatility measure, Q , both show strong positive skewness consistent with a chi-squared distribution. Since the Q is the basis of the volatility measures in this research, subsequent tables will explain it in greater depth. Taken together, these parameters provide strong evidence that the GARCH (1, 1) model is appropriate for this sample.

6.1.3. Bootstrapped CAV Critical Values

Figure 13 reports the results of the CAV critical values based on 10,000 bootstrapped trials as explained in the methodology section. This figure presents the 1%, 5%, and 10% two-way confidence intervals for the CAV critical values. Clearly, the bootstrapped distribution deviates from a normal distribution. The substantial differences stem from cross-sectional correlation of abnormal returns as identified in figure 2. The most obvious feature of figure 13 is the extreme increase in 1% critical values shortly before the election. A brief investigation determined that a single trading day was responsible for this unusual feature. Perhaps one should not be surprised to find that the first trading day after 9/11 produced extreme volatility among military contractors. September 17th, 2001 is to blame: what a difference a day makes.

[Figure 13 about here]

Due to the unique nature and extreme impact of this day, I truncated September 17th, 2001 from the data used to produce the bootstrapped distribution.²⁶ In doing so, I make the implicit assumption that a similar event will not occur. To this extent, the statistics I report are – like many statistics – not robust to Black Swan Theory as explained by Taleb (2007). While this was only one of 6000 data dates, the resulting critical values shown in figure 14 are substantially altered. However, even with this adjustment, this figure presents critical values that remain non-normal, with a noticeably skewed distribution.²⁷ The p-value tests for all election category CAV is based on the results presented in figure 14. The modified distribution is therefore a more reasonable representation of the expectation for future CAV.

[Figure 14 about here]

The non-normal distribution of CAV results in a new distribution for the differences between CAV. Since these differences in CAV between election categories do not follow the same empirical distribution, I calculate those following the bootstrap algorithm. The critical values for the CAV differences are presented in figure 15. As theory suggests, the critical values of this bootstrapped distribution are nearly symmetric, more consistent with a normal distribution. The critical values presented in this distribution are used to determine the significance of p-values in the CAV differences tables.

[Figure 15 about here]

²⁶ For the results that exclude September 17th, 2001, the extreme volatility measure on that date is truncated. On that day, the value weighted market return was -5.1%, while 10% of the sample firms enjoyed returns greater than 34%, producing extremely high abnormal returns. Since this date is 36 trading days prior to the election, the category volatility is formally stated: $M_{-36,2001} = 54$. This value indicates a volatility level that is 5300% above the benchmark volatility. For perspective, the second most extreme volatility date, $M_{-17,2008} = 18$.

²⁷ As suggested by Dr. Kim, the skewness must be rigorously quantified. Hutton, Marcus and Tehrani (2009) may provide a good resource for this.

6.2. Hypotheses Tests

The results of the hypotheses tests provide a detailed account of the relationship between political uncertainty and equity volatility. The H_1 test results show evidence of amplified CAV around elections, consistent with the findings of Białkowski et al. (2008). The H_{2a} test results demonstrate that federal elections increase the equity volatility of military contractors' more than local elections. To test H_{2b} , federal elections are sub-divided into presidential and midterm elections, then compared to show that these categories exhibit distinct volatility patterns. The H_{2c} results suggest that the period of war following the September 11th, 2001 terror attacks changes the relationship between political uncertainty and equity volatility. The H_3 results show that military contractors' equity volatility exhibits a strong positive relationship with national security and war uncertainty. From the H_4 results, I find only weak and inconsistent evidence that powerful military contractors engage in regulatory capture, mitigating their equity volatility around elections. As such, the H_4 results are inconclusive. Finally, the H_5 test results show a distinct daily volatility profile around elections. The volatility profile models I construct help to explain the dynamic interaction between political risk around elections and equity volatility. My research extends the finance literature by explaining how political risk determines a large portion of equity volatility in the weeks before and after US elections.

To better convey the volatility dynamics around elections, I include CAV figures to illustrate the results presented in the tables. Since CAV can be determined for any election category – including individual years – these annual volatility results are shown in figures 16 & 17. However, some of these annual results are explained by confounding events, so caution is required when attempting to interpret the annual CAV without considering the historical context.

These figures are a useful reference but individual years suffer from idiosyncratic influences and

a small sample size. However, even with these concerns, plausible explanations are apparent for many individual years. The annual CAV results typically fall into two paradigms. Some annual election windows show elevated CAV due to political uncertainty during the event period while others indicated decreased CAV due to high volatility during the estimation period.

[Figures 16 & 17 about here]

The election windows with the highest CAV have clear explanations and are significant at the 1% level. The Gulf War is coincident with the 1990 election, resulting in a 165% increase in implied volatility. Since the political uncertainty regarding US involvement may not have been a function of the midterm elections, this year presents a potentially confounding event. The 9/11 attacks produce the large volatility spike 36 trading days before the election in 2001, resulting in a 78% implied volatility increase and confounding this election. Since there is no reason to believe that 9/11 was related to the local elections in 2001, this year is truncated throughout the analysis of results. However, the largest annual CAV result, an amazing 254% implied volatility increase beyond the benchmark level stems from political uncertainty around a key election. By all accounts, the presidential candidates in 2008 promoted differing approaches to the use of US military power. Accordingly, military contractors attempted to gain political access, with Barack Obama pocketing 34% more money from defense-contractor sources than John McCain despite McCain's 23-year Navy career and extensive service on the Senate Committee on Armed Services (Thompson (2008)). This disparity in contributions may help explain why military contractors experienced large mean CARs that drove increased volatility in the months around the 2008 election. Of the three years with extremely high CAV, all have plausible explanations.

Election windows with the lowest CAV are due to high volatility in the two years prior to the election. Since volatility projections for the event windows are produced using actual volatility data from the prior 500 trading days, extreme volatility events during the estimation period may confound the volatility parameters. The three lowest CAV all show evidence of mean reversion. The 2003 election with -50% implied volatility includes both 9/11 and the invasion of Iraq in the estimation period. The 2009 and 2010 elections with -58% and -50% implied volatility respectively include the 2008 election and uncertainty surrounding the withdraw from Iraq in their estimation periods. All three of these election windows show reduced CAV due to the high volatility during their estimation periods.

Since there are both extremely high and low CAV years, outliers are a concern. There is even one year when the election uncertainty dragged on for weeks. In the 2000 election there was not a clear presidential victor until the United States Supreme Court issued the December 12th ruling on Bush v. Gore. Even so, this election does not drive CAV for the presidential category. Fortunately, the noisy volatility of individual years is moderated by using election categories to pool the volatility measures. As these figures are more intuitive than the tables, I employ these as a supplement to help communicate the results. Throughout the results section, Figures 18-42 provide a visual reference for the results reported in Tables VI-XI. Unless otherwise noted, my discussion of results focuses on the longest (-40, 40) event window. As the figures merely support the corresponding table results – in most cases – I do not independently discuss the figures. Analysis of the table results is sufficient for a quantitative assessment of the results, while the figures facilitate communication of the key findings. I present election category results to illustrate the link between political uncertainty and equity volatility.

6.2.1. Cumulative Abnormal Volatility Results (H_1)

In Table VI, I detail CAV by election category to provide test results for hypothesis one. Panel A provides descriptive summary information about the election category observations used to produce the CAV results. The sample size information shows a sufficient number of observations from which to draw statistically valid conclusions about the military contractor industry in the months around elections. Panels B & C facilitate direct comparison with Table 3 of Białkowski et al. (2008) while Panel D provides pre-election event windows, which were not reported in their work. I employ the nomenclature of their tables to the extent possible, using the sample event windows plus the 40 day window. For example, (-5, 0) represents an event period beginning five trading days prior to the US election date and through the date, which is always on a Tuesday. The results presented here provide strong support for the hypothesis that elections are associated with an increase in the volatility of military contractor firms.

[Table VI about here]

In Panel B of Table VI, CAV is presented for the six election categories; local, federal, presidential, midterm, pre-9/11 (peace), and post-9/11 (war). As noted earlier, the 2001 data is truncated due to the confounding effect of 9/11. For local elections, CAV reaches a value of 8.725 over the 81-day event window. While this value may not appear intuitive, by construction, one can easily calculate a meaningful result. The percentage change in implied volatility relative to the benchmark is calculated by dividing CAV by the total number of days included in the event window. This calculation, Δ implied volatility = $8.725/81 = 11\%$, shows an increase in the implied volatility for local elections which is marginally significant at the 5% level. In contrast, federal elections show an implied volatility increase of 35% over the same period (1% significance). When the federal election category is sub-divided into presidential and midterm

categories the ordinal effects are expected, while the magnitude is surprising. Presidential elections increase volatility by 43% while midterms increase volatility by 27%, both significant at the 1% confidence level. The implied volatility increases 36% (1% significance) during peace time elections, while volatility increases 15% (5% significance) for elections during war. All six election categories exhibit a significant volatility increase, with the CAV magnitude indicating the importance of each category. The results of Panel B confirm that elections increase the equity volatility of military contractors due to political uncertainty.

Panels C yields interesting results that deviate from the volatility observed around parliamentary elections. While the post-election CAV observed by Białkowski et al. (2008) is large and significant, in my results, only the presidential election category is associated with a large (37%) and significant (1%) volatility increase following the election. As suggested by Białkowski et al. (2008) elevated CAV in the post-election period is likely due to uncertainty associated with forming a government. To the extent that political uncertainty informs equity volatility, the high volatility following a presidential election is likely a result of greater political uncertainty when the executive branch is involved. Many presidentially appointed positions are likely to materially impact military contractor firms growth opportunities. Cabinet positions including the Secretaries of: State, Defense, Army, Navy, Air Force, and Energy all require Congressional approval so are often in flux for weeks or months following a presidential election. This result shows that political uncertainty translates directly to equity volatility for military contractor firms.

The US presidential results support the Białkowski et al. (2008) conclusions, but the local and midterm elections show no evidence of CAV following the elections. This result is consistent with the notion that political uncertainty is resolved by elections which is quickly

reflected in reduced equity volatility. Since local and midterm elections typically lack this degree of secondary uncertainty, the CAV in these categories is not elevated post-election. These differences are presented more rigorously in the H₂ results. Figures 18-21 provide a graphical depiction of the results in Table VI.

[Figures 18 - 21 about here]

While the international elections of Białkowski et al. (2008) did not show elevated CAV in the pre-election period, the CAV of US military contractors is consistently higher pre-election than post-election. Panel D of Table VI shows that the pre-election event window is responsible for most of the volatility increase observed in the symmetric event window results reported in Panel B. The pre-election implied volatility increase is consistently greater than the percentage increase in implied volatility over the symmetric event window. Each election category shows significant CAV more than two weeks (10 trading days) prior to the election date. In the (-40, 0) window, the CAV is even greater. Only the local category shows a marginal volatility increase of 14.7%, significant at 5%. Federal elections show a 50% increase in volatility which is significant at 1% confidence prior to the election. This effect remains consistent across both presidential and midterm election categories and is significant at 1%. By contrast, the international elections – which are overwhelmingly parliamentary – do not exhibit a volatility increase prior to the election date. This is consistent with the notion that parliamentary elections are only the first step to resolving political uncertainty since coalition governments may take weeks or even months to form.

The substantial difference regarding the timing of the amplified equity volatility is a consequence of the channel for resolution of political uncertainty. Since a two-party political system results in more limited outcomes, firm-level expectations can be more readily assessed

ahead of elections. Given the vast array of possible coalition governments resulting from a parliamentary system, it may not be practical for investors to assess politically contingent firm-level growth opportunities ahead of elections. I find that the timing of increased volatility is a function of the specific nature of political uncertainty. My results reinforce the extant literature illustrating the linkage between political uncertainty and equity volatility.

6.2.2. Differences Between Election Categories (H_2)

The results presented in Table VI indicate that volatility is a function of the election category. Since the magnitude of CAV differs by election category, I use CAV presented in Table VI to calculate the election category differences presented in Table VII. The statistics for these tables are based on the bootstrapped distribution shown in figure 15. Panel A of Table VII provides the difference in CAV between the two election categories over symmetric election windows extending to a maximum of (-40, 40). The CAV differences presented in Panels B & C of Table VII are based on the values from Panels C & D of Table VI. These results present strong evidence to support each of the three sub-sections of H_2 .

[Table VII about here]

6.2.2.1. Federal Versus Local Elections (H_{2a})

The first column in Panel A of Table VII presents the differences in CAV employed to test H_{2a} . I subtract local CAV from federal CAV to show that implied volatility is 24% higher for federal than local elections, significant at the 5% level. The fact that federal elections produce more equity volatility than local elections is not surprising but the magnitude of the difference is substantial. This evidence yields strong support for H_{2a} , suggesting that federal elections produce greater CAV than local elections.

The pre and post-election windows facilitate a nuanced analysis of the volatility dynamics. The first column of Panel B, Table VII shows no significant difference between the CAV of federal and local categories in the weeks after the election. Thus, the post-election volatility profile is similar for these election categories, consistent with the notion of elections resolving the political uncertainty related to growth opportunities of military contractors. However, Panel C shows that federal elections exhibit 35% greater volatility (5% significance) than local elections in the two months leading up to Election Day. This volatility ahead of the election is consistent with the notion that the US two-party system limits potential outcomes sufficiently to allow investors to analyze and trade ahead of the election, because political uncertainty is resolved in a predictable manner. These results reinforce the H_1 findings: political uncertainty shows a positive relationship with equity volatility. The CAV difference between federal and local elections is illustrated in figure 22, to better convey these results.

[Figure 22 about here]

The federal election category is further sub-divided into presidential and midterm elections to measure differentially impact of these election categories on volatility. In addition to the results presented in column one of Panel A of Table VII, I also test the difference between each sub-divided federal category and local elections. The volatility difference is more prominent when presidential CAV is compared to local elections CAV. During presidential elections, column three of Panel A shows that the implied volatility increases 32% above that of local elections, significant at the 1% level. However, column four of Panel A shows that midterm elections have only a 16% volatility increase over local elections, significant at the 5% level. Both midterm and presidential elections produce significantly greater volatility than do local elections but the effect is stronger for presidential elections. Even after controlling for the week

of the year, day of the week, the fact of an election, and near-perfect matching firms, I find that both presidential and midterm elections are associated with amplified equity volatility. Therefore, H_{2a} is confirmed. The CAV differences between these election types are illustrated in figures 24 and 25.

[Figure 24 and 25 about here]

6.2.2.2. Presidential Versus Midterm Elections (H_{2b})

The prior results are consistent with the notion that presidential elections substantially increase volatility, while midterm elections are associated with less political uncertainty so generate a smaller change in volatility. To quantify this difference, I compare the CAV of the election categories. Column two of Panel A shows that presidential elections are associated with only 15% greater implied volatility than midterm elections. However, this difference only approaches a marginal level of significance ($p\text{-value} = 0.12$) over the $(-40, 40)$ window so pre and post-election analysis is required to better understand the volatility dynamics.

The results in column two of Panel B show that presidential elections produce 33% higher volatility than do midterm elections, significant at the 5% level. However, the column two of Panel C results show that the pre-election window has only a miniscule 0.1% volatility difference, which is obviously not significant. This further supports the notion that presidential elections produce greater volatility following the election as the secondary political positions are nominated by the president and the Congressional confirmation process begins. This lingering political uncertainty translates to equity volatility as military contractors are sensitive to the identity of these key decision makers.

While conventional wisdom and much literature suggests that presidential elections matter vastly more than midterm elections, my results show that they exhibit substantial

similarities. Presidential and midterm elections both show 35% higher volatility (5% significance) than local elections in the eight weeks leading up to the election. There is little difference between midterm and local elections in the eight weeks after the election. However, presidential elections are associated with 30% higher volatility (5% significance) than local elections in the eight weeks following the election. As such, while support for H_{2b} in the symmetric event window is marginal at best, there is good evidence for H_{2b} in the post-election window. This result shows that political uncertainty ahead of the two election categories is associated with a similar effect on volatility but the post-election political uncertainty is different. The only plausible explanation is that equity volatility is positively related to political uncertainty. Figure 23 illustrates the CAV difference between presidential and midterm elections.

[Figure 23 about here]

6.2.2.3. War Versus Peace (H_{2c})

This hypothesis tests the notion that equity volatility around elections depends on the fact of military conflict. I compare the relatively peaceful period before 9/11 (1989-2000) with the sustained period of war after 9/11 (2001-2012). The results in column five of Panel A show that the equity volatility of military contractors is 22% less during war than during peace, significant at the 5% level. While it is tempting to assume that war always increases political uncertainty, this may not be so. However, the results show greater volatility during peace which supports the sole super-power discretion hypothesis. Figure 26 illustrates the CAV difference between post-9/11 and pre-9/11 elections.

[Figure 26 about here]

The time period analysis shows greater peace time volatility in Panel A but the dynamics around the election shows more detail. In column five of Panel B of Table VII, the difference between elections held in peace or war is 34% lower post-election volatility (5% significance) during war. This may indicate that US voters produce authoritative resolution of political uncertainty connected to the critical issue of armed conflict. This notion is consistent with the nation falling in line behind the leadership of the commander-in-chief during a time of war, regardless of individual political views. In Panel C, there is no substantial pre-election volatility difference between war and peace. This indicates that pre-election CAV is always elevated regardless of the fact of war. Once again, these results are consistent with the notion that equity volatility is positively related to political risk.

6.2.3. National Security and War Index (H₃)

My third hypothesis tests the proposition that political uncertainty regarding national security and war is linked with the equity volatility of military contractors. If political uncertainty does cause an increase in equity volatility, the difference should be most apparent between the highest and lowest quartiles of the Baker et al. (2013) national security and war uncertainty index. These results provide overwhelming evidence that national security and war uncertainty in the month of September predicts equity volatility throughout the four months surrounding federal elections. These results confirm a strong positive relationship between political uncertainty and equity volatility. I include Table VIII and corresponding figures to provide the raw CAV values for the quartiles, but the discussion is focused on the differences between these quartile results. Figures 27-29 illustrate the CAV for high and low uncertainty index quartiles of federal election categories.

[Table VIII about here]

[Figures 27- 29 about here]

The differences between the index quartiles are presented in Table IX. As expected, federal elections with a high level of national security and war uncertainty show much greater volatility than elections with low levels of uncertainty. The implied volatility for federal elections is 134% greater (1% significance) for the top quartile than for the lowest quartile. Since there are 12 federal election cycles, the top three are compared to the bottom three. However, with six each of presidential and midterm elections, I compare the top two to the bottom two, resulting in smaller differences between the national security and war index values. As an artifact of the sample sizes, the implied volatility is lower when the federal category is sub-divided into presidential (106%) and midterm (67%) elections, although it remains significant at the 1% level for each. These exceptionally strong results demonstrate the utility of the Baker et al. (2013) national security and war index as a predictive measure. These results provide compelling evidence that political uncertainty drives equity volatility.

[Table IX about here]

Importantly, local elections do not follow a similar pattern. In fact, local elections exhibit CAV that is 43% less for the highest uncertainty quartile (1% significance) than for the lowest quartile. Consistent with mean reversion, when *index* value is among the top quartile, it is expected to decline in subsequent months. While a bottom quartile *index* value is expected to increase in subsequent months. If the national security and war uncertainty index is positively related to equity volatility, then any event window with an inconsequential or even a marginal event, should exhibit mean reversion of equity volatility along with the *index*. This pattern of mean reversion is well illustrated in figure 30. Additionally, given the mean reversion of the *index* value, the extreme results for federal, presidential, and midterm elections would be even

greater without this bias. Effectively, the mean reversion induces a bias against finding significant differences between quartiles. The fact of such overwhelming results despite this bias suggests an extremely strong positive relationship between political uncertainty and equity volatility of military contractors.

[Figure 30 about here]

Panels B & C of Table IX show that the CAV differences are large and significant in both pre-election and postelection windows. As noted previously, in contrast to parliamentary elections, the pre-election volatility is consistently greater than post-election. While the 168% pre-election implied volatility increase is more pronounced than the 102% post-election volatility increase, both are extreme differences and significant at the 1% level. This general pattern holds for both presidential (118% vs. 97%) and midterm (86% vs. 48%) elections, all significant at the 1% level. This shows that elevated uncertainty in September is not only associated with pre-election volatility but is also predictive of post-election volatility. The national security and war index value may link highly uncertain elections with period of extended equity volatility resolution. Once again, these results are consistent with the notion that political risk dictates equity volatility. Figures 31-34 illustrate the CAV differences between high and low uncertainty index categories.

[Figures 31- 34 about here]

6.2.4. Share of Sales to the Military (H₄)

My fourth hypothesis test is structured to determine if the strength of a military contractor's business relationship with the government impacts the firm's equity volatility. I test for evidence of channels linking political risk to equity volatility. There are two plausible routes by which political influence may impact the firm. Under the regulatory capture theory, the share

of sales to the military mitigates equity volatility around elections because firms which derive a high portion of revenue from military contracts will purchase political influence regardless of the election winner.²⁸ Under the alternative political risk hypothesis, the share of sales to the military increases volatility around elections due to the political risk of gaining or losing access to military contracts. This is an empirical question tested using the *share* variable from the SIPRI data. These results provide only weak and inconsistent support for the regulatory capture explanation. Much like with H_3 , for H_4 , I include Table X and corresponding figures to provide the raw CAV values for the quartiles, but the discussion is focused on the differences between the quartile results. Figures 35-38 illustrate the CAV for high and low share of sales to the military (*share*) quartiles.

[Table X about here]

[Figures 35 - 38 about here]

Table XI presents the differences between the *share* quartiles. In column one of Panel A of Table XI, the (-40, 40) event window for federal elections shows military contractors with the highest share of sales to the military (top quartile) have 29% lower volatility (1% significance) than firms among the lowest *share* quartile.²⁹ In all columns and panels of this table, the military contractors with the highest share of sales to the military exhibit less volatility around elections. However, these results are inconsistently significant. In the symmetric event window of Panel A, with a 48% lower volatility for the top *share* quartile, only midterm elections show significance

²⁸ As suggested by Dr. Dorn, politicians could also be influenced by a large firm employing voters in their Congressional district. While I lack the data to directly account for this, my robustness checks include a proxy for the size of the firm. Since firm size is positively correlated with the number of voters employed, the robustness regressions may better isolate the effects of the share of sales to the military.

²⁹ As suggested by Dr. Kim, I could use only the largest firms in this analysis since they are more likely to exert real political influence via stronger political connections. This will be tested post-dissertation defense. Thank you.

at the 1% level. Local elections show 19% lower volatility for the top *share* quartile, but this is marginal (10% significance). Interestingly, the presidential results do not show a significant difference in CAV between the *share* quartiles. Since all firms may be substantially impacted by presidential elections, this result remains inconclusive without the context of a reference study that provides equity volatility dynamics for all types of firms. Since only the midterm elections are associated with lower volatility for the most focused military contractors, there is not a clear finding for H_4 .

[Table XI about here]

Overall, there is only marginal or inconsistent evidence that firms with a high *share* of sales to the military exhibit reduced equity volatility around elections. The limited evidence, such as it is, provides only a weak support for the regulatory capture hypothesis. Since literature suggests that elections induce volatility throughout the market, a firm conclusion about regulatory capture cannot be made given these results, without information about the equity volatility response of non-military contractors to presidential elections. Another possible explanation for this inconclusive result is the absence of a good control for endogeneity. Unfortunately, this is a problem since the percentage of sales to the military and the firms' exposure to political uncertainty via the political lobbying channel may be simultaneously determined. To the extent that firms can redirect assets to growth opportunities unconnected to politics, this endogeneity will create a bias against finding significant equity volatility differences, between high and low share firms. As such, this bias makes finding equally of volatility between the groups more likely rather than less. In the robustness check section, I address this issue in greater detail using *share* as a variable in the cross-sectional regressions but

find similar inconclusive results. Figures 39-42 illustrate the CAV differences between the high and low share categories.

[Figures 39 - 42 about here]

6.2.5. Daily Volatility Profile (H_5)

I present a simple piecewise daily equity volatility model which explains a substantial portion of military contractors' daily volatility in the months around elections. This model provides strong evidence of a distinct volatility profile around elections. For every election category, consistent with the image displayed in figure 4, I find that daily volatility increases in the weeks leading up to an election, declines sharply at the election, and is non-positive in the weeks following the election. This pattern emerges in all election categories and is particularly prominent in elections associated with elevated uncertainty about national security and war policy. My parsimonious model is predictive of equity volatility around elections.

Models of the daily volatility measure by election category, $M_{t,c}$, during the election window (-40, 40) are presented in Table XII. In Panel A, I provide mean and median volatility measures in the symmetric event window, the pre-election window, and the postelection window to provide a reference level of for volatility. The top line of Panel A, shows that mean daily volatility is greater than the baseline volatility over the four months around all election categories, significant at the 1% level except for the post 9/11 period (5% significance). Since the volatility measure follows a chi-square distribution, typically the mean volatility exceeds the median due to the right skew. Both of these averages are included to demonstrate that despite this skew, the high volatility outliers are not driving the results. For each election category, the pre-election volatility exceeds the postelection volatility as suggested by the results presented in

$H_1 - H_4$.

[Table XII about here]

The essential daily equity volatility model findings are presented in Panel B of Table XII. The α values are the four time point volatility measures and the β values are the two time trend volatility measures displayed in figure 4. The key finding of this table is the clear evidence of a distinct volatility profile in the four months around elections.

The top line of Panel B provides the daily volatility 40 days prior to the election date. A full two months before the election, volatility is typically near the benchmark level of one, except in the case of midterm elections where the volatility is 34% higher than the benchmark and significant at the 1% level. This top line generally indicates that daily equity volatility at the beginning of the traditional campaign season is near the benchmark level of volatility. However, the elevated volatility in midterm election years may suggest that daily volatility begins to increase before early September or confounding events such as the Gulf War in 1990 produce this result. Daily equity volatility measures near one suggest that a (-40, 40) event window is sufficient to capture the majority of the volatility profile around elections.

Across all election categories, the second line of Panel B shows that the change in daily volatility, β , is positive and significant at the 1% level for all categories except midterm elections. In the presidential election category, volatility increases 2.5% every day over the 8 weeks prior to the election while local elections show a daily volatility increase of 1% per day. Again, Midterm elections do not seem to fit as they exhibit a volatility increase of only 0.8% per day. However, this may stem from the high starting value for daily volatility. If so, the midterm election daily volatility increase is likely an underestimate due to the high initial volatility level two months prior to the election. This unusual result for the midterm election requires more investigation but is not a critical flaw as it is qualitatively if not quantitatively similar to the other

results. This increase in daily volatility is consistent with the notion that investors accelerate trading on expectations ahead of US elections.

By the election date, line three shows that volatility is amplified across all election categories, significant at the 1% level. The magnitude of the daily volatility measures on election day is generally consistent with the prior hypotheses. In the presidential election category, volatility doubles, while midterms are associated with a 67% increase, and local elections show a 35% increase. To state this more succinctly, local elections increase volatility to a maximum of one third above the benchmark level, midterm elections double that, and presidential elections triple the volatility increase of local elections. I suggest that this result may be used as a rule of thumb to gage the relative importance of these election categories. Overall, this high daily volatility level across all election categories provides strong evidence of a positive link between political uncertainty and equity volatility. Volatility increases pre-election, leading to a significantly higher level of volatility on the election day, regardless of the election category.

A piecewise volatility model allows for volatility resolution on the election date and a new volatility time-trend post-election. The fourth line in Panel B indicates a drastic daily volatility decline at the election. In local and midterm elections, immediately after election results become public, the model shows daily volatility decline to just 13% above the benchmark level, only marginally significant at the 10% level. However, for the presidential election category, daily volatility declines substantially but still remains 50% above the benchmark level, which is significant at the 1% level. These results are consistent with the explanation of H_2 , that presidential elections are associated with greater volatility post-election because the second tier of decision makers awaits nomination and confirmation by Congress. It seems that in presidential

election years, there is an expectation that some real political uncertainty about the prospects of military contractors will be resolved during the “Lame Duck” session of Congress.

Over the two months following the election, line 5 of Panel B shows a daily volatility change that is non-positive. The daily volatility may slowly decline in the post-election period, but this daily decrease is not even marginally significant. By the time that Congress is sworn into office in early January, the daily equity volatility is indistinguishable from the benchmark volatility level. Considering the non-positive daily volatility time trend and the return to a benchmark level of volatility, whatever lingering political uncertainty following the election is substantially resolved over the subsequent two months.

The piecewise daily volatility model describes the equity volatility of military contractors in the months around elections. This model produces an adjusted R^2 value of 9% for the local election category and 36% for the federal election category. This yields strong evidence for a non-constant daily equity volatility profile, driven by political uncertainty. Again, I apply a similar approach in the robustness checks section to more explicitly detail the dynamics between political uncertainty and equity volatility, in the months around US elections.

6.3. Robustness Check Results

I present detailed robustness checks to support the findings of three hypotheses. All three employ firm-level volatility measures (5) to present a more fine-tuned volatility picture. However, they may be more susceptible to model misspecification due to the asymptotic adjustment used to construct $M_{i,c}$ from (6). The firm-level daily volatility measure, $\hat{Q}_{i,t,y}$ is employed in regressions to produce evidence for the national security and war uncertainty hypothesis, H_3 , and the share of sales to the military hypothesis, H_4 . Firm-level characteristics are included as control variables to isolate the effects of the *index* and *share* variables

respectively. The volatility profile hypothesis, H_5 , is also re-tested using the firm-level volatility approach. Tables XIII – XVII present results that reinforce my findings.

6.3.1. Robustness of National Security and War (H_3)

While the national security and war index value also serves as an annual fixed effect, a regression using control variables is used to explain the firm-level daily volatility variable, $\hat{Q}_{i,t,y}$. The results, presented in Table XIII, reinforce the findings of Table IX which provide evidence of a strong positive relationship between national security and war uncertainty in the month of September and CAV in the months around elections.

[Table XIII about here]

Table XIII presents results of regressions to explain the CAV of individual firms for each election category during the (-40, 40) election window. Regressions are run using the widely used firm-level control variables leverage, ROA, Tobin's Q, and firm size to help isolate the impact of the national security and war index. The overall model fit is strong, with the F-values significant at 1% in all cases and the adjusted R^2 values exceeding 10% for all federal elections. The market to book ratio is inversely related to CAV around federal elections at 1% significance. This indicates that low growth opportunities are associated with amplified political sensitivity, which translates to increased equity volatility. The positive relationship between size and CAV suggests that larger firms have greater equity volatility around elections. This may be an artifact of larger military contractors having more at stake during election season. Ultimately, these firm-level controls are used to isolate the impact of the key variable of interest, *Index*.

The September national security and war index value is a strong leading indicator of military contractors' equity volatility around elections. In presidential election years, each index point increases CAV by 3.0%, significant at 1%, while midterm years remain significant at 5%

but only increase CAV by 0.6% per index point. These results are consistent with the notion of greater political uncertainty leading to elevated equity volatility. In local elections, the inverse relationship between the index and CAV is easily explained by mean reversion. Since local elections should have little effect on equity volatility via political uncertainty, above average levels of national security and war uncertainty should decay while below average should increase during local election years. This is exactly the result that is observed, significant at 1%. Additionally, mean reversion of the national security and war index creates a bias against finding a positive relationship between CAV and the index. Since a positive relationship during federal election years is identified, these results are even more impressive. Therefore, the national security and war uncertainty hypothesis has very strong support. The national security and war index presents a strong link between political uncertainty and equity volatility.

6.3.2. Robustness of Share of Sales (H_4)

Since a quartile analysis of CAV based on the share of sales to the military lack sufficient detail, *share* is included in regressions with firm-level control variables to show the effect on the firm-level daily volatility variable, $\hat{Q}_{i,t,y}$. This approach indicates the continuous effect of additional shares of sales to the military. The results, presented in Table XIV, fail to strengthen the weak support for the captured regulator hypothesis presented in Table XI. However, these results also fail to support the election risk hypothesis, leaving this issue unresolved.

[Table XIV about here]

Table XIV presents results of regressions to explain the CAV of individual firms for each election category during the (-40, 40) election window. Regressions are run using the widely used firm-level control variables leverage, ROA, Tobin's Q, and firm size to help isolate the impact of the share of sales to the military. The overall model fit is strong, with the F-values

significant at 1% in all cases and the adjusted R^2 values exceeding 35% for all federal elections. The market to book ratio is inversely related to CAV only in presidential elections at 5% significance. This provides some evidence that low growth opportunities are associated with amplified political sensitivity in presidential election years, which translates to increased equity volatility. The positive relationship between size and CAV suggests that larger firms have greater equity volatility around elections, significant at 1% in all categories except local elections where significance is at the 5% level. This may be an artifact of larger military contractors having more at stake during election season. Ultimately, these firm-level controls are used to isolate the impact of the key variable of interest, *Share*.

The share of sales to the military does not show a strong relationship to firm-level CAV. In fact, the coefficients are not even marginally significant and are not economically meaningful. The lack of a relationship between the share of sales to the military and CAV in presidential elections damages support for the election risk hypothesis. Due to the expected bias against differences between the categories, a better understanding of how political uncertainty impacts the volatility of non-military contractors is important. However, there is no support for the alternative regulatory capture hypothesis either. Given the inconsistent support for the regulatory capture hypothesis presented in table XI, conclusive evidence is lacking. As such, H_4 remains unresolved. A new approach with additional industry perspective will be required to elicit clear results for this hypothesis.

6.3.3. Robustness of Daily Volatility (H_5)

Table XV presents the volatility model results based on firm-level analysis over the (-40,40) election window. To prevent misspecification of the individual firm-year models, a non-negative constraint is imposed to ensure meaningful volatility values at each time point, as

shown in figure 4. This constraint reduces the model fit (10) to achieve valid volatility values, thus producing a bias against finding slope parameters, β , with large absolute values.³⁰ This firm-level analysis ensures that the volatility resolution on the election date is significant. As a robustness check it adds certainty that the variance in individual firm volatility does not preclude a significant result. These results reinforce the conclusions drawn from table XII by displaying a similar volatility profile.

Table XV presents mean and median firm-level volatility model parameters in Panels A and B respectively. The mean volatility 40 trading days before the election is not significantly different from the benchmark volatility for local elections while it is 20.7% higher for federal elections (5% significance), once again, this is driven by the midterm elections. The increase in daily volatility, β_{pre} , ahead of the election is consistent with the results presented in Table XII results for H_5 . The largest difference is in presidential elections where mean daily volatility increase is 2.5% on a pooled basis and 2.2% on a firm-specific basis. On election day, volatility declines sharply due to the resolution of political risk. This election day daily volatility resolution effect is 28% for Federal (1% significance) and 16% for local elections (5% significance). Just as with Table XII, immediately following the election, volatility remains elevated above the benchmark level. For Federal elections, it remains 30% above the benchmark level (1% significance) and for local, volatility remains 13% above (5% significance). In the 40 trading days following the election, volatility appears non-positive but with only marginal significance in the mean model results (the median do have significant negative values). At 40 trading days after the election, volatility has largely returned to normal levels with local elections

³⁰ In the unconstrained model, volatility time trends are more pronounced and the confidence interval is even greater.

only 3% higher (not significance) than the benchmark and federal only 12% higher (10% significance). These results reinforce the findings presented in Table XII, consistently showing the volatility profile as displayed in figure 4. This provides strong evidence in support of the election period volatility profile hypothesis.

Tables XVI and XVII provide additional robustness checks for the volatility profile based on the quartile analysis for H_3 and H_4 . These results show that the previously identified volatility profile is amplified when national security and war uncertainty is high, consistent with the conclusions presented in H_3 . The volatility profile is only marginally amplified for firms with a smaller share of sales to the military, consistent with the inconclusive results for H_4 . The results of these additional robustness checks provide extra support for the prior findings.

[Table XVI and XVII about here]

Chapter 7: Conclusions

To the best of my knowledge, this is the first study to document firm-level daily equity volatility profiles around all categories of US elections. My results demonstrate a powerful and pervasive link between political uncertainty and equity volatility. I find evidence that local, midterm, and presidential elections all significantly amplify the equity volatility of military contractors in the (-40, 40) election window. Local elections increase CAV by 11%, midterms by 27%, and presidential by 43%. This strongly suggests that midterm and even local elections play a role in shaping the growth opportunities for military contractors. While a large body of finance literature focuses on presidential elections, my analysis compares presidential, midterm and even local elections.

All the election categories exhibit generally similar patterns, with differences found mainly in the magnitude of the impact. I measure this link between equity volatility and political uncertainty for election categories: local, federal, presidential, midterm, peace, and war. Extant literature focuses heavily on presidential elections but my findings demonstrate that local and Congressional political uncertainty also substantially inform equity volatility. Local elections increase daily equity volatility by about one third over the benchmark volatility level, midterm elections by two thirds over the benchmark, and presidential elections typically double the daily equity volatility.

In contrast with equity volatility results from an international sample, US elections generate most of the equity volatility in the weeks ahead of the election, rather than after voting. I also compare the volatility of election categories. To highlight this results, I show that midterm and presidential elections produce quantitatively similar impacts on volatility ahead of elections, it is only in the post-election period that presidential elections generate substantially greater

(30%) equity volatility. This finding is explained by the political uncertainty tied to the presidential nomination and Congressional confirmation process. All elections generate a distinct daily volatility profile – as shown in figure 4 – which I model with a parsimonious function. My central contribution is quantifying the impact of political uncertainty on the equity volatility of military contractors, facilitating predictive applications around US elections.

My key predictive approach applies the Baker et al. (2013) national security and war uncertainty index to estimate daily equity volatility in the months around elections. For example, in the federal election category, the highest uncertainty index quartile exhibits 134% greater volatility than the lowest index quartile. In addition to predicting volatility, I validate the utility of this new index in a practical finance application.

These findings are important for academics and carry practical implications for the finance industry. In scholarly work, these findings may be most readily applied to finance, economics, and political science research. In the finance industry, my findings can be used to improve estimates for vega around elections.

Chapter 8: Future Research

As political uncertainty creates a differential impact on the range of industries, it is likely to produce an industry-dependent equity volatility response around elections. Even with this non-comprehensive sample of military contractors, there is a wide range of industries. The military contractor firms represent 19 two-digit, 47 three-digit, and 62 four-digit SIC codes. Perhaps more importantly, nearly half (23) of the 48 industry groups identified by Fama and French (1997) are represented. This disparate representation of industries makes any political dynamics focused on a particular industry or range of business issues difficult to discern.³¹ Additionally, the CRSP and Compustat datasets present serious challenges when attempting industry analysis, military contractor or otherwise.³² Despite the challenges of industry classification, since this collection of firms is based on sales to the military, it provides unique insight into the military contractor industry. An index of equity volatility around US elections by industry group would be useful in placing this military contractor research in context. Research using a pan-industry sample would provide a much broader understanding of the link between political uncertainty and equity volatility.

This equity volatility research could also be extended to show the impact of political uncertainty based on actual election results using voting data. This research could bridge the gap between political science and finance in such a manner to greatly inform both disciplines.

³¹ Question to WRDS: Is CRSP SICH better than Compustat SICCD? Answer from Ticket #632-8606050 on 1JUL13: It depends on your research goals. SICH is the historical SIC code, as opposed to header company data - e.g. the SIC code as it was at the time of the data date. Also, CRSP does not assign SIC codes themselves but takes them from the exchanges (NASDAQ, AMEX, etc.) In contrast, Compustat does put in some investigation on its own when assigning SIC codes. So, it would depend on whether you have greater faith in the exchange or Compustat. I use the CRSP SICH in this research as it provides data for each year.

³² Only 20% of firm-year observations have an exact match between the Compustat SICCD and the CRSP SICH. Again, this reinforces the difficulty of identifying military contractors by industry group.

Election results data for the House of Representatives, Senate, and presidential contests is available from various sources. However, one cannot clearly quantify the difference in firm growth opportunities associated with individual candidates or parties. The notion that one party is always better for defense contractors is an extremely strong assumption, so partisan research is a challenge. It is exceptionally impractical, if not impossible, to assign motivations for voting behavior. This is true among the general electorate and among elected politicians since bills often come with a bundle of riders and attachments. As such, it is extremely difficult to quantify the link between the political uncertainty and equity volatility based on voting data. While the obstacles to this type of research are serious, the implications are great.

The daily equity volatility profile presented in this research is a simple model. Of course, there may be superior models for daily volatility but is a topic for a future paper. Advanced models of daily equity volatility are better suited for dedicated model builders.³³ My simple daily volatility model demonstrates the existence of a volatility profile around elections and suggests the magnitude of the effect but does not definitively prove the best fit. An advanced model of daily volatility may substantially improve the profile.

Overall, my findings promise important practical applications for equity traders, options traders, and portfolio managers. Election categories are strongly associated with differential impacts on equity volatility. This is due to varying levels of political uncertainty which is largely predictable using the Baker et al. (2013) index. This leading indicator of volatility, may be exploited by options traders to improve Vega estimates during the months surrounding elections.

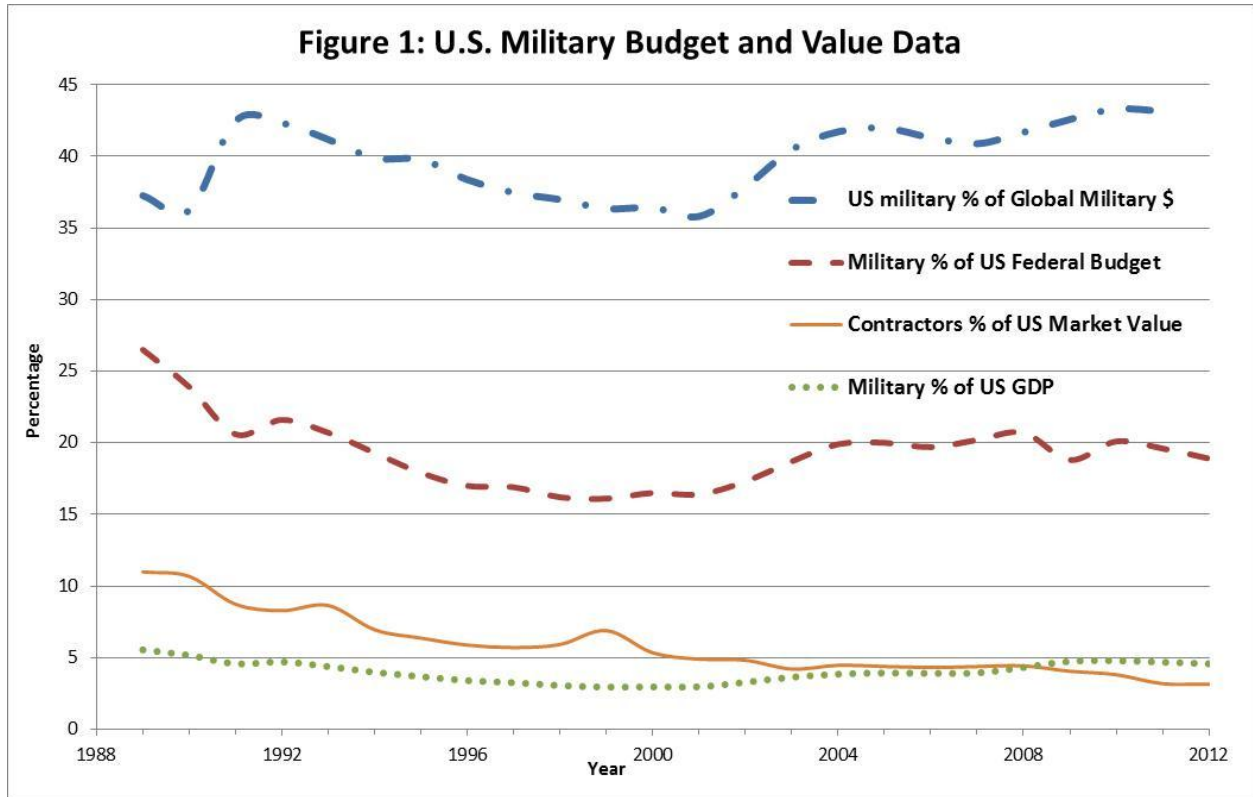
³³ For instance, the Chow (1960) test could be employed to detect a structural break at the election. However, since the Chow test does not determine timing of a break, the Bai and Perron (2003) technique may be superior. Additionally, one might model equity volatility with something more complex than a simple piecewise linear function. Some form of sigmoid, exponential, logarithmic, or other function may well produce a better fit.

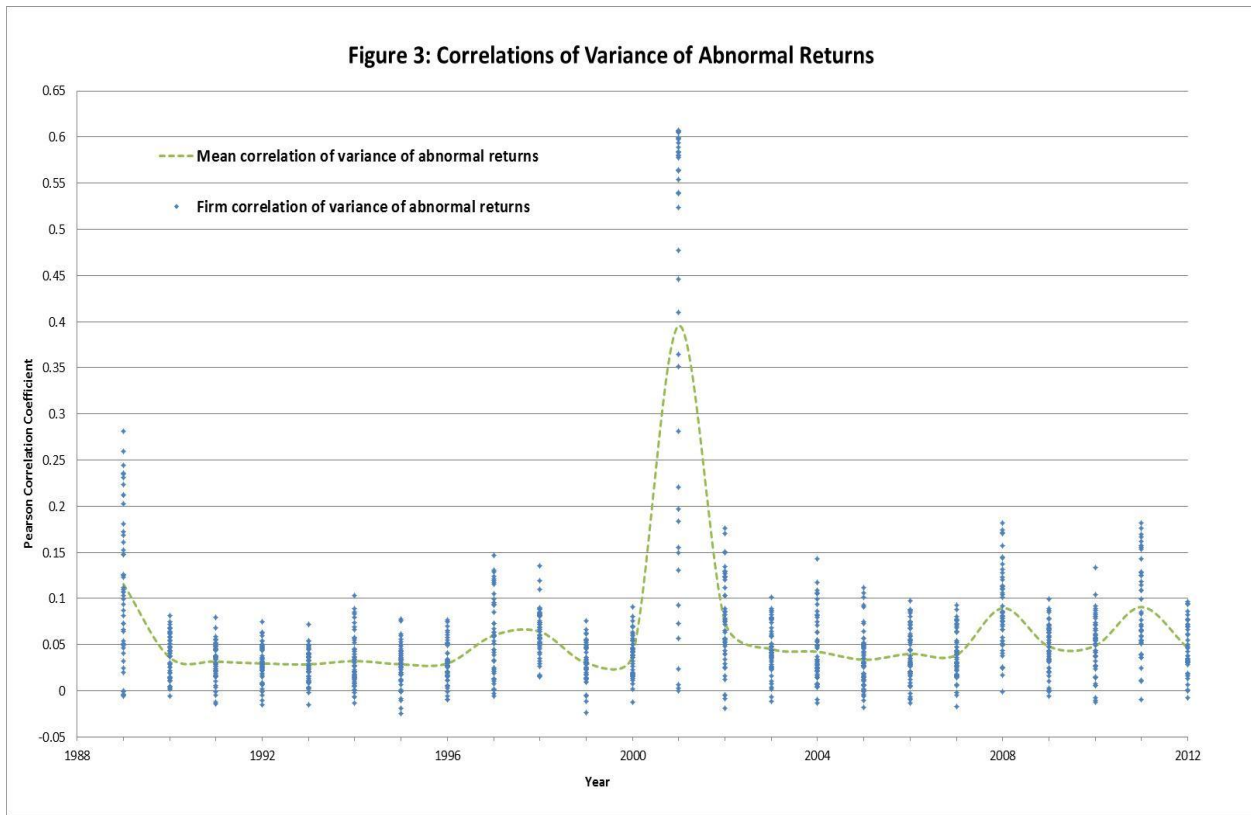
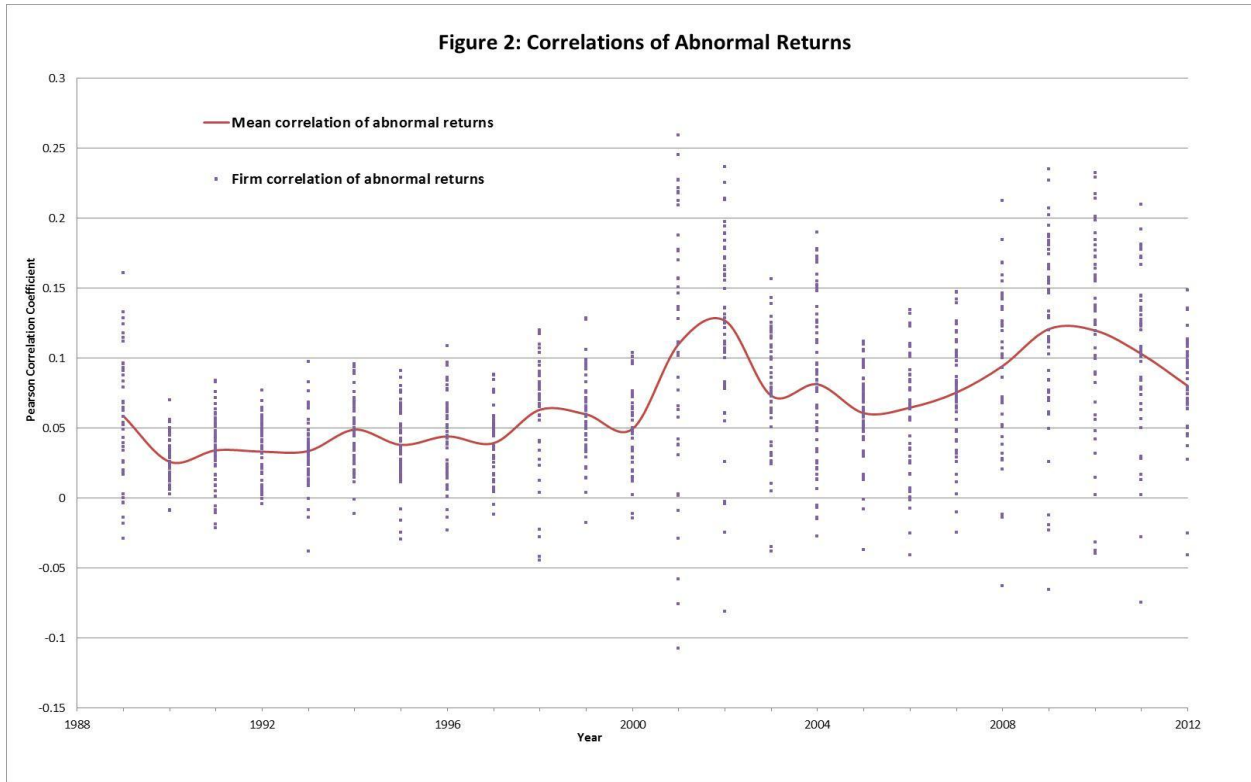
An election-season trading strategy for military contractors firms can be designed around these findings. This important contribution to the asset pricing of derivatives, might be most directly employed by informing trading band analytics. While these techniques typically rely on moving first and second moment analysis, the implications of my results facilitate a predictive component. For instance, equity volatility could be modeled using a Bollinger band, supplemented with an additional predictive term based on these results. This improved estimate of implied volatility should lead to more profitable trading performance around elections.

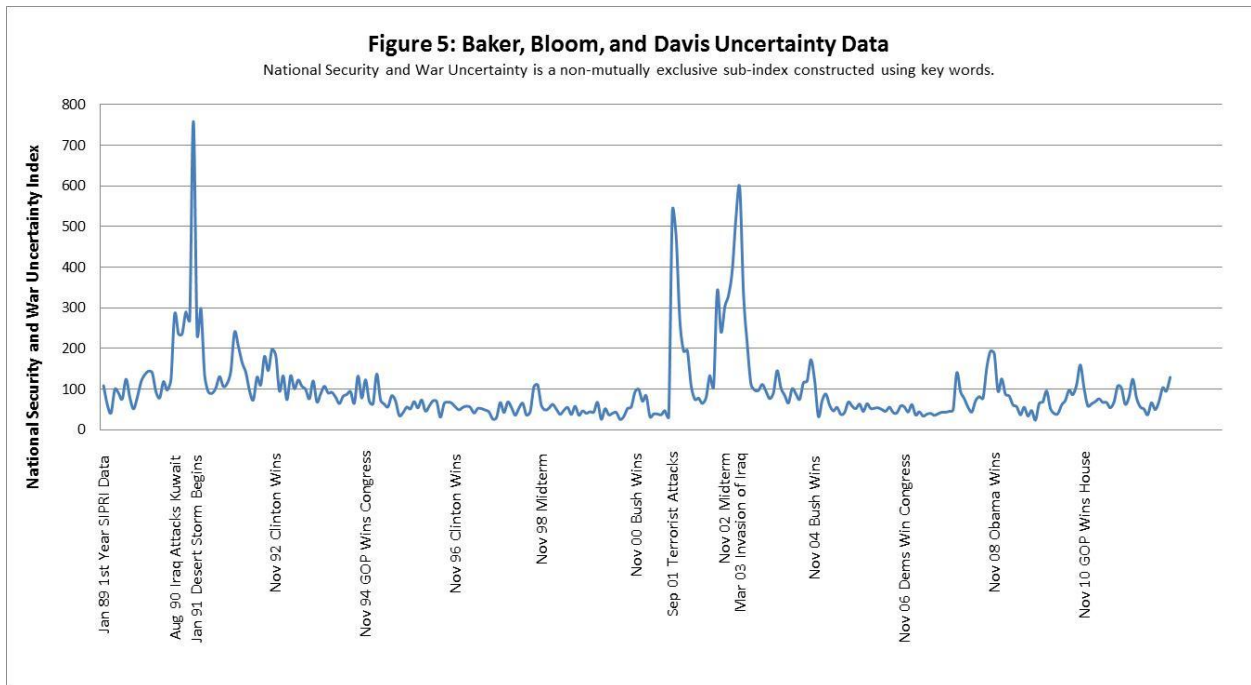
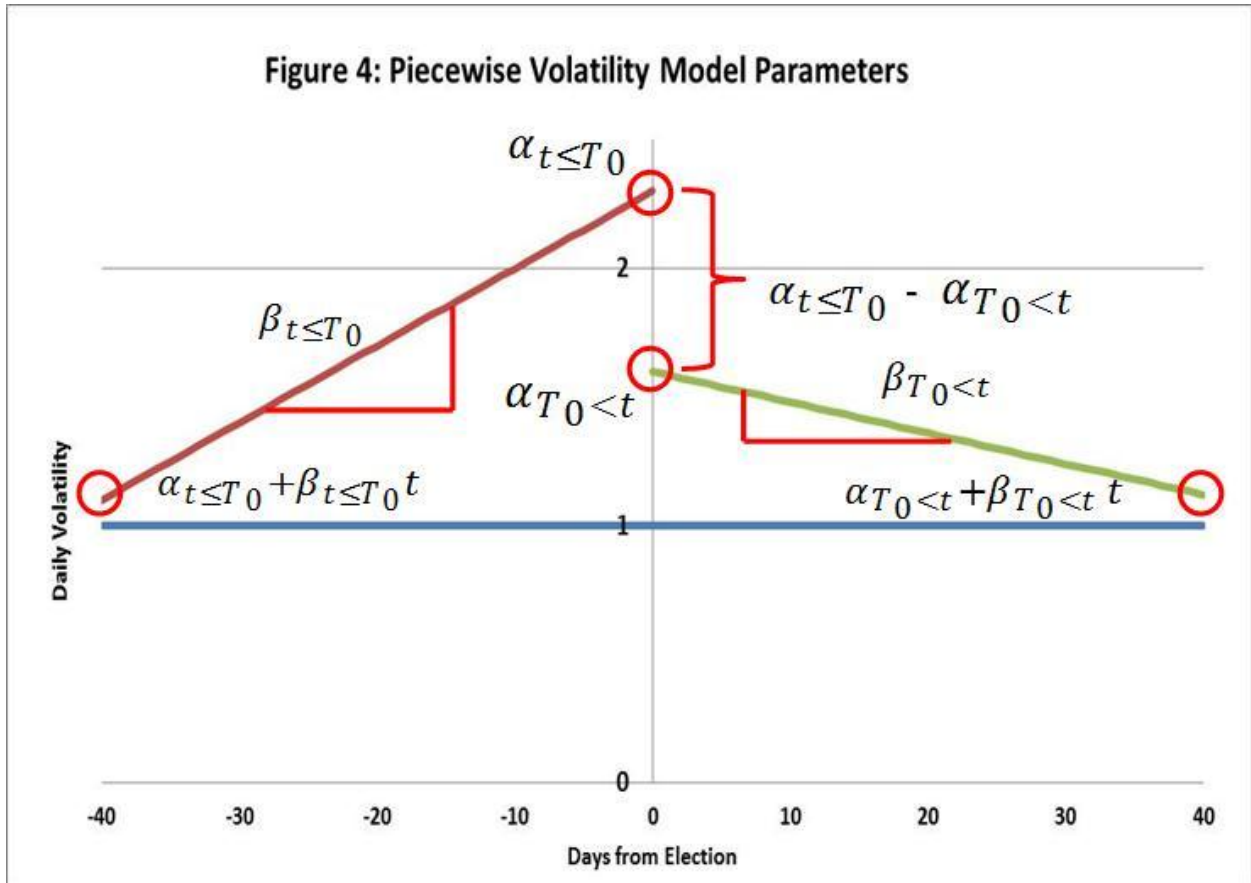
The relationship between political uncertainty and equity volatility may be a function of the time horizon.³⁴ While my research focuses on the link between political uncertainty and equity volatility in the months around elections, it could also be observed in greater detail using intraday data in the hours around election results. This may allow for greater analysis of partisan political influence on military contractor firms.

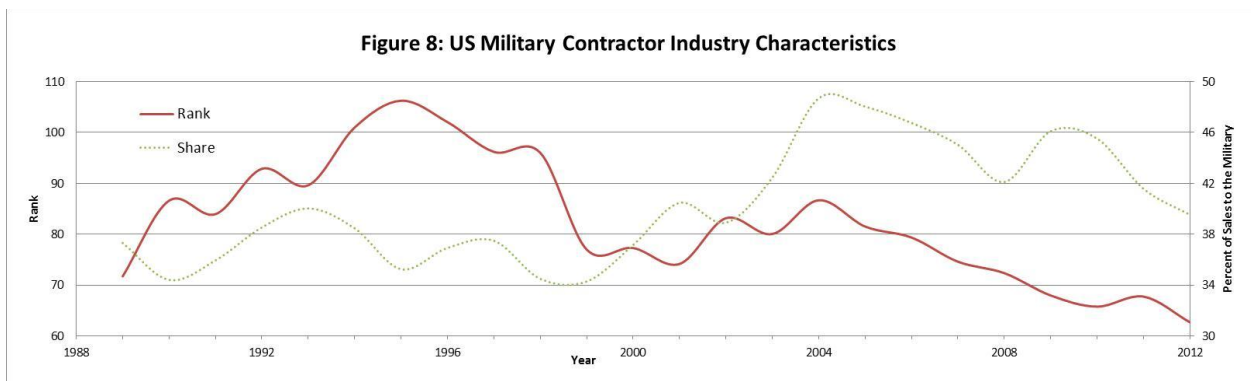
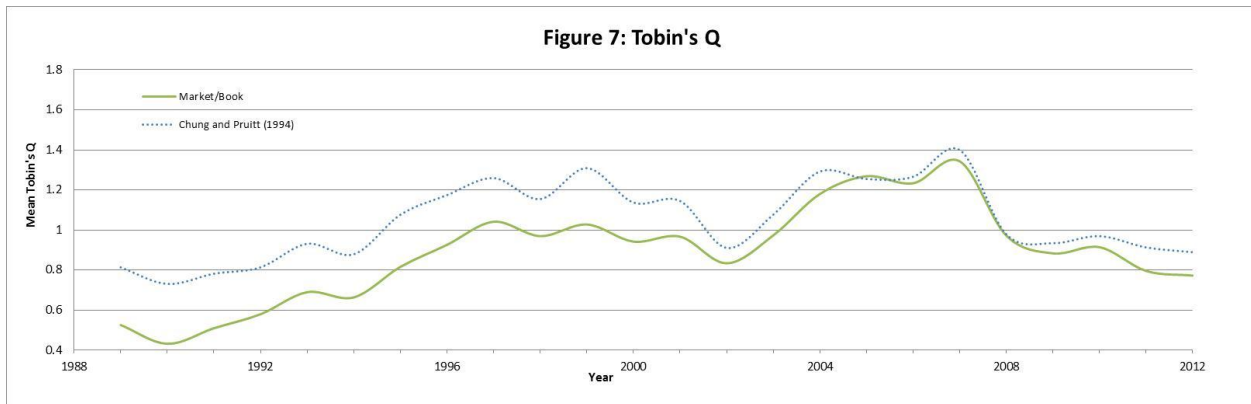
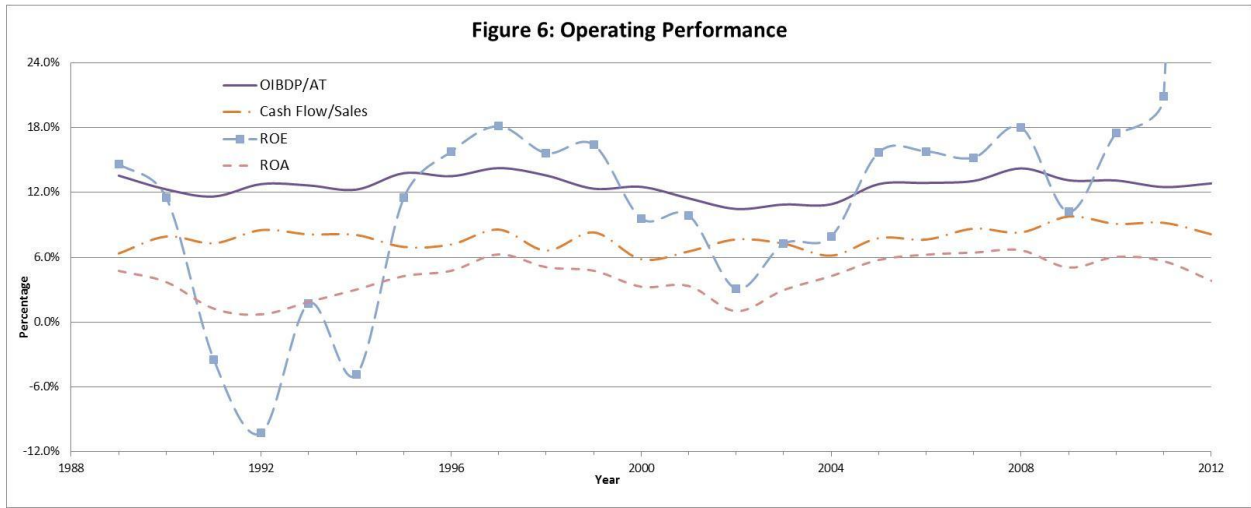
³⁴ I thank Dr. Dorn for advocating this approach to the political uncertainty and equity volatility dynamic.

APPENDIX A – DESCRIPTIVE FIGURES









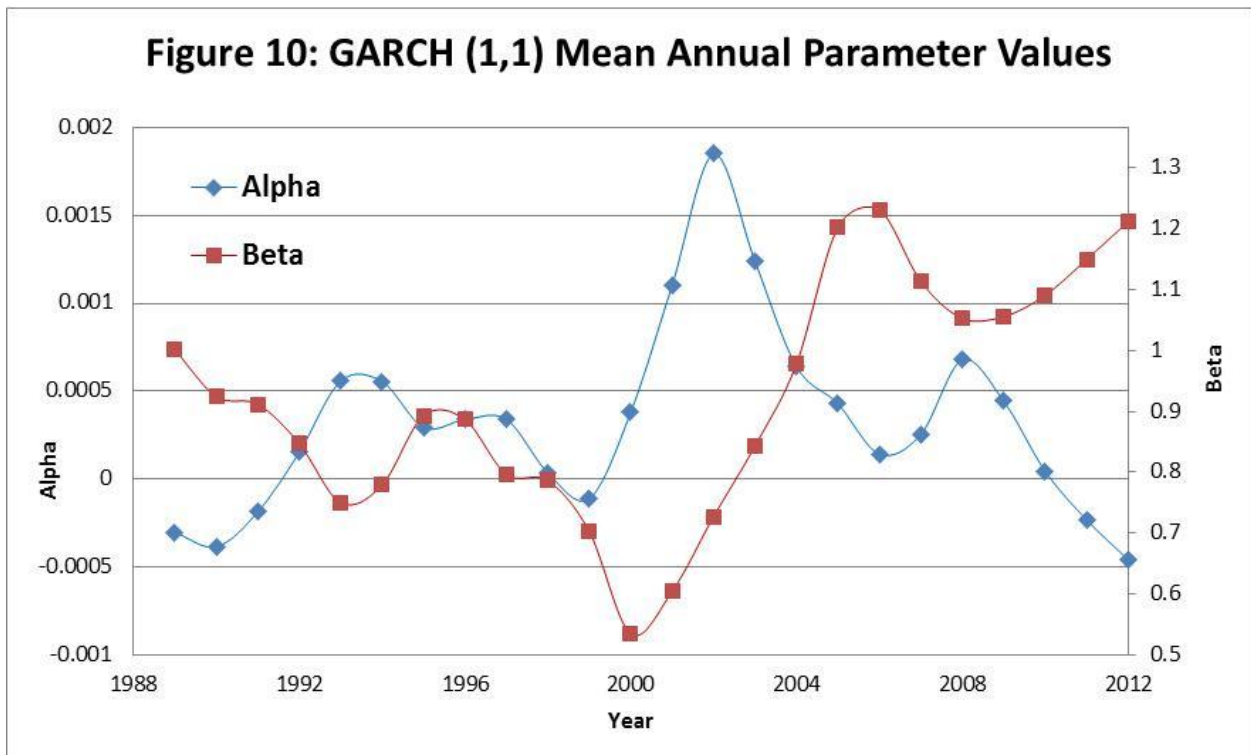
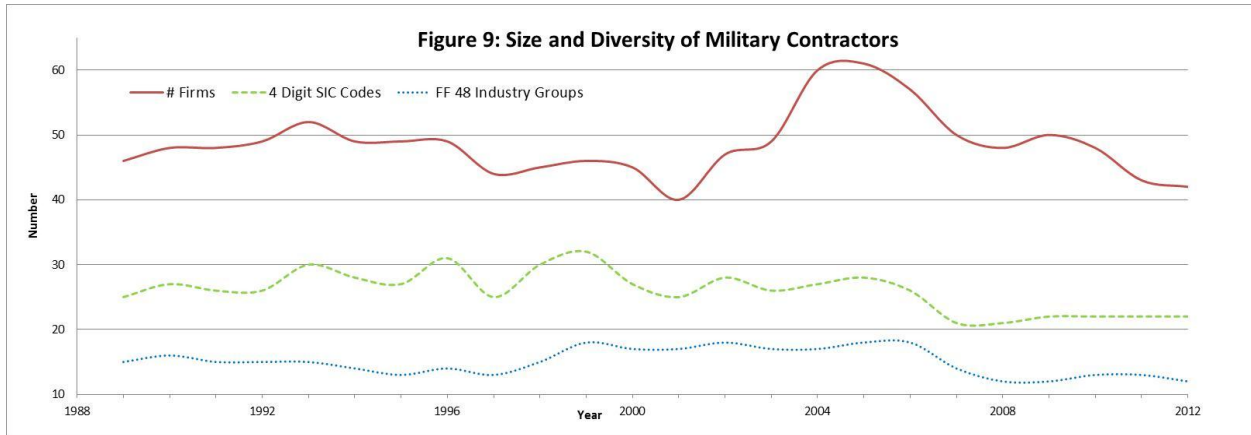


Figure 11: GARCH(1,1) Mean Annual Γ_0

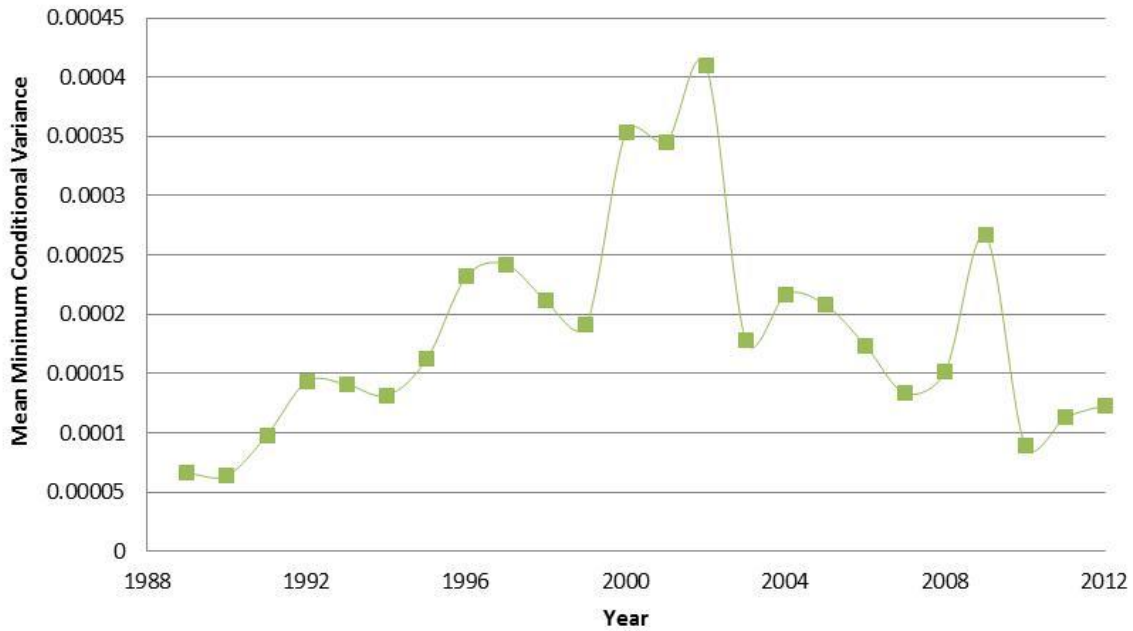


Figure 12: GARCH(1,1) Mean Annual Gamma Values

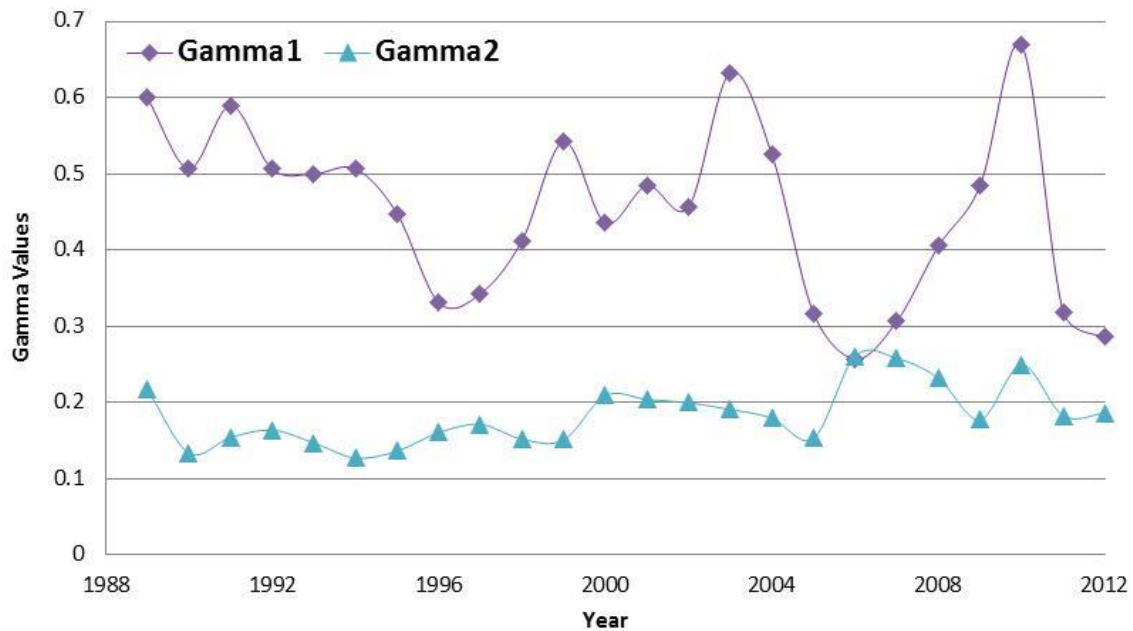


Figure 13: Selected CAV Critical Values (6000 days)

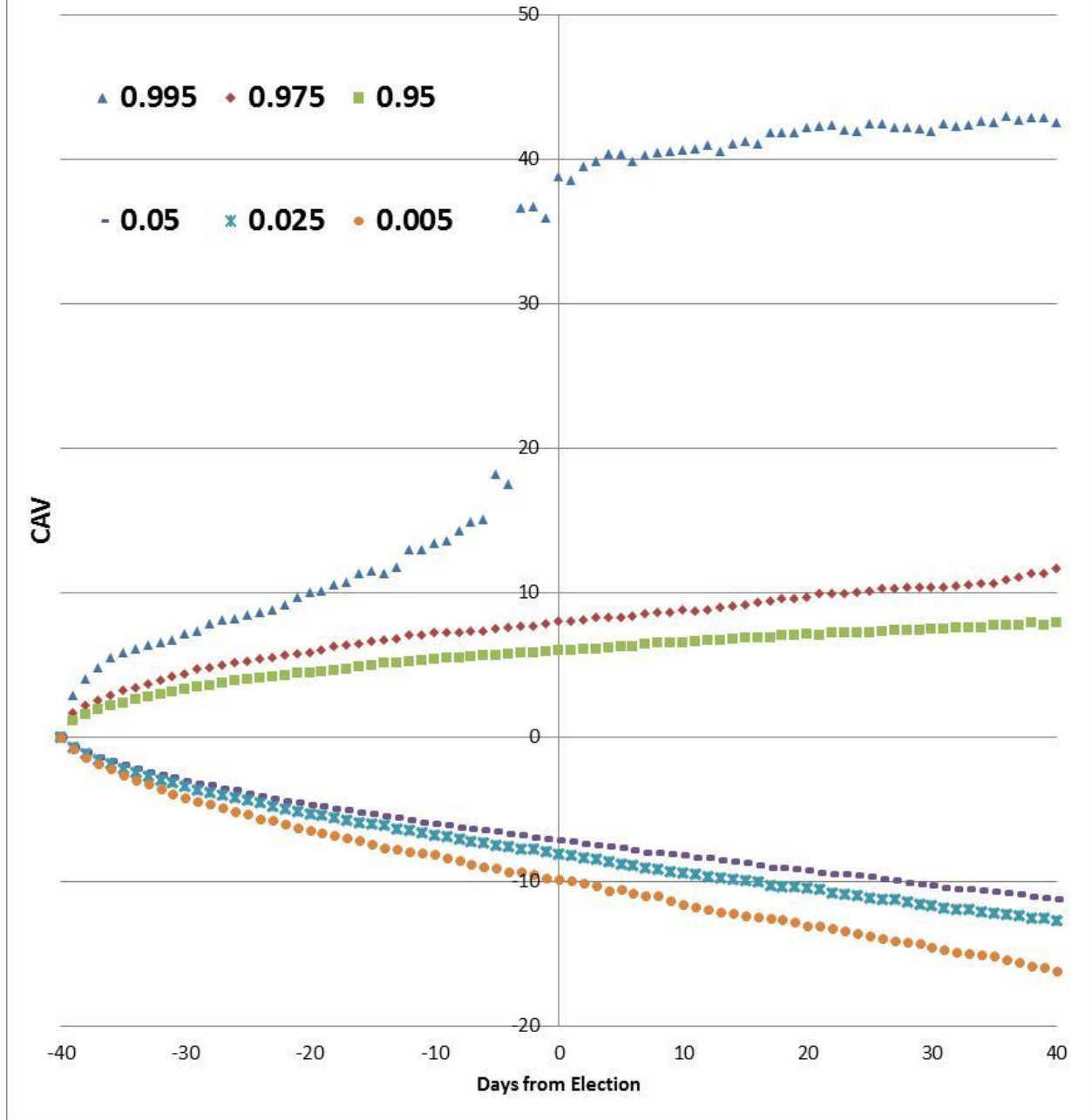


Figure 14: Selected CAV Critical Values Excluding September 17th, 2001 (5999 days)

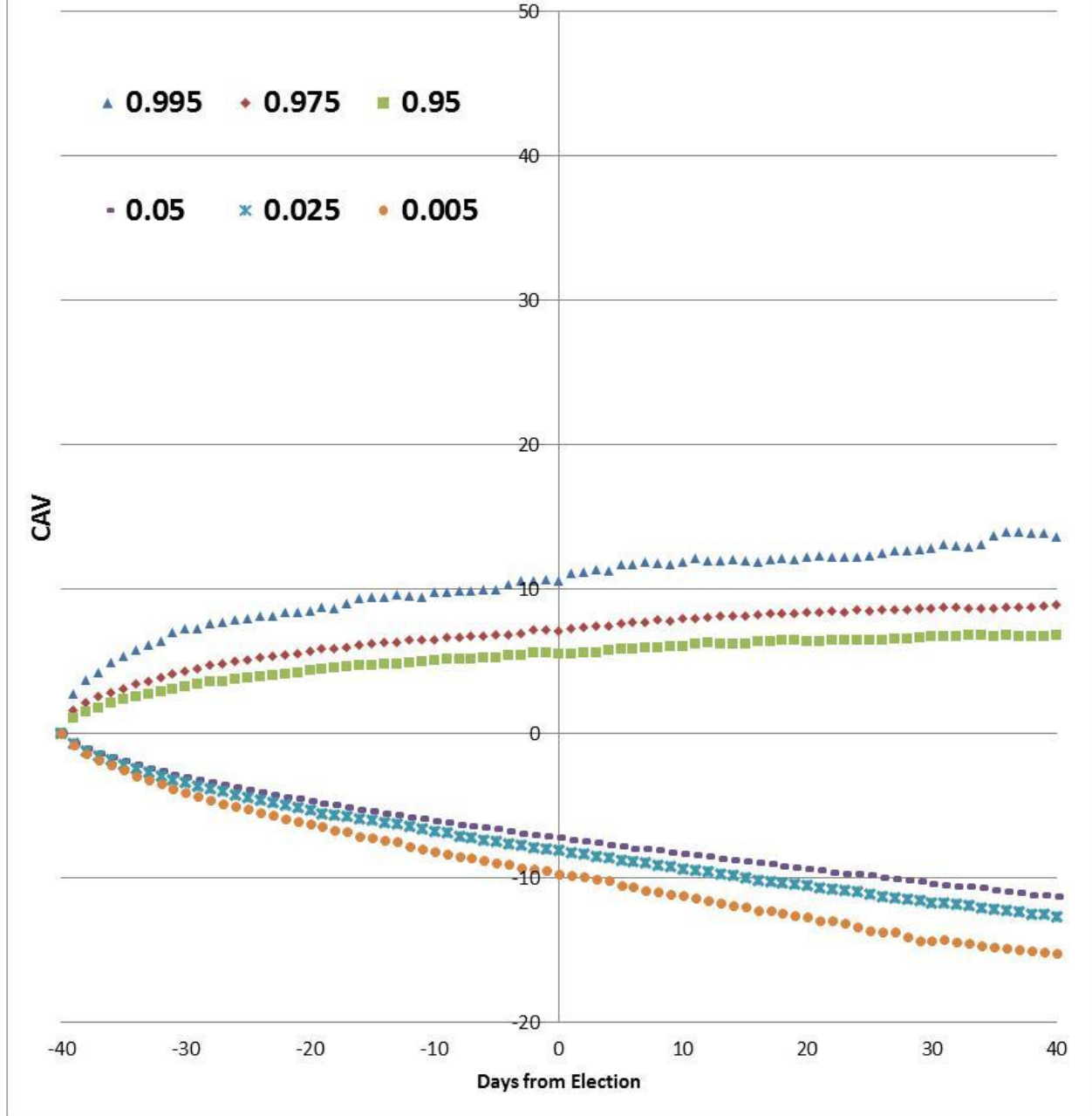
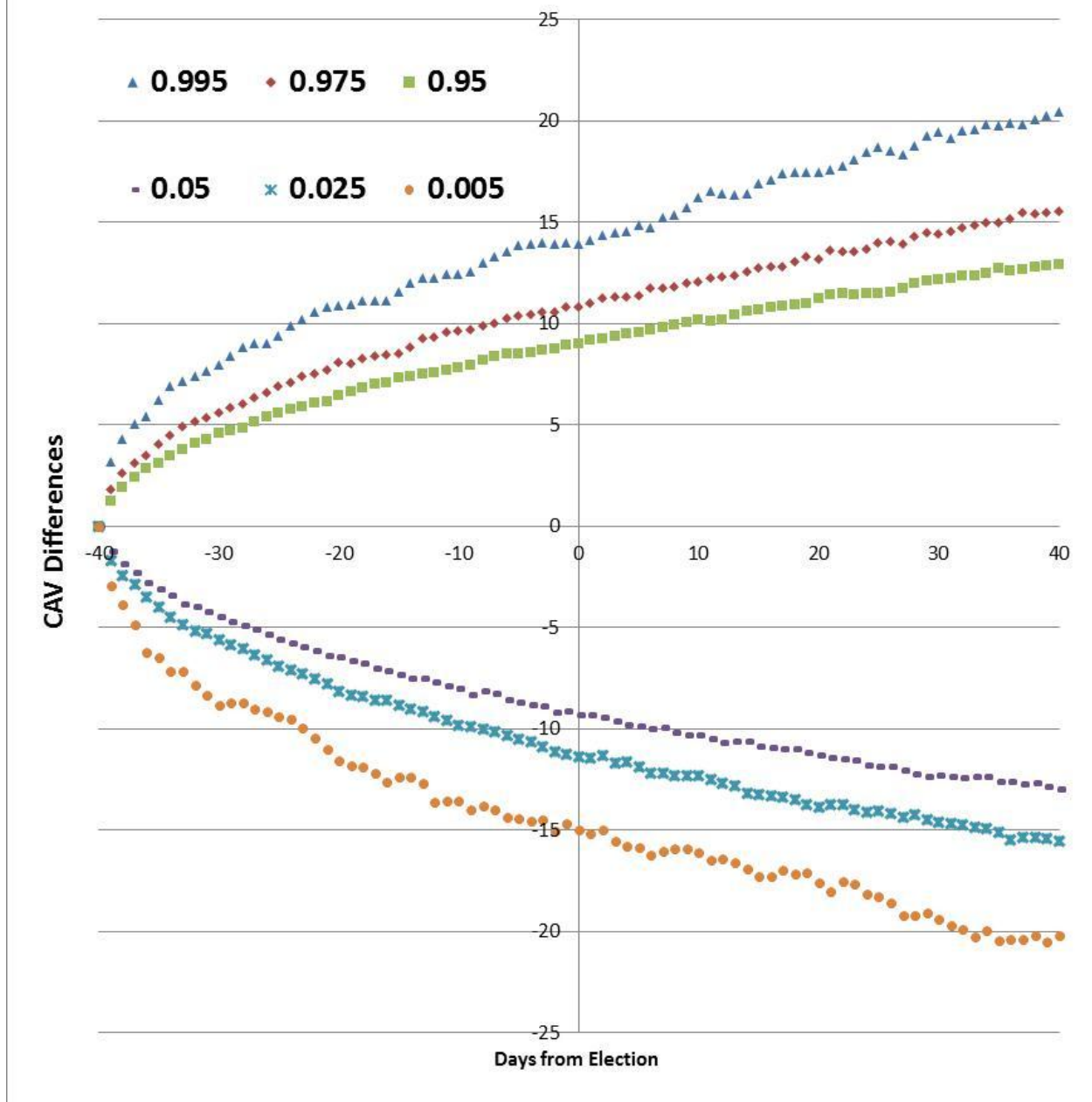


Figure 15: Selected Critical Values Excluding September 17th, 2001 (5999 days) for CAV Differences



APPENDIX B – DESCRIPTIVE TABLES

Table I: Variable Definitions

Table I the variable definitions and acronyms found in the paper. Table indicates where each variable first appears. Source indicates the origin of the data used to construct each variable. Variable gives the name of the item.

Tables	Source	Variable	Definition
		CARs	Cumulative abnormal returns
		CAV	Cumulative abnormal volatility
	Compustat		A database of financial, statistical and market information, Centennial, CO, United States.
		CRSP	The Center for Research in Security Prices, Booth School of Business at the University of Chicago.
	GARCH (1,1)		Generalized autoregressive conditional heteroskedasticity with $p = 1$ and $q = 1$.
		OLS	Ordinary least squares
		SIPRI	Stockholm International Peace Research Institute, Solna, Sweden.
		MEVEC	Multiplicative effect of volatility by election category
II	SIPRI	Arms Sales	Dollar value of military goods and services to military customers, including both sales for domestic procurement and sales for export.
II	SIPRI	Rank	Global ranking of a military contractor firm based on total arms sales, with the largest firm having a rank of one.
II	SIPRI	Share	Arms Sales / Total Revenue of the firm
II	US gov't	SIC	Standard Industrial Classification
III	US gov't	All	US elections are held every year on the first Tuesday to fall on November 2nd through November 8th.
III	US gov't	Federal	Elections in even years that have candidates for Congress. Half of these also include candidates for the President of the United States.
III	US gov't	Local	Elections in odd years that typically do not have candidates for Congress.
III	US gov't	Mid-term	Elections in the even years between presidential elections. These include candidates for Congress but not for the President of the United States.
III	US gov't	Presidential	Elections in years divisible by 4. These include both candidates for Congress and the President of the United States.
III	BBD	National Security	The uncertainty component from newspapers that specifically relates to national security or war.
III	BBD	News-based	The uncertainty component from 10 large US newspapers comprises 50% of the overall economic policy uncertainty index
III	BBD	Policy	Overall economic uncertainty index value.
III	BAS	Doomsday Clock	Represents the danger of global catastrophe. Published by the Bulletin of the Atomic Scientists at the University of Chicago.
IV	Compustat	AT	Total Assets of a company at a point in time.
IV	Compustat	CAPX	Capital Expenditures
IV	Compustat	CEQ	The sum of Common/Ordinary Stock (Capital) (CSTK), Capital Surplus/Share Premium Reserve (CAPS) and Retained Earnings (RE).
IV	Compustat	CSHO	The net number of all common shares outstanding at year-end, excluding treasury shares and scrip.
IV	Compustat	DD1	Long-Term Debt Due in One Year
IV	Compustat	DLTT	Long-Term Debt - Total
IV	Compustat	MKVALT	Consolidated company-level market value is the sum of all issue-level market values, including trading and non-trading issues.
IV	Compustat	NI	Net income represents the fiscal period income or loss reported by a company after subtracting expenses and losses from all revenues and gains.
IV	Compustat	OANCF	Operating Activities Net Cash Flow
IV	Compustat	OIBDP	Operating Income Before Depreciation using the U.S. and Canadian GAAP Definition
IV	Compustat	SALE	Total Sales represents gross sales (the amount of actual billings to customers for regular sales completed during the period).
IV	Compustat	XRD	Research and Development Expense
IV	Calculated	Cash Flow/Sales	Operating Cash Flow over Sales (OANCF/SALE)
IV	Calculated	CERDATR	Capital Expenditure and Research & Development to Assets Ratio (CAPX + XRD)/AT
IV	Calculated	Leverage	Debt to Total Assets Ratio (DLTT + DD1)/AT.
IV	Calculated	Profit Margin	Net Income to Sales Ratio (NI/SALE)
IV	Calculated	ROA	Return on Assets (NI/AT)
IV	Calculated	ROE	Return on Equity (NI/CEQ)
IV	Calculated	Tobin's Q (simple)	Market to Book Ratio (MKVALT/AT)
IV	Calculated	Tobin's Q (Chung)	Applies the Chung and Pruitt (1994) method
V	(1)	α	The idiosyncratic component of returns.
V	(1)	β	The systematic component of returns.
V	(2)	γ_0	The minimum level of conditional variance.
V	(2)	γ_1	The coefficient on lagged conditional variance.
V	(2)	γ_2	The coefficient on lagged squared abnormal return.
V	(1)	ε	Abnormal component of returns.
V	(1)	h	Conditional variance of returns.
V	(5)	Q	Firm-level daily volatility measure.

Table II: US Public Military Contractor Firms

Table II presents the US public military contractor firms included in the sample from 1989-2012. Each firm year observation meets the following requirements: included in the SIPRI database as a top 300 global military contractor, included in Compustat with positive common equity (CEQ > 0), and has the full 500 daily return values in CRSP during the estimation period. The Company Name is the name of the firm as recorded in the SIPRI database. The 48 Industry Groups are identified by the Industry Group - Long Name (Fama and French (1997)). Year(s) in sample provides the total number of years in the sample for a firm with a given historical SIC code (SICH). Share Information gives summary statistics of the SIPRI variable, Share (arms sales divided by total sales).

Obs #	Company Name	SIC Code	Fama French 48 Industry Groups	Year(s) Total	Share Information			
					Mean	Max	Median	Min
1	AAR Corp	5080	Wholesale	9	41.7	53.0	39.1	36.0
2	Advanced Technical Products	3728	Aircraft	1	71.0	71.0	71.0	71.0
3		3460	Fabricated Products	4	66.5	74.0	65.5	61.0
4	Aeroflex	3825	Measuring and Control Equipment	5	34.8	42.0	34.0	29.0
5		3674	Electronic Equipment	6	38.3	43.0	41.5	29.0
6	Alcoa	3350	Steel Works Etc	1	1.4	1.4	1.4	1.4
7	Allegheny Technologies	3312	Steel Works Etc	4	9.3	12.0	9.3	6.5
8	Alliant Techsystems	3480	Defense	14	73.1	97.4	70.1	53.5
9		3760	Defense	6	63.8	78.8	61.8	57.7
10	Allied Signal	3724	Aircraft	7	12.2	15.1	12.6	8.9
11		3714	Automobiles and Trucks	2	9.3	10.1	9.3	8.5
12	Anteon	7373	Computers	2	88.5	89.0	88.5	88.0
13	Applied Signal Technology	3663	Electronic Equipment	15	14.8	23.1	14.0	3.8
14	Argon ST	3812	Electronic Equipment	7	76.1	93.9	73.0	55.9
15	Armor Holdings	7381	Business Services	1	53.1	53.1	53.1	53.1
16		3842	Medical Equipment	8	49.7	81.7	39.8	25.1
17	AT&T	4813	Communication	5	1.0	1.1	1.0	1.0
18	Avondale Industries	3730	Shipbuilding, Railroad Equipment	9	77.4	86.8	76.8	68.3
19	Ball	3411	Shipping Containers	6	5.7	6.3	5.7	5.1
20	BFGoodrich	2800	Chemicals	1	10.0	10.0	10.0	10.0
21		3724	Aircraft	3	6.0	6.6	6.3	5.1
22	Boeing	3721	Aircraft	23	33.9	55.2	32.4	14.9
23	Brunswick	3730	Shipbuilding, Railroad Equipment	1	9.6	9.6	9.6	9.6
24	CACI International	7373	Computers	20	63.5	79.9	63.8	49.0
25	Ceradyne	3290	Construction Materials	8	57.1	76.2	61.3	29.0
26	Ceridian	3571	Computers	2	50.7	51.0	50.7	50.4
27		8721	Business Services	3	36.9	38.2	37.0	35.4
28	Computer Data Systems	7373	Computers	1	45.0	45.0	45.0	45.0
29	Computer Sciences Corp	7373	Computers	5	30.3	35.5	29.3	27.0
30		7370	Business Services	19	25.7	37.5	25.6	14.5
31	Control Data	7373	Computers	1	19.1	19.1	19.1	19.1
32	Cordant Technologies	3320	Steel Works Etc	2	14.6	16.0	14.6	13.1
33	Cubic Corporation	3812	Electronic Equipment	16	60.1	72.0	60.1	42.6
34		3829	Measuring and Control Equipment	4	43.8	47.3	43.7	40.4
35	Cummins Engines	3578	Computers	1	62.7	62.7	62.7	62.7
36		3510	Machinery	6	2.7	5.1	2.5	1.1
37	Curtiss-Wright Corporation	3590	Machinery	3	31.3	41.0	32.3	20.6
38		3728	Aircraft	10	41.9	50.0	41.5	30.0
39	DRS Technologies	3812	Electronic Equipment	12	91.5	98.0	92.4	75.8
40	Ducommun	3728	Aircraft	11	58.9	66.1	59.9	48.9
41	Dyncorp	7381	Business Services	2	67.0	74.0	67.0	60.0
42	Eaton	3714	Automobiles and Trucks	2	6.6	7.1	6.6	6.1
43	EDO	3812	Electronic Equipment	14	80.4	92.1	84.6	65.9
44	EDS	7370	Business Services	9	5.7	11.5	4.8	2.5
45	Emerson Electric	3621	Electrical Equipment	1	9.6	9.6	9.6	9.6
46		3823	Measuring and Control Equipment	1	8.0	8.0	8.0	8.0
47	Engineered Support Systems	3585	Machinery	7	89.5	95.1	93.1	78.7
48	Esco Electronics	3812	Electronic Equipment	3	80.1	81.6	80.4	78.3
49		3537	Automobiles and Trucks	1	68.6	68.6	68.6	68.6
50	3569	Machinery	3	45.0	50.5	43.5	40.9	

51	Esterline Technologies	3823	Measuring and Control Equipment	14	39.4	45.0	40.0	33.4
52	E-Systems	3812	Electronic Equipment	6	81.8	91.1	78.3	76.9
53	Evans & Sutherland	3690	Electrical Equipment	3	59.7	75.2	53.8	50.2
54	Flir Systems	3812	Electronic Equipment	8	33.5	42.7	32.3	26.4
55	Fluor	1600	Construction	5	5.8	9.6	6.2	1.9
56	FMC	2800	Chemicals	7	25.7	29.8	27.2	20.5
57	Force Protection	3790	Automobiles and Trucks	2	100.0	100.0	100.0	100.0
58	Ford Motor	3711	Automobiles and Trucks	2	0.9	1.1	0.9	0.7
59		3760	Defense	11	47.7	75.2	48.5	30.8
60	Gencorp	3714	Automobiles and Trucks	1	27.7	27.7	27.7	27.7
61		3060	Rubber and Plastic Products	3	20.1	22.1	21.5	16.6
62		3721	Aircraft	3	81.6	83.6	81.5	79.8
63	General Dynamics	3730	Shipbuilding, Railroad Equipment	16	80.9	95.7	79.0	61.9
64		3790	Automobiles and Trucks	5	71.6	73.7	72.7	66.5
65	General Electric	3600	Electrical Equipment	10	5.6	11.5	3.5	1.6
66		9997		14	2.1	3.0	2.1	1.2
67	General Motors	3711	Automobiles and Trucks	14	3.2	6.1	4.0	0.2
68	Goodrich	3728	Aircraft	12	25.8	31.9	27.0	8.0
69	Grumman	3721	Aircraft	5	79.0	85.0	80.9	72.4
70	GTE	4813	Communication	11	4.6	7.2	4.4	2.4
71	GTSI Corporation	5045	Wholesale	4	52.0	61.0	56.5	34.0
72		1389	Petroleum and Natural Gas	2	18.4	29.3	18.4	7.4
73	Halliburton	1600	Construction	3	26.4	32.1	28.8	18.5
74		3663	Electronic Equipment	19	31.5	45.9	33.0	18.0
75	Harris	3812	Electronic Equipment	5	52.9	61.5	51.2	47.8
76	Harsco	3440	Construction Materials	2	24.7	29.6	24.7	19.8
77		3790	Automobiles and Trucks	3	44.9	54.6	47.6	32.5
78	Heico	3724	Aircraft	9	21.6	26.0	23.0	16.0
79	Hercules	2821	Chemicals	4	23.1	25.9	23.0	20.5
80		2890	Chemicals	3	15.6	21.6	20.2	4.8
81	Herley Industries	3812	Electronic Equipment	7	85.3	95.3	95.0	61.0
82	HewlettPackard	3570	Computers	5	2.0	2.3	2.1	1.4
83	Hexcel	2821	Chemicals	8	22.4	27.0	22.4	18.0
84	Honeywell	3822	Measuring and Control Equipment	10	7.7	23.1	6.2	4.2
85	Honeywell International	3728	Aircraft	15	13.8	18.0	14.5	6.0
86	IBM	3570	Computers	6	1.9	2.6	2.1	0.2
87	ITT	6331	Insurance	5	6.3	7.9	5.9	4.3
88	ITT Corporation	3812	Electronic Equipment	5	41.8	44.2	42.7	36.4
89	ITT Industries	3714	Automobiles and Trucks	4	9.9	12.5	11.5	4.2
90		3561	Machinery	8	32.0	43.0	30.5	27.6
91	Jacobs Engineering Group	1600	Construction	15	9.0	14.1	8.5	6.0
92	Kaman	5080	Wholesale	24	21.2	39.9	19.7	7.0
93	KBR	1623	Construction	4	27.2	41.2	28.2	11.1
94	Kratos Defense & Security Solutions	4899	Communication	3	63.0	77.6	59.3	52.0
95	L-3 Communications	3663	Electronic Equipment	13	80.5	88.6	81.8	70.4
96	LaBarge	3812	Electronic Equipment	7	43.4	47.9	45.0	37.0
97	Lear Siegler	2531	Business Supplies	3	100.0	100.0	100.0	100.0
98		3812	Electronic Equipment	10	75.7	91.7	78.2	58.2
99	Litton	3730	Shipbuilding, Railroad Equipment	1	70.6	70.6	70.6	70.6
100		7373	Computers	1	69.9	69.9	69.9	69.9
101	Lockheed Martin	3760	Defense	22	71.6	78.3	71.0	60.4
102		3721	Aircraft	2	69.9	77.0	69.9	62.9
103	Logicon	7371	Business Services	8	91.4	96.1	92.5	84.8
104	Loral	3812	Electronic Equipment	6	91.4	93.5	90.9	90.0
105	Lucent Technologies	3661	Electronic Equipment	2	1.3	1.5	1.3	1.2
106	ManTech International	7373	Computers	9	94.7	96.6	95.0	91.8
107	Martin Marietta	3760	Defense	5	73.5	75.1	74.9	68.9
108	McDonnell Douglas	3721	Aircraft	8	63.0	70.0	64.4	53.4
109	Moog	3590	Machinery	7	34.6	47.0	30.5	25.7
110		3728	Aircraft	9	42.7	49.7	42.7	38.0
111	Morrison Knudsen	1540	Construction	6	13.1	21.6	12.1	5.5
112	Motorola	3663	Electronic Equipment	12	2.9	6.8	1.8	0.8
113	MTC Technologies	8711	Business Services	4	96.8	98.0	97.0	95.4
114	Nichols Research Corporation	8711	Business Services	4	58.6	69.3	56.0	53.0
115		3721	Aircraft	7	86.9	89.8	89.2	80.7
116	Northrop Grumman	3812	Electronic Equipment	14	76.7	81.0	77.0	68.9
117		3728	Aircraft	3	68.1	73.5	66.7	64.0
118	Olin	2800	Chemicals	7	13.8	16.5	13.8	12.1
119		3350	Steel Works Etc	4	8.5	10.0	8.5	7.1
120	Orbital Sciences Corporation	3760	Defense	7	44.4	54.0	44.0	36.0
121		3663	Electronic Equipment	3	42.7	54.0	39.0	35.0
122	Oshkosh Truck	3711	Automobiles and Trucks	24	46.5	72.0	45.3	19.1
123	Perot Systems	7373	Computers	5	8.4	11.5	7.4	6.3
124	Precision Castparts	3320	Steel Works Etc	5	18.5	22.5	18.5	13.0
125		3728	Aircraft	6	13.0	16.0	12.5	12.0

126	Primex Technologies	3480	Defense	1	78.6	78.6	78.6	78.6			
127	Raytheon	3812	Electronic Equipment	24	66.4	92.8	67.0	33.8			
128	Remec	3674	Electronic Equipment	1	34.6	34.6	34.6	34.6			
129		3663	Electronic Equipment	4	27.3	31.7	27.4	22.9			
130	Rockwell Collins	3728	Aircraft	10	54.0	61.3	52.7	49.6			
131	Rockwell International	3760	Defense	7	29.9	35.9	33.1	18.7			
132		3620	Electrical Equipment	3	11.7	15.3	9.9	9.8			
133	Rohr Industries	3728	Aircraft	8	17.0	29.7	14.1	8.0			
134	Science Applications	7373	Computers	1	70.0	70.0	70.0	70.0			
135	Sequa	3724	Aircraft	18	12.9	34.2	10.0	2.0			
136	Shaw Group	8711	Business Services	10	11.4	16.2	11.3	5.9			
137	Silicon Graphics	3571	Computers	3	16.2	18.2	15.7	14.6			
138	SRA International	7370	Business Services	7	51.7	58.9	50.0	48.0			
139	Stewart & Stevenson	3510	Machinery	2	19.8	24.3	19.8	15.3			
140		5084	Wholesale	9	39.9	86.8	37.7	16.6			
141	Sundstrand	3728	Aircraft	8	21.5	28.4	21.9	15.2			
142		3561	Machinery	2	16.1	16.5	16.1	15.8			
143	Tech-Sym	3812	Electronic Equipment	2	67.6	75.6	67.6	59.7			
144	Teledyne Technologies	3663	Electronic Equipment	11	37.5	43.8	38.0	29.0			
145	Tenneco	3523	Machinery	6	15.2	17.2	14.6	14.0			
146		3714	Automobiles and Trucks	1	18.7	18.7	18.7	18.7			
147	Tetra Tech	8711	Business Services	11	22.1	33.7	22.8	6.2			
148	Texas Instruments	3674	Electronic Equipment	9	21.7	33.1	21.6	7.7			
149	Textron	3720	Aircraft	9	17.1	24.0	17.6	9.5			
150		3721	Aircraft	9	21.9	29.0	24.0	11.4			
151		9997		6	11.7	14.2	11.8	9.2			
152	Thiokol	3760	Defense	9	40.8	56.4	43.3	22.4			
153	Titan	7373	Computers	7	53.1	63.0	54.1	42.6			
154	Tracor	3812	Electronic Equipment	3	77.5	80.8	78.1	73.6			
155	Triumph Group	3728	Aircraft	5	34.0	37.0	36.3	27.8			
156	TRW	3714	Automobiles and Trucks	12	27.9	36.5	29.3	17.6			
157		3760	Defense	1	39.1	39.1	39.1	39.1			
158	UNC	3724	Aircraft	3	40.7	52.2	39.6	30.3			
159	Unisys	3570	Computers	4	20.7	22.8	20.2	19.8			
160		7370	Business Services	3	14.2	19.4	18.9	4.2			
161	United Defense	3790	Automobiles and Trucks	1	100.0	100.0	100.0	100.0			
162	United Industrial	3690	Electrical Equipment	15	85.2	97.0	85.5	74.8			
163	United Technologies	3724	Aircraft	15	17.2	21.0	19.1	10.8			
164		3720	Aircraft	9	18.5	21.6	18.0	16.0			
165	URS Corporation	8711	Business Services	11	31.2	37.7	31.0	25.4			
166	ViaSat	3663	Electronic Equipment	9	50.5	56.0	50.7	45.1			
167	VSE Corporation	8711	Business Services	10	81.4	98.2	82.6	56.7			
168	Washington Group International	8711	Business Services	2	17.0	17.0	17.0	17.0			
169	Westinghouse Electric	3585	Machinery	3	17.9	18.1	18.0	17.7			
170		3812	Electronic Equipment	3	23.7	24.6	23.8	22.7			
171		3510	Machinery	1	26.5	26.5	26.5	26.5			
172		4833	Communication	1	7.6	7.6	7.6	7.6			
Unique Observations											
Share Statistics											
		4 Digit SICs	3 Digit SICs	2 Digit SICs	FF 48 Groups	# of Firms	Firm-years	Mean	Median	Std Dev	Skewness
Summary Values		63	48	19	23	121	1165	40.5	35.0	28.5	0.43

Table III: National Security and War Uncertainty

Table III presents the Baker et al. (2013) monthly national security & war uncertainty from January 1985 thru October 2012 from. Policy is the overall economic policy uncertainty index value. News-based is the uncertainty component from 10 large US newspapers and comprises 50% of the overall economic policy uncertainty index. National Security is the uncertainty component from newspapers that specifically relates to national security or war. Panel A presents uncertainty metrics by periods to show how uncertainty changes. Differences are shown for the events of September 11th, 2001 and catastrophic threat based on the Doomsday Clock positioned at 7 minutes or less to midnight. Panel B presents differences between local elections and US federal elections. Panel C provides differences between mid-term elections and presidential elections. All t-statistics are calculated using the Satterthwaite method for unequal variances. The 2% truncated values drop the six highest and six lowest values of the national security and war index. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Panel A: Differences between periods (pre - post)								
Classification	# Observations		Policy Index		News-based Index		National Security Index	
			Δ	p value	Δ	p value	Δ	p value
9 / 11	Pre 200	Post 134	-20.15	0.000 ***	-22.98	0.000 ***	-9.67	0.000 ***
Doomsday clock	> 7 144	< = 7 190	-18.71	0.000 ***	-6.90	0.101	2.92	0.759

Panel B: Differences between election categories (local - federal)								
Months	# Observations		Policy Index		News-based Index		National Security Index	
	Local	Federal	Δ	p value	Δ	p value	Δ	p value
Jan - Dec (All)	168	166	-2.50	0.482	-4.58	0.285	1.42	0.876
Aug - Oct	42	42	-8.77	0.306	-14.00	0.213	-32.27	0.091 *
Aug - Nov	56	55	-8.05	0.252	-13.08	0.155	-33.27	0.036 **
Aug - Nov 2% trunc	50	55	-9.83	0.165	-17.37	0.046 **	-44.71	0.000 ***

Panel C: Differences between election categories (presidential - mid-term)								
Months	# Observations		Policy Index		News-based Index		National Security Index	
	Mid-term	President	Δ	p value	Δ	p value	Δ	p value
Aug - Oct	21	21	0.32	0.978	-3.27	0.824	26.41	0.224
Aug - Nov	28	27	0.53	0.956	-2.60	0.834	25.12	0.198

Table IV: Descriptive Statistics

Table IV presents the summary descriptive statistics of the US public military contractor sample firms from 1989 through 2012. The variables Rank and Share are from the SIPRI database. Rank indicates the standing of a military contractor on a global basis as determined by the dollar value of sales to the military. Share is the percentage of arms sales to total sales of the firm. Compustat variables include: Operating Income Before Depreciation (OIBDP) is divided by both SALE and AT to produce these variables, Cash Flow per Sales is Operating Cash Flow (OANCF)/SALE, capital expenditure and research & development to assets ratio (CERDATR) is (CAPX + XRD)/AT, Return on Equity (ROE) is NI/CEQ, Return on Assets (ROA) is NI/AT, and Profit Margin is NI/SALE. Simple Tobin's Q (M/B) is MKVALT/AT, the Tobin's Q (Chung) follows the Chung and Pruitt (1994) method, and leverage is (DLTT + DD1)/AT.

Source	# Obs	Variables	Mean	Standard Deviation	Max	3rd Quartile	Median	1st Quartile	Min
SIPRI	1165	Rank	82.6	52.9	1	38	77	123	214
	1165	Share	40.5%	28.5%	100.0%	63.6%	35.0%	16.0%	0.16%
Compustat	1165	OIBDP/Assets	12.6%	5.3%	34.8%	16.0%	12.5%	9.8%	-24.76%
	1165	OIBDP/Sales	12.1%	6.5%	44.7%	14.3%	11.6%	8.7%	-16.90%
	1165	Cash Flow/Sales	7.7%	6.0%	36.1%	10.4%	7.7%	4.6%	-14.44%
	940	CERDATR	7.6%	5.1%	34.7%	9.9%	6.2%	4.1%	0.75%
	1165	ROE	16.2%	209.0%	7038.5%	18.6%	12.4%	6.9%	-604.95%
	1165	ROA	4.2%	6.1%	38.0%	7.1%	4.9%	2.4%	-45.10%
	1165	Profit Margin	3.9%	6.2%	44.0%	6.3%	4.2%	2.2%	-79.76%
	1036	Tobin's Q (M/B)	0.92	0.61	5.56	1.16	0.77	0.51	0.04
	639	Tobin's Q (Chung)	1.04	0.50	4.46	1.25	0.94	0.71	0.14
	1144	Leverage	0.19	0.13	0.59	0.28	0.18	0.10	0.00

Table V: Summary of GARCH (1,1) Parameters and Output

Table V provides summary information for the parameters and output produced by the GARCH (1, 1) model. Panel A presents the GARCH (1, 1) parameters as determined during the estimation period (-540, -41). From equation 1, α provides the idiosyncratic component of returns while β indicates the systematic component. From equation 2, γ_0 indicates the minimum conditional variance, γ_1 is the coefficient for the lagged conditional variance, and γ_2 is the coefficient for the lagged squared abnormal return. Panel B presents summary information on the daily output during the event period (-40, 40). From equation 1, ε is the abnormal component of returns while h is the conditional variance of abnormal returns. From equation 5, \hat{Q} provides a measure of the firm-level daily volatility.

Variable	Mean	Standard Deviation	Skewness	Max	3rd Quartile	Median	1st Quartile	Min
Panel A: GARCH (1, 1) Parameters								
α	0.0003	0.0010	0.79	0.0060	0.0008	0.0003	-0.0003	-0.0051
β	0.93	0.39	0.34	2.62	1.17	0.92	0.64	-0.30
γ_0	0.00018	0.00026	3.37	0.00215	0.00023	0.00009	0.00003	0.00000
γ_1	0.45	0.35	-0.02	1.00	0.79	0.48	0.05	0.00
γ_2	0.18	0.18	2.29	1.00	0.24	0.13	0.07	0.00
Panel B: Abnormal Return and Volatility in Event Period (-40, 40)								
ε	0.0003	0.0229	0.73	0.4550	0.0092	-0.0003	-0.0096	-0.5044
h	0.0007	0.0023	31.14	0.2008	0.0006	0.0002	0.0001	0.0000
Q	1.25	5.66	39.02	554.37	0.99	0.27	0.05	0.00

APPENDIX C – RESULTS TABLES

Table VI: Cumulative Abnormal Volatility

Table VI presents cumulative abnormal volatility (CAV) for the 1165 firm-election observations of military contractors. Event windows (n_1, n_2) are identified by days relative to the election date. Local elections include all odd year elections except for 2001 due to the confounding event of September 11th 2001. Federal elections include all even year elections. Presidential elections include each year with a candidate for president and Mid-term elections include each federal election year without a presidential candidate. Pre 9/11 includes all types of elections from 1989 through 2000, while post 9/11 includes all types of elections from 2001 through 2012. Panel A provides descriptive information about each election category. Election is the number of events in each election category. Firm-years gives the cumulative number of firm observations in each election category. Daily is the total number of daily volatility values (Q) used to construct the election category volatility measure (M) and calculate CAV for the $(-40, 40)$ window. Panel B provides the symmetric event periods around the election date. Panel C provides the asymmetric event periods following the election date. Panel D provides the asymmetric event periods prior to the election date. CAV values are reported along with significance levels based on bootstrapped distributions which exclude September 17th 2001. Significance levels for election categories are based on critical values presented in figure 14. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Window (n_1, n_2)	All Elections CAV		Federal Elections CAV		Federal Elections CAV		Federal Elections CAV		CAV by Period		CAV by Period	
	Local no '01	Federal	Presidential	Mid-term	Presidential	Mid-term	Pre 9/11	Post 9/11	Pre 9/11	Post 9/11	Pre 9/11	Post 9/11
Panel A: Observations for Election Category												
Election	11	12	6	6	6	6	12	12	12	12	12	12
Firm-years	538	587	293	294	293	294	570	570	570	570	570	595
Daily	43578	47547	23733	23814	23733	23814	46170	46170	46170	46170	46170	48195
Panel B: Symmetric event windows												
(n_1, n_2)	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ
(-2, 2)	0.446	8.9%	2.140 *	42.8%	3.408 **	68.2%	0.902	18.0%	0.993	19.9%	1.525	30.5%
(-5, 5)	1.942	17.7%	5.029 **	45.7%	7.246 ***	65.9%	2.874 *	26.1%	3.150 *	28.6%	3.672 **	33.4%
(-10, 10)	5.983 **	28.5%	9.947 ***	47.4%	12.516 ***	59.6%	7.493 ***	35.7%	8.963 ***	42.7%	6.759 **	32.2%
(-25, 25)	7.543 **	14.8%	22.073 ***	43.3%	27.923 ***	54.8%	16.492 ***	32.3%	21.107 ***	41.4%	8.242 **	16.2%
(-40, 40)	8.725 **	10.8%	28.250 ***	34.9%	34.698 ***	42.8%	22.194 ***	27.4%	29.243 ***	36.1%	11.764 **	14.5%
Panel C: Post-election event windows												
(0, 2)	0.127	4.2%	1.366 *	45.5%	2.494 **	83.1%	0.256	8.5%	0.330	11.0%	1.093	36.4%
(0, 5)	0.298	5.0%	1.476	24.6%	2.440 *	40.7%	0.540	9.0%	0.925	15.4%	0.865	14.4%
(0, 10)	1.888	17.2%	2.910 *	26.5%	4.359 **	39.6%	1.513	13.8%	3.348 *	30.4%	1.361	12.4%
(0, 25)	2.145	8.3%	6.331 **	24.4%	10.735 ***	41.3%	2.053	7.9%	7.052 **	27.1%	1.027	3.9%
(0, 40)	2.638	6.4%	8.339 **	20.3%	15.100 ***	36.8%	1.770	4.3%	12.200 ***	29.8%	-1.855	-4.5%
Panel D: Pre-election event windows												
(-2, 0)	0.263	8.8%	1.352 *	45.1%	1.930 **	64.3%	0.790	26.3%	0.756	25.2%	0.855	28.5%
(-5, 0)	1.587	26.4%	4.131 **	68.8%	5.823 ***	97.1%	2.478 *	41.3%	2.318 *	38.6%	3.230 **	53.8%
(-10, 0)	4.037 **	36.7%	7.615 ***	69.2%	9.174 ***	83.4%	6.125 ***	55.7%	5.708 **	51.9%	5.822 ***	52.9%
(-25, 0)	5.340 **	20.5%	16.319 ***	62.8%	18.205 ***	70.0%	14.584 ***	56.1%	14.148 ***	54.4%	7.639 **	29.4%
(-40, 0)	6.030 **	14.7%	20.488 ***	50.0%	20.614 ***	50.3%	20.568 ***	50.2%	17.135 ***	41.8%	14.042 ***	34.2%

Table VII: Cumulative Abnormal Volatility Differences

Table VII presents cumulative abnormal volatility (CAV) differences between election categories. Event windows (n_1, n_2) are identified by days relative to the election date. Local elections include all odd year elections except for 2001 due to the confounding event of September 11th 2001. Federal elections include all even year elections. Presidential elections include each year with a candidate for president and Mid-term elections include each federal election year without a presidential candidate. Pre 9/11 includes all types of elections from 1989 through 2000, while post 9/11 includes all types of elections from 2001 through 2012. Panel A provides the symmetric event periods around the election date. Panel B provides the asymmetric event periods following the election date. Panel C provides the asymmetric event periods prior to the election date. The CAV differences are reported along with significance levels based on bootstrapped distributions which exclude September 17th 2001. Significance levels for the CAV differences between election categories are based on the critical values displayed in figure 15. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

(n_1, n_2)	Federal - Local no '01		Presidential - Mid-term		Presidential - Local no '01		Mid-term - Local no '01		Post 9/11 - Pre 9/11	
	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ
Panel A: Symmetric event windows										
(-2, 2)	1.694	33.9%	2.506	50.1%	2.961	59.2%	0.455	9.1%	0.532	10.6%
(-5, 5)	3.087	28.1%	4.372	39.7%	5.304 *	48.2%	0.932	8.5%	0.522	4.7%
(-10, 10)	3.965	18.9%	5.023	23.9%	6.534	31.1%	1.510	7.2%	-2.204	-10.5%
(-25, 25)	14.530 **	28.5%	11.431 *	22.4%	20.381 ***	40.0%	8.949	17.5%	-12.865 **	-25.2%
(-40, 40)	19.525 **	24.1%	12.504	15.4%	25.973 ***	32.1%	13.469 *	16.6%	-17.479 **	-21.6%
Panel B: Post-election event windows										
(0, 2)	1.239	41.3%	2.238	74.6%	2.368	78.9%	0.130	4.3%	0.764	25.5%
(0, 5)	1.177	19.6%	1.899	31.7%	2.141	35.7%	0.242	4.0%	-0.060	-1.0%
(0, 10)	1.022	9.3%	2.847	25.9%	2.471	22.5%	-0.375	-3.4%	-1.987	-18.1%
(0, 25)	4.186	16.1%	8.683 *	33.4%	8.590 *	33.0%	-0.093	-0.4%	-6.025	-23.2%
(0, 40)	5.701	13.9%	13.330 **	32.5%	12.462 **	30.4%	-0.868	-2.1%	-14.055 **	-34.3%
Panel C: Pre-election event windows										
(-2, 0)	1.089	36.3%	1.141	38.0%	1.668	55.6%	0.527	17.6%	0.099	3.3%
(-5, 0)	2.544	42.4%	3.345	55.8%	4.237	70.6%	0.891	14.9%	0.913	15.2%
(-10, 0)	3.577	32.5%	3.049	27.7%	5.136	46.7%	2.087	19.0%	0.114	1.0%
(-25, 0)	10.979 **	42.2%	3.620	13.9%	12.864 **	49.5%	9.244 *	35.6%	-6.509	-25.0%
(-40, 0)	14.458 **	35.3%	0.046	0.1%	14.585 **	35.6%	14.538 **	35.5%	-3.093	-7.5%

Table VIII: Cumulative Abnormal Volatility by Uncertainty Index

Table VIII presents cumulative abnormal volatility (CAV) based on the top (1st) and bottom (4th) quartiles of the September national security and war uncertainty index from Baker, Bloom, and Davis (2013). Index is the September national security and war uncertainty index value of top and bottom quartiles. Panels A-D and the CAV values are consistent with the information in Table VI. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Variable	Federal Quartile				Presidential Quartile				Mid-term Quartile				Local no '01 Quartile			
	1st	4th	1st	4th	1st	4th	1st	4th	1st	4th	1st	4th	1st	4th		
Observations	90,02	96,00	92,08	96,00	96,00	90,02	90,02	98,06	98,06	91,93	93,03	95,97	97,07	95,97	97,07	
Years	143	151	97	94	94	95	95	102	102	149	149	143	143	143	143	
Firm-years	11583	12231	7857	7614	7614	7695	7695	8262	8262	12069	12069	11583	11583	11583	11583	
Daily	38,53	17,12	36,67	17,12	17,12	59,49	59,49	27,80	27,80	26,79	26,79	10,88	10,88	10,88	10,88	
Index	38,53	17,12	36,67	17,12	17,12	59,49	59,49	27,80	27,80	26,79	26,79	10,88	10,88	10,88	10,88	
Panel A: Observations for Election Category																
Panel B: Symmetric event windows																
(n ₁ , n ₂)	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ
(-2, 2)	8.175 ***	163.5%	0.691	13.8%	8.245 ***	164.9%	0.937	18.7%	3.803 **	76.1%	1.094	21.9%	-1.287	-25.7%	1.722 *	34.4%
(-5, 5)	20.168 ***	183.3%	0.516	4.7%	20.066 ***	182.4%	0.891	8.1%	9.893 ***	89.9%	1.867	17.0%	-2.468	-22.4%	4.975 ***	45.2%
(-10, 10)	39.563 ***	188.4%	0.535	2.5%	38.050 ***	181.2%	1.356	6.5%	21.887 ***	104.2%	4.279 *	20.4%	-3.874	-18.4%	11.163 ***	53.2%
(-25, 25)	87.058 ***	170.7%	2.561	5.0%	87.944 ***	172.4%	11.441 ***	22.4%	48.260 ***	94.6%	12.545 ***	24.6%	-8.740	-17.1%	14.011 ***	27.5%
(-40, 40)	114.879 ***	141.8%	6.014 *	7.4%	107.962 ***	133.3%	22.001 ***	27.2%	71.408 ***	88.2%	17.115 ***	21.1%	-13.575	-16.8%	20.887 ***	25.8%
Panel C: Post-election windows																
(n ₁ , n ₂)	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ
(0, 2)	5.663 ***	188.8%	0.239	8.0%	6.404 ***	213.5%	0.226	7.5%	1.743 *	58.1%	0.362	12.1%	-0.648	-21.6%	0.868	28.9%
(0, 5)	7.406 ***	123.4%	-0.619	-10.3%	7.144 ***	119.1%	-0.204	-3.4%	3.608 **	60.1%	-0.557	-9.3%	-1.426	-23.8%	1.857 *	31.0%
(0, 10)	15.296 ***	139.1%	-1.279	-11.6%	13.927 ***	126.6%	-0.169	-1.5%	8.744 ***	79.5%	-1.187	-10.8%	-2.507	-22.8%	5.079 **	46.2%
(0, 25)	32.944 ***	126.7%	-2.857	-11.0%	38.601 ***	148.5%	2.039	7.8%	14.266 ***	54.9%	-1.991	-7.7%	-4.679	-18.0%	6.688 **	25.7%
(0, 40)	42.781 ***	104.3%	0.815	2.0%	50.689 ***	123.6%	10.878 ***	26.5%	18.510 ***	45.1%	-1.002	-2.4%	-6.469	-15.8%	13.943 ***	34.0%
Panel D: Pre-election event windows																
(n ₁ , n ₂)	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ
(-2, 0)	4.666 ***	155.5%	0.683	22.8%	4.141 ***	138.0%	0.911	30.4%	2.792 **	93.1%	0.888	29.6%	-0.854	-28.5%	1.106	36.9%
(-5, 0)	14.916 ***	248.6%	1.365	22.8%	15.223 ***	253.7%	1.295	21.6%	7.017 ***	117.0%	2.581 **	43.0%	-1.256	-20.9%	3.371 **	56.2%
(-10, 0)	26.420 ***	240.2%	2.044	18.6%	26.423 ***	240.2%	1.725	15.7%	13.875 ***	126.1%	5.622 **	51.1%	-1.582	-14.4%	6.338 ***	57.6%
(-25, 0)	56.267 ***	216.4%	5.648 **	21.7%	51.643 ***	198.6%	9.602 ***	36.9%	34.727 ***	133.6%	14.692 ***	56.5%	-4.275	-16.4%	7.576 **	29.1%
(-40, 0)	74.252 ***	181.1%	5.429 *	13.2%	59.573 ***	145.3%	11.322 ***	27.6%	53.631 ***	130.8%	18.273 ***	44.6%	-7.321	-17.9%	7.197 **	17.6%

Table IX: Cumulative Abnormal Volatility Differences by Uncertainty Index

Table IX presents cumulative abnormal volatility (CAV) differences between the top (1st) and bottom (4th) quartiles of the September national security and war uncertainty index from Baker, Bloom, and Davis (2013). Index is the September national security and war uncertainty index value of top and bottom quartiles. Panels A-C and the CAV differences are consistent with the information in Table VI. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Top vs. bottom	Δ Federal = 21.41		Δ Presidential = 19.55		Δ Mid-term = 31.69		Δ Local no '01 = 15.91	
(n ₁ , n ₂)	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ
Panel A: Symmetric event windows								
(-2, 2)	7.483 ***	149.7%	7.308 ***	146.2%	2.708	54.2%	-3.009	-60.2%
(-5, 5)	19.652 ***	178.7%	19.176 ***	174.3%	8.025 **	73.0%	-7.442 **	-67.7%
(-10, 10)	39.027 ***	185.8%	36.694 ***	174.7%	17.608 ***	83.8%	-15.037 ***	-71.6%
(-25, 25)	84.497 ***	165.7%	76.503 ***	150.0%	35.715 ***	70.0%	-22.750 ***	-44.6%
(-40, 40)	108.865 ***	134.4%	85.961 ***	106.1%	54.293 ***	67.0%	-34.462 ***	-42.5%
Panel B: Post-election windows								
(0, 2)	5.424 ***	180.8%	6.178 ***	205.9%	1.381	46.0%	-1.517	-50.6%
(0, 5)	8.026 ***	133.8%	7.349 ***	122.5%	4.166 *	69.4%	-3.283	-54.7%
(0, 10)	16.575 ***	150.7%	14.096 ***	128.1%	9.931 ***	90.3%	-7.585 **	-69.0%
(0, 25)	35.801 ***	137.7%	36.562 ***	140.6%	16.257 ***	62.5%	-11.367 **	-43.7%
(0, 40)	41.965 ***	102.4%	39.811 ***	97.1%	19.512 ***	47.6%	-20.412 ***	-49.8%
Panel C: Pre-election event windows								
(-2, 0)	3.983	132.8%	3.230	107.7%	1.905	63.5%	-1.960	-65.3%
(-5, 0)	13.550 ***	225.8%	13.928 ***	232.1%	4.437	73.9%	-4.627	-77.1%
(-10, 0)	24.376 ***	221.6%	24.698 ***	224.5%	8.254 **	75.0%	-7.919 **	-72.0%
(-25, 0)	50.619 ***	194.7%	42.041 ***	161.7%	20.035 ***	77.1%	-11.851 **	-45.6%
(-40, 0)	68.823 ***	167.9%	48.251 ***	117.7%	35.358 ***	86.2%	-14.518 **	-35.4%

Table X: Cumulative Abnormal Volatility by Share

Table X presents cumulative abnormal volatility (CAV) differences between the top (1st) and bottom (4th) quartiles of the September national security and war uncertainty index from Baker, Bloom, and Davis (2013). Index is the September national security and war uncertainty index value of top and bottom quartiles. Panels A-C and the CAV differences are consistent with the information in Table IX. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

	Federal Quartile			Presidential Quartile			Mid-term Quartile			Local no '01 Quartile		
	1st	4th	Implied %Δ	1st	4th	Implied %Δ	1st	4th	Implied %Δ	1st	4th	Implied %Δ
Panel A: Observations for Election Category												
Firm-years	147	147		74	74		74	74		74	135	135
Daily	11907	11907		5994	5994		5994	5994		10935	10935	10935
Share	62.98	15.78		62.96	15.78		63.63	15.99		64.00	16.00	16.00
Panel B: Symmetric event windows												
(n ₁ , n ₂)	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ	CAV	Implied %Δ
(-2, 2)	1.672 *	33.4%	3.057 **	61.1%	2.137 *	42.7%	4.702 ***	94.0%	1.226	24.5%	1.465	29.3%
(-5, 5)	3.924 **	35.7%	6.252 ***	56.8%	3.967 **	36.1%	7.534 ***	68.5%	3.975 **	36.1%	5.121 **	46.6%
(-10, 10)	9.471 ***	45.1%	11.047 ***	52.6%	10.596 ***	50.5%	12.857 ***	61.2%	8.495 ***	40.5%	9.624 ***	45.8%
(-25, 25)	20.645 ***	40.5%	32.758 ***	64.2%	29.160 ***	57.2%	33.950 ***	66.6%	12.992 ***	25.5%	34.460 ***	67.6%
(-40, 40)	23.364 ***	28.8%	46.771 ***	57.7%	35.324 ***	43.6%	45.265 ***	55.9%	12.681 ***	15.7%	51.820 ***	64.0%
Panel C: Post-election windows												
(0, 2)	0.493	16.4%	1.810 *	60.3%	0.523	17.4%	3.447 **	114.9%	0.471	15.7%	0.186	6.2%
(0, 5)	0.657	10.9%	2.519 *	42.0%	0.109	1.8%	3.710 **	61.8%	1.261	21.0%	1.354	22.6%
(0, 10)	2.819 *	25.6%	4.462 **	40.6%	3.309 *	30.1%	6.276 ***	57.1%	2.404 *	21.9%	2.682 *	24.4%
(0, 25)	4.691 *	18.0%	9.998 ***	38.5%	9.837 ***	37.8%	13.212 ***	50.8%	0.059	0.2%	8.754 ***	33.7%
(0, 40)	5.418 *	13.2%	15.038 ***	36.7%	13.647 ***	33.3%	20.204 ***	49.3%	-1.966	-4.8%	12.058 ***	29.4%
Panel D: Pre-election event windows												
(-2, 0)	1.305 *	43.5%	2.616 **	87.2%	1.587 *	52.9%	4.004 ***	133.5%	1.034	34.5%	1.270 *	42.3%
(-5, 0)	3.393 **	56.6%	5.103 ***	85.0%	3.831 **	63.8%	6.574 ***	109.6%	2.993 **	49.9%	3.758 **	62.6%
(-10, 0)	6.778 ***	61.6%	7.954 ***	72.3%	7.261 ***	66.0%	9.331 ***	84.8%	6.370 ***	57.9%	6.932 ***	63.0%
(-25, 0)	16.080 ***	61.8%	24.130 ***	92.8%	19.296 ***	74.2%	23.487 ***	90.3%	13.212 ***	50.8%	25.696 ***	98.8%
(-40, 0)	18.072 ***	44.1%	33.103 ***	80.7%	21.651 ***	52.8%	27.811 ***	67.8%	14.926 ***	36.4%	39.752 ***	97.0%

Table XI: Cumulative Abnormal Volatility Differences by Share

Table XI presents cumulative abnormal volatility (CAV) differences between the top (1st) and bottom (4th) quartiles of share of sales to the military. Share is the top and bottom quartiles percentage of arms sales to total sales of the firm from SIPRI. Panels A-C and the CAV differences are consistent with the information in Table IX. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

	Δ Fed = 47.21		Δ Pres= 47.18		Δ Mid= 47.64		Δ Local = 48.00	
(n_1, n_2)	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ	CAV	Implied % Δ
Panel A: Symmetric event windows								
(-2, 2)	-1.384	-27.7%	-2.565	-51.3%	-0.239	-4.8%	-1.233	-24.7%
(-5, 5)	-2.328	-21.2%	-3.567	-32.4%	-1.146	-10.4%	-3.709	-33.7%
(-10, 10)	-1.576	-7.5%	-2.261	-10.8%	-1.128	-5.4%	-5.575	-26.5%
(-25, 25)	-12.113 *	-23.8%	-4.790	-9.4%	-21.468 ***	-42.1%	-9.667	-19.0%
(-40, 40)	-23.407 ***	-28.9%	-9.941	-12.3%	-39.139 ***	-48.3%	-15.089 *	-18.6%
Panel B: Post-election windows								
(0, 2)	-1.317	-43.9%	-2.923 **	-97.4%	0.285	9.5%	-0.945	-31.5%
(0, 5)	-1.862	-31.0%	-3.600 *	-60.0%	-0.093	-1.6%	-1.751	-29.2%
(0, 10)	-1.643	-14.9%	-2.967	-27.0%	-0.278	-2.5%	-1.430	-13.0%
(0, 25)	-5.308	-20.4%	-3.374	-13.0%	-8.695 *	-33.4%	-1.000	-3.8%
(0, 40)	-9.620 *	-23.5%	-6.557	-16.0%	-14.024 **	-34.2%	-3.460	-8.4%
Panel C: Pre-election event windows								
(-2, 0)	-1.311	-43.7%	-2.417	-80.6%	-0.236	-7.9%	-0.432	-14.4%
(-5, 0)	-1.710	-28.5%	-2.743	-45.7%	-0.764	-12.7%	-2.103	-35.0%
(-10, 0)	-1.177	-10.7%	-2.070	-18.8%	-0.562	-5.1%	-4.289	-39.0%
(-25, 0)	-8.050	-31.0%	-4.191	-16.1%	-12.485 **	-48.0%	-8.812 *	-33.9%
(-40, 0)	-15.031 **	-36.7%	-6.160	-15.0%	-24.826 ***	-60.6%	-11.774 *	-28.7%

Table XII: Volatility Models by Election Category

Table XII presents the average election category volatility measure (6) and volatility models (10) around elections for the 1165 military contractor firm-year observations. Event windows (n_1, n_2) are identified by days relative to the election. Local elections include all odd year elections except for 2001 due to the confounding event of September 11th 2001. Federal elections include all even year elections. Presidential elections include each year with a candidate for president and Mid-term elections include each federal election year without a presidential candidate. Pre 9/11 includes all types of elections from 1989 through 2000, while post 9/11 includes all types of elections from 2001 through 2012. Panel A provides the mean and median election category volatility measures (6) for the full event window (-40, 40), pre-election (-40, 0) and post-election (0, 40) windows. The significance of mean values is reported using the t-test while median values use the Wilcoxon signed rank test. Panel B provides the election category volatility model (10) parameters. The significance of model parameters is reported using the t-test. The adjusted R² value indicates the overall fit of the volatility model. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

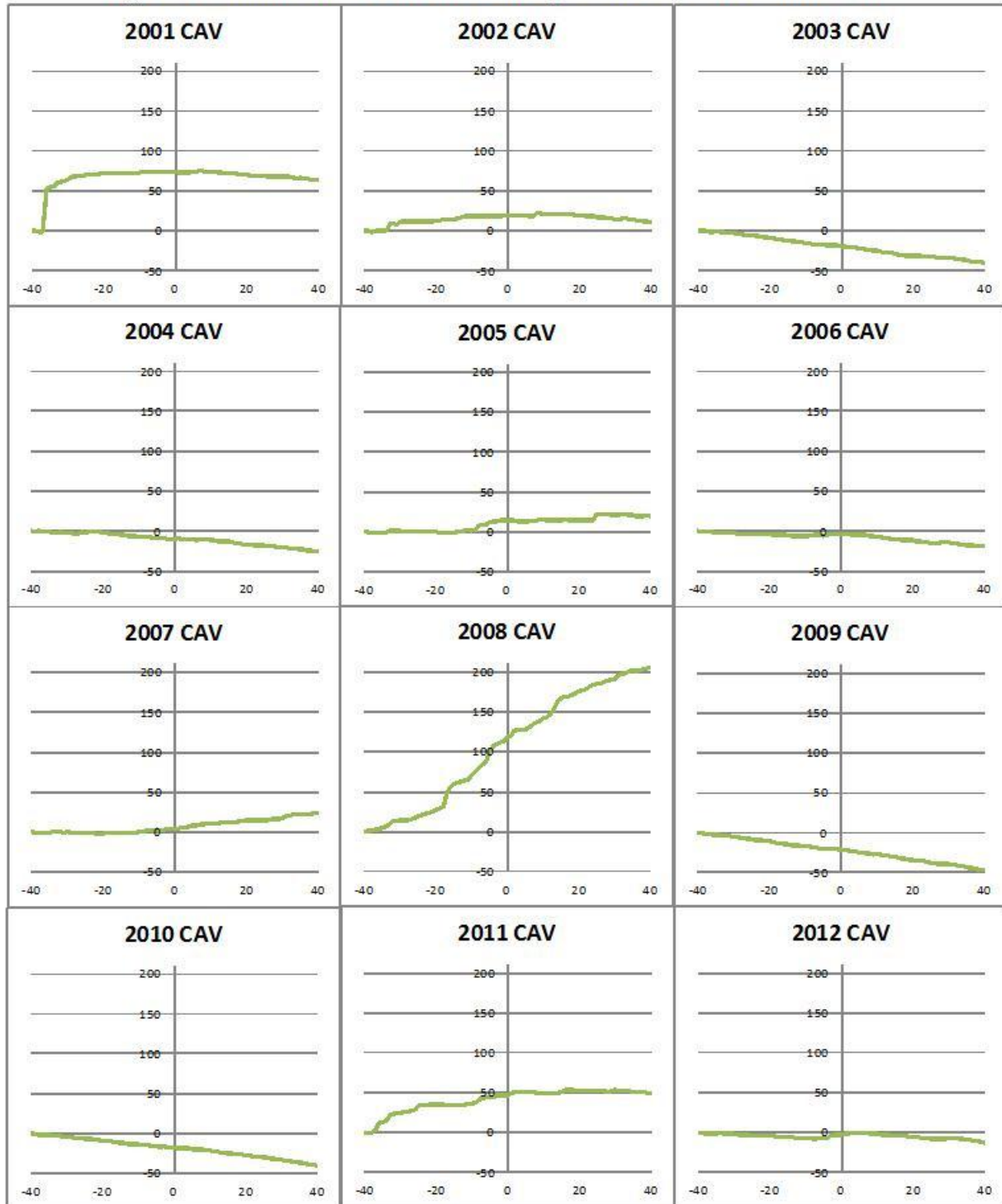
Window (n_1, n_2)	Variable	All Elections		Federal Elections		Period	
		Local no '01	Federal	Presidential	Mid-term	Pre 9/11	Post 9/11
Panel A: Average Volatility							
(-40, 40)	mean M	1.106 ***	1.349 ***	1.427 ***	1.276 ***	1.361 ***	1.143 **
	median M	1.060 ***	1.312 ***	1.322 ***	1.192 ***	1.353 ***	1.009
(-40, 0)	mean M	1.143 ***	1.500 ***	1.501 ***	1.505 ***	1.418 ***	1.339 ***
	median M	1.046 **	1.488 ***	1.380 ***	1.498 ***	1.434 ***	1.167 ***
(1, 40)	mean M	1.067 *	1.194 ***	1.352 ***	1.041	1.303 ***	0.943
	median M	1.068	1.173 ***	1.249 ***	1.041	1.334 ***	0.916 **
Panel B: Models of Volatility							
(-40, 0)	$\alpha_{pre} + \beta_{pre}(n_1)$	0.936	1.172 *	1.003	1.344 ***	1.126	1.336
	β_{pre}	0.010 **	0.016 ***	0.025 ***	0.008	0.015 ***	0.000
	α_{pre}	1.350 ***	1.829 ***	1.999 ***	1.666 ***	1.709 ***	1.341
(1, 40)	α_{post}	1.130	1.309 ***	1.497 ***	1.127 *	1.261 ***	1.167 **
	β_{post}	-0.003	-0.006	-0.007	-0.004	0.002	-0.011 ***
	$\alpha_{post} + \beta_{post}(n_2)$	1.004	1.079	1.207	0.954	1.344 ***	0.719 ***
	Adjusted R ²	0.087	0.361	0.167	0.362	0.219	0.108

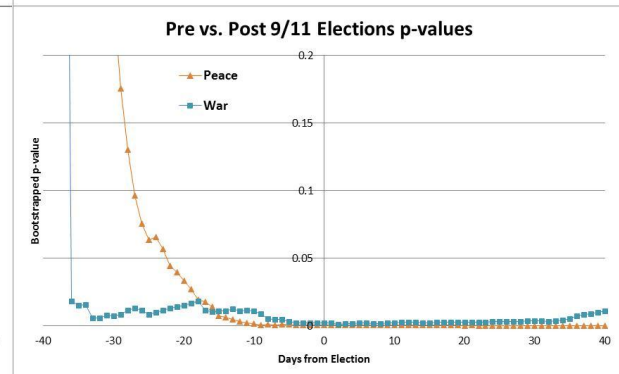
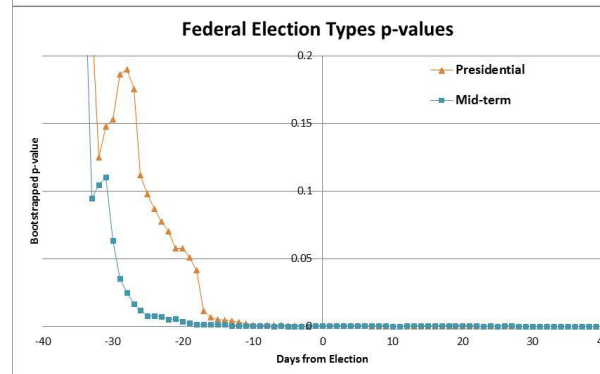
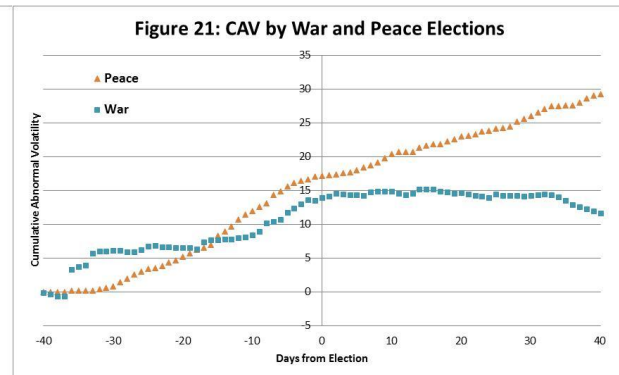
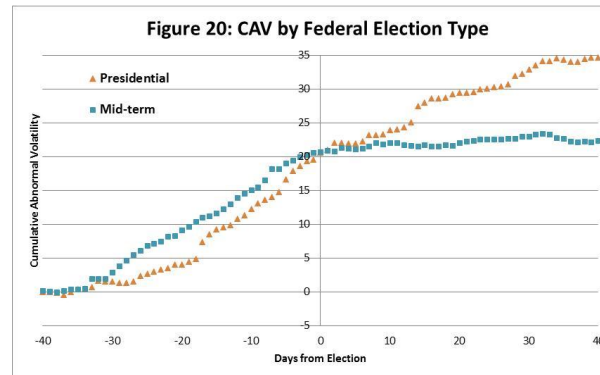
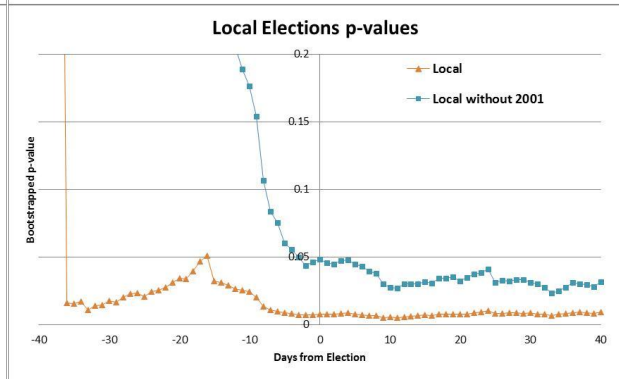
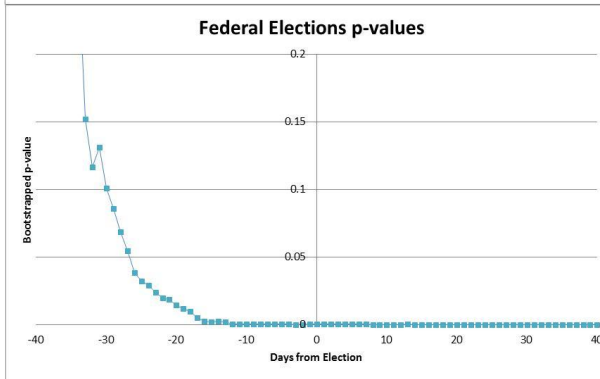
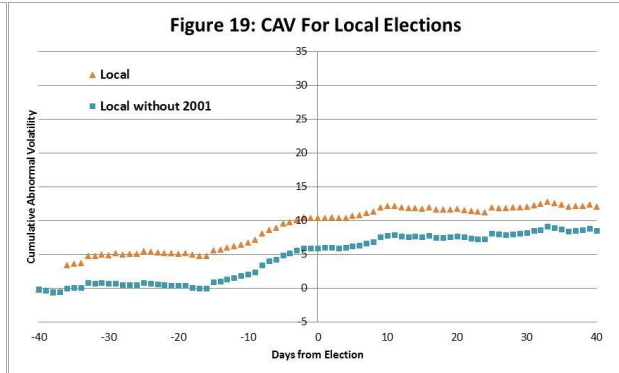
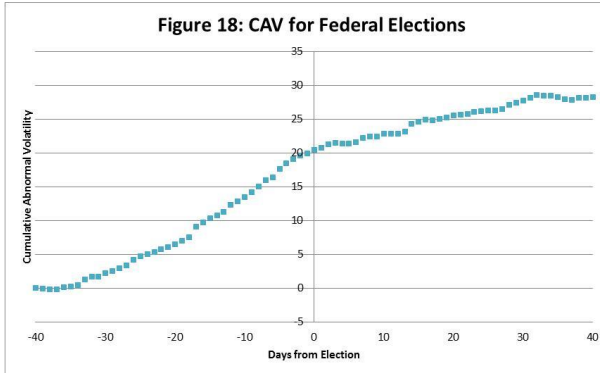
APPENDIX D – RESULTS FIGURES

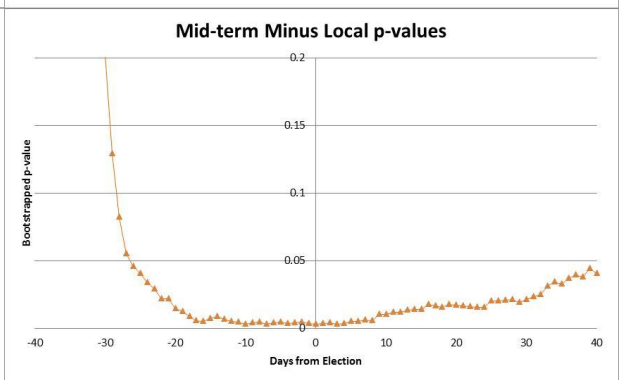
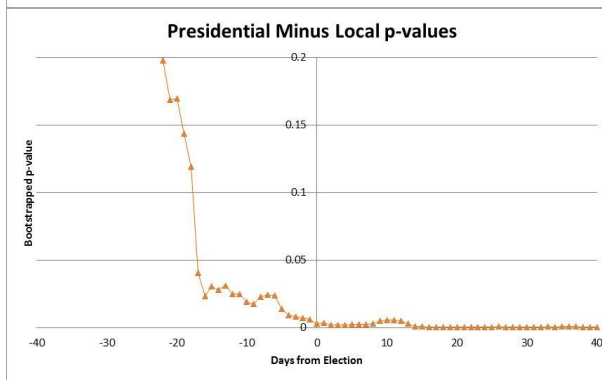
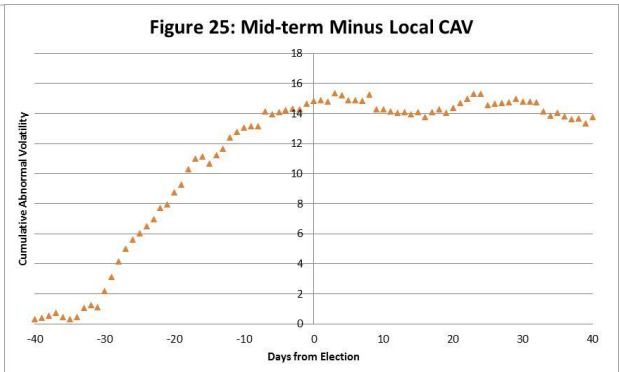
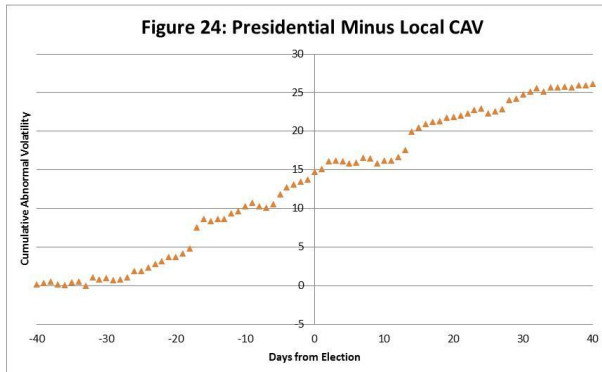
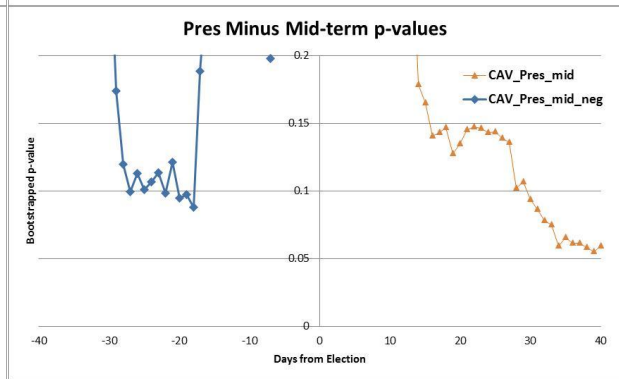
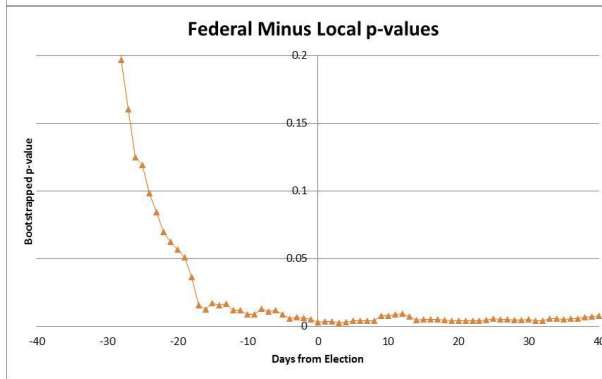
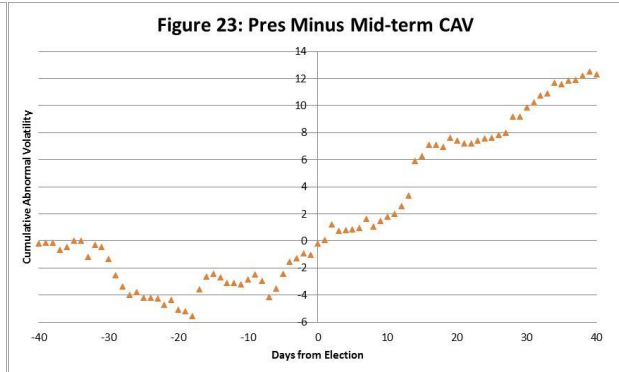
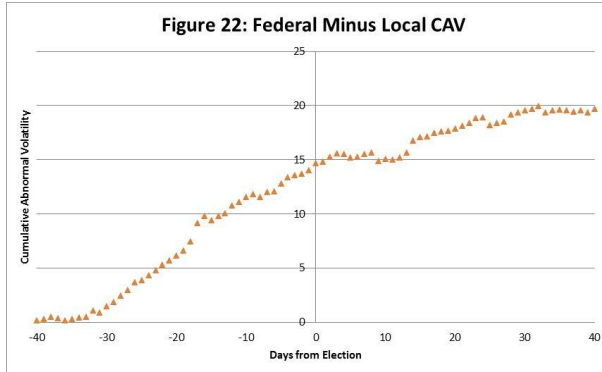
Figure 16: Cumulative Abnormal Volatility at Elections from 1989 to 2000

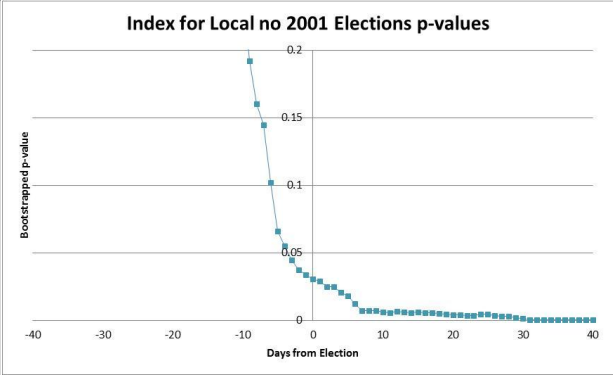
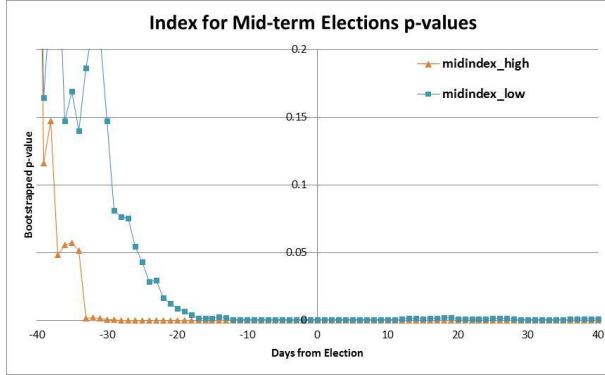
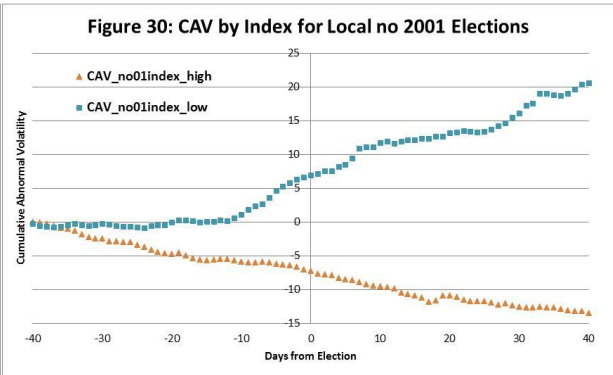
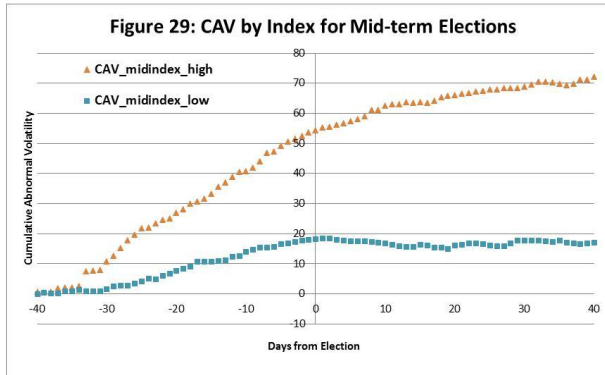
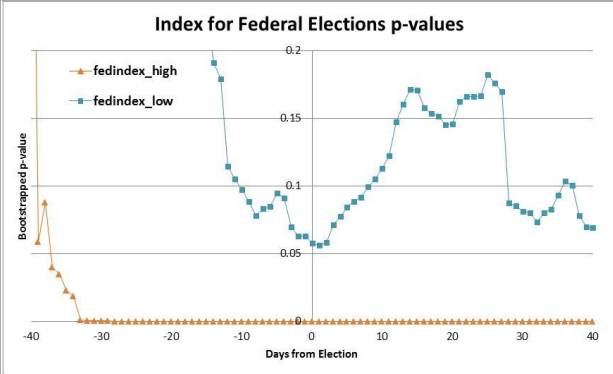
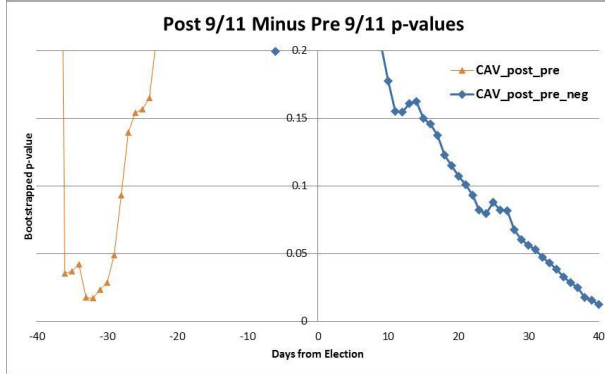
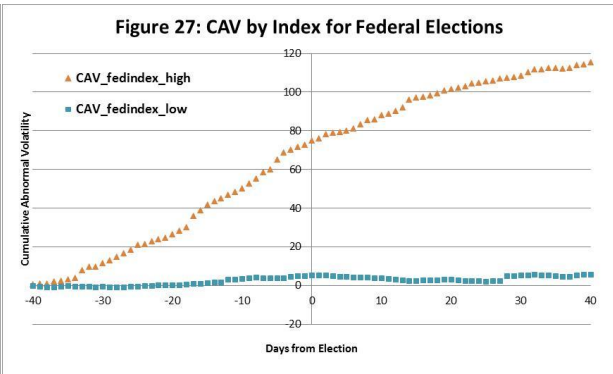
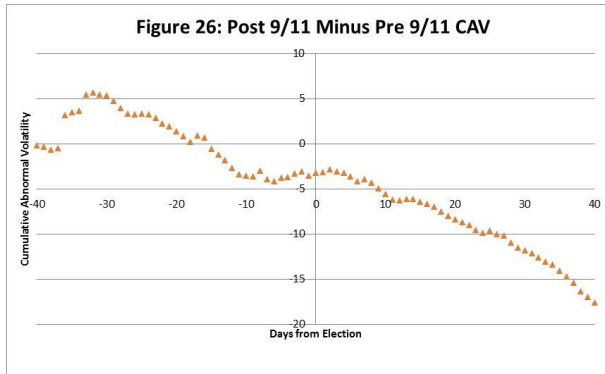


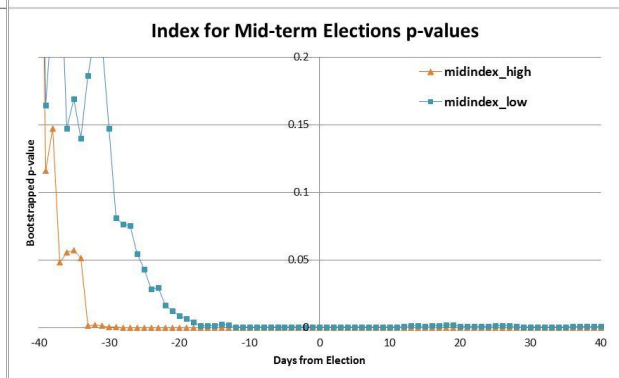
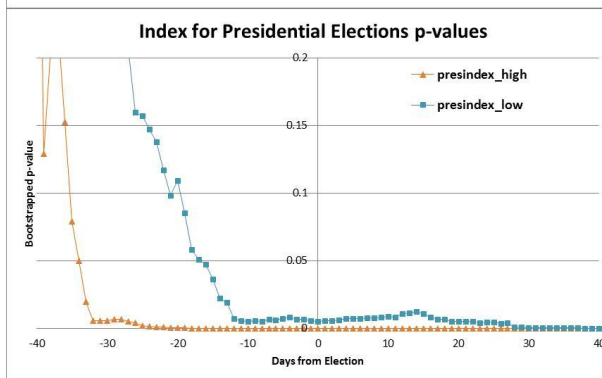
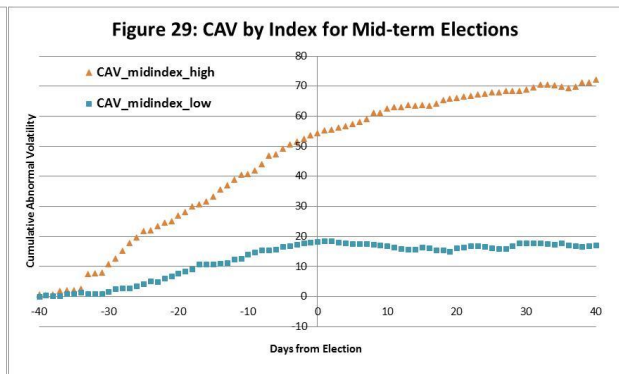
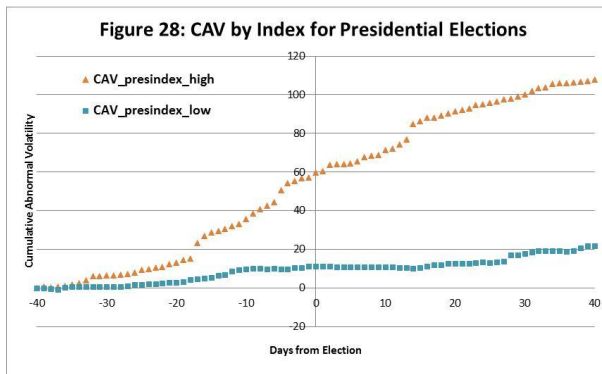
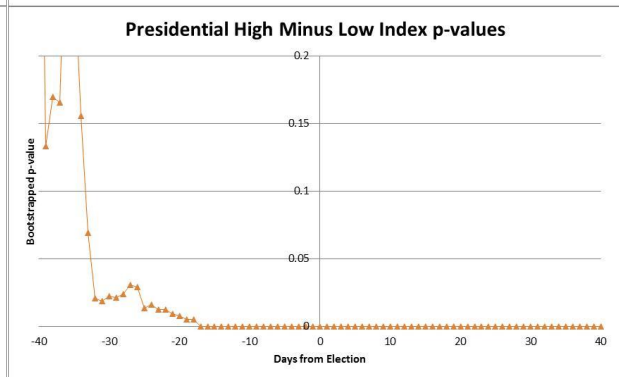
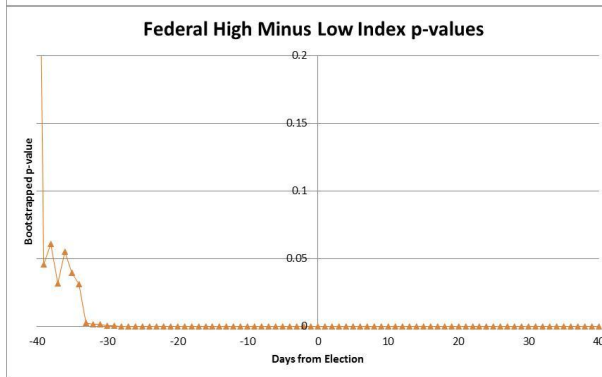
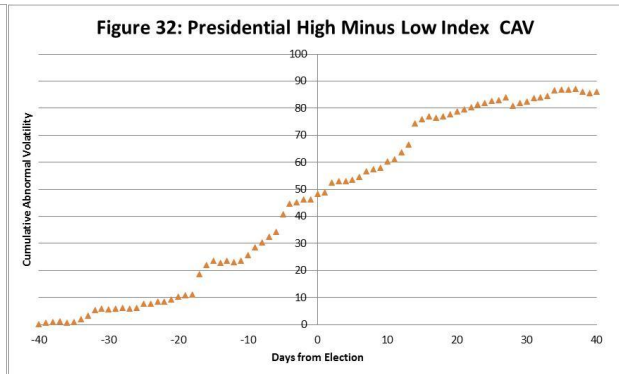
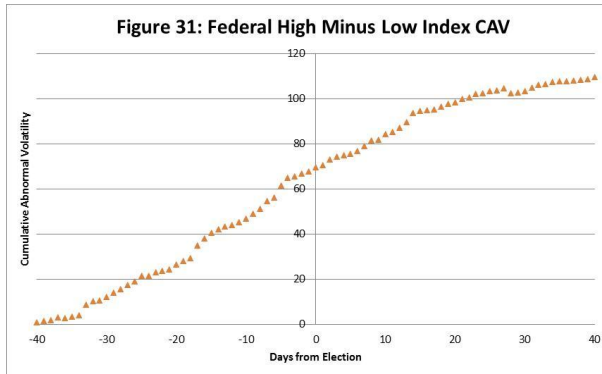
Figure 17: Cumulative Abnormal Volatility at Elections from 2001 to 2012

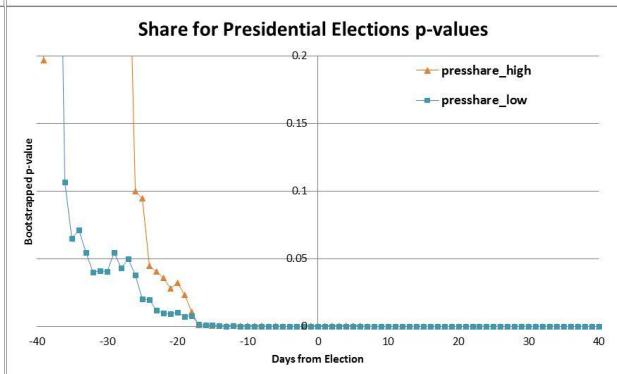
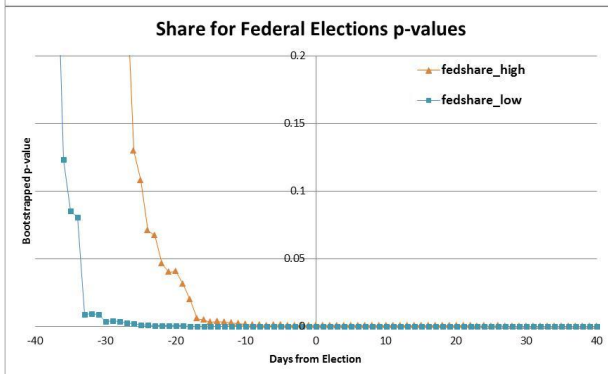
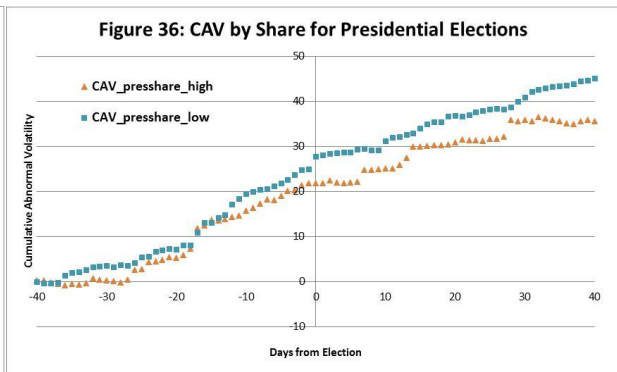
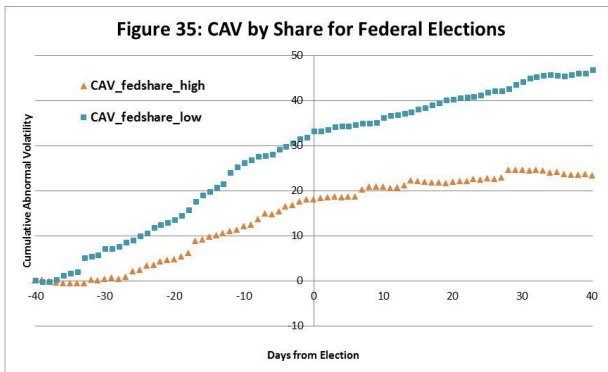
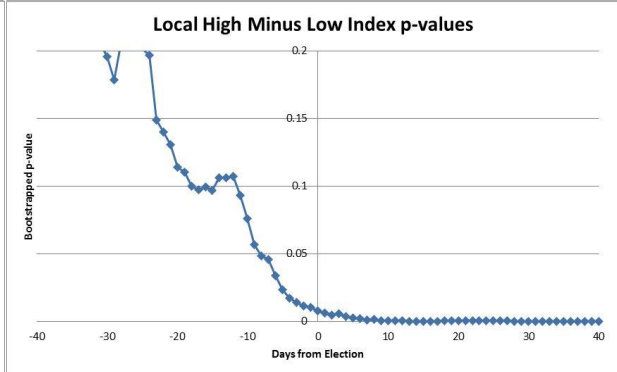
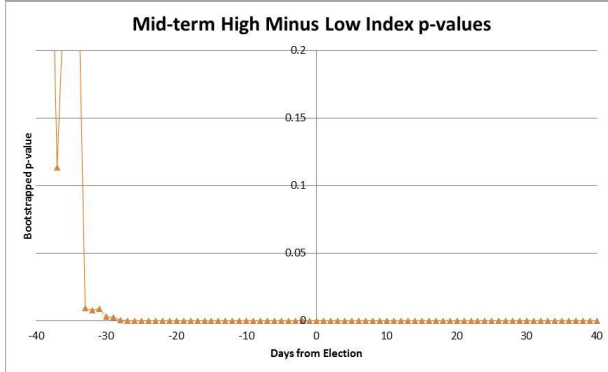
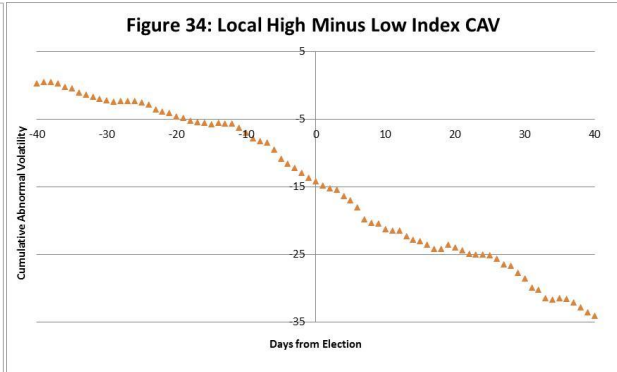
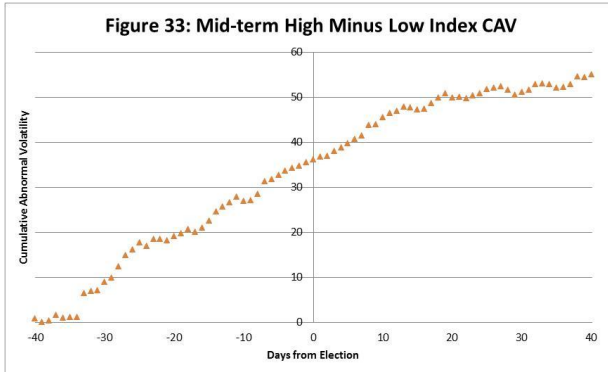


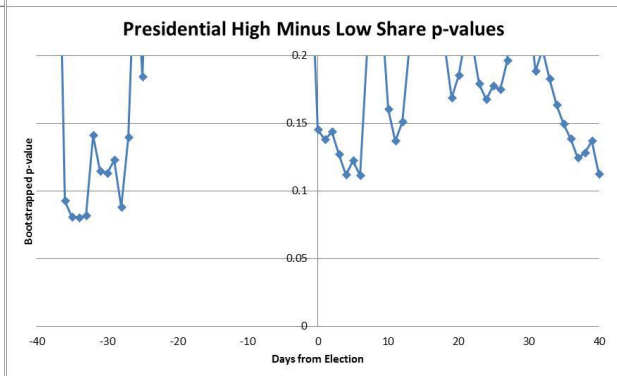
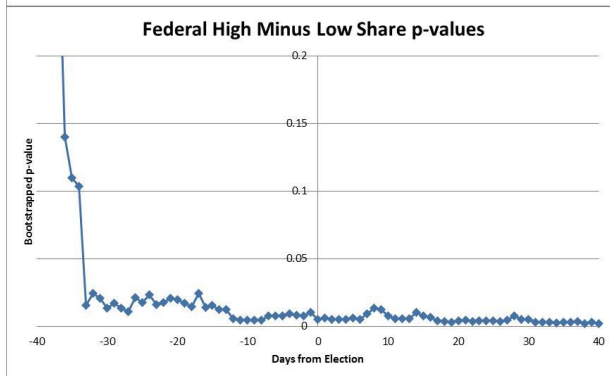
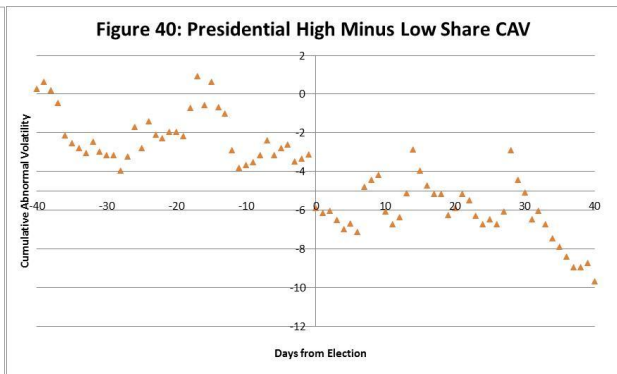
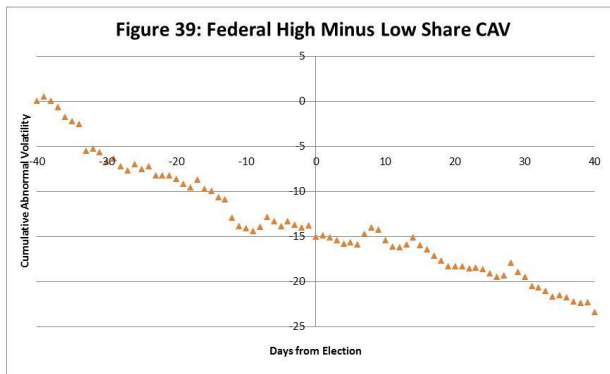
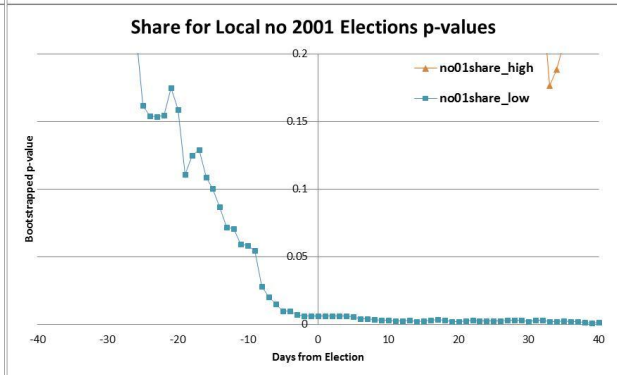
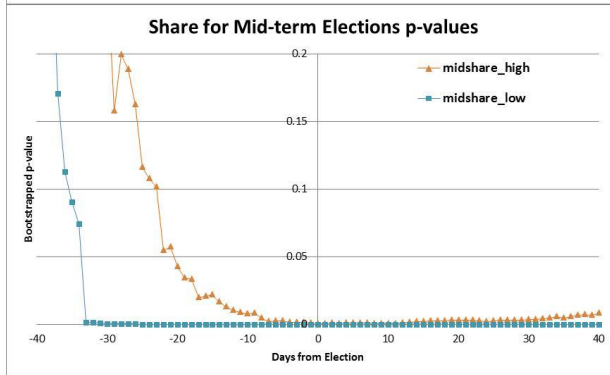
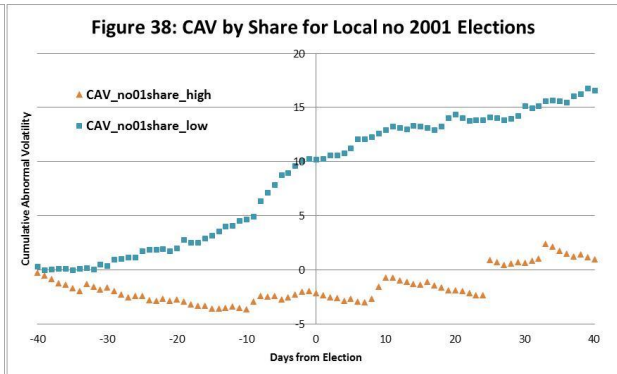
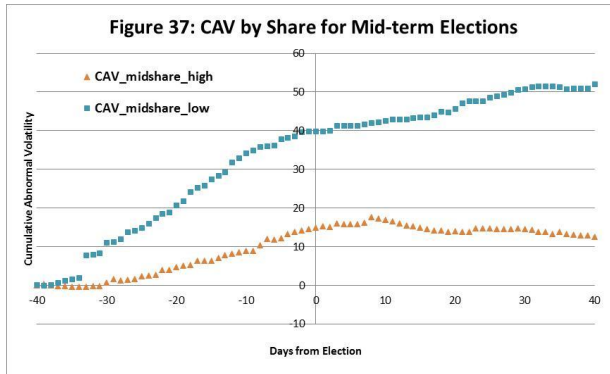


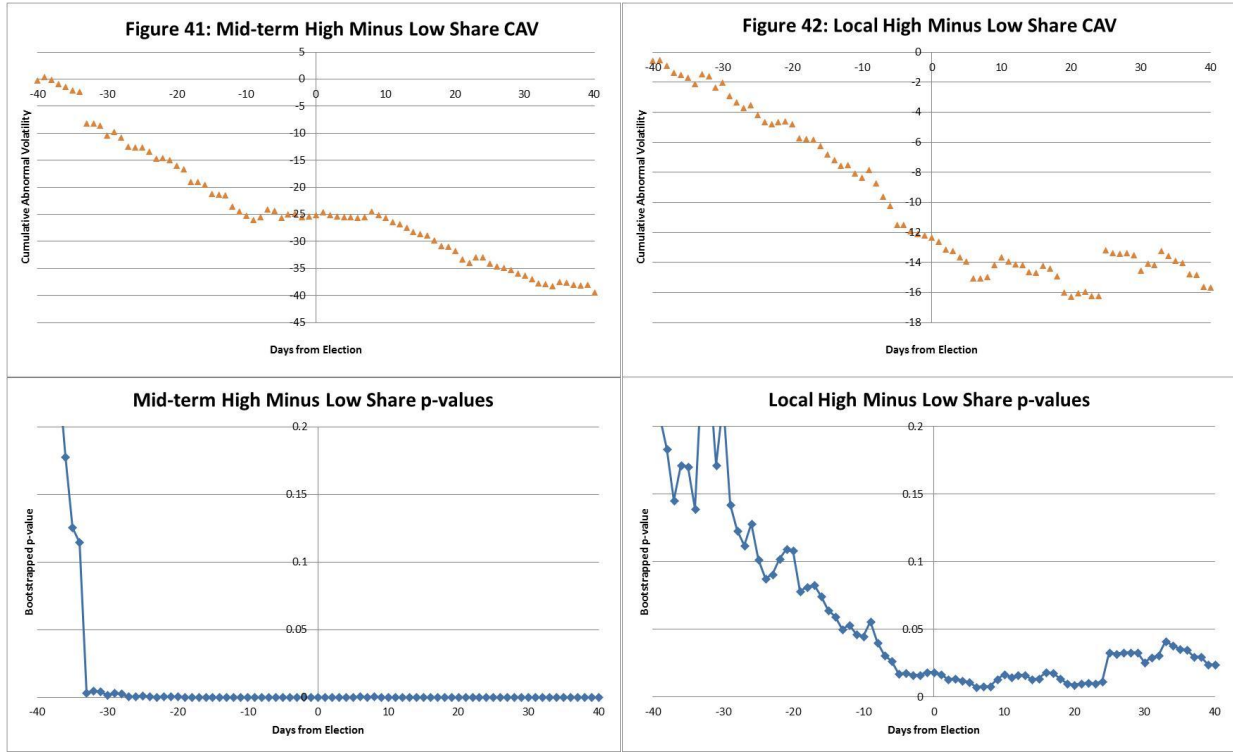












APPENDIX E – ROBUSTNESS TABLES

Table XIII: Volatility Regressions Including Uncertainty Index

Table XIII presents average volatility models (9) using firm-election level daily volatility measures (5) over the event window (-40, 40). A non-negative intercept constraint is imposed to ensure that each firm-election volatility model is valid. Local elections include all odd year elections except for 2001 due to the confounding event of September 11th 2001. Federal elections include all even year elections. Presidential elections include each year with a candidate for president and Mid-term elections include each federal election year without a presidential candidate. Pre 9/11 includes all types of elections from 1989 through 2000, while post 9/11 includes all types of elections from 2001 through 2012. Compustat variables include: Leverage is $(DLTT + DD1)/AT$, Return on Assets (ROA) is NI/AT , Tobin's Q is $MKVALT/AT$, and Size is the natural log of assets (AT). Index is the September national security and war uncertainty index from Baker, Bloom, and Davis (2013). The significance of mean values is reported using the t-test. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Variable	All Elections		Federal Elections		Period	
	Local no '01	Federal	Presidential	Mid-term	Pre 9/11	Post 9/11
Leverage	8.29	-34.12	-73.36	-16.63	-17.30	-10.96
ROA	-67.11	47.61	126.21	-65.04	-66.59	138.82 **
Tobins_Q	10.63 *	-31.57 ***	-34.65 ***	-41.63 ***	0.27	-16.61 **
Size	3.01 **	5.02 ***	1.93	5.21 ***	1.69	1.18
Index	-1.33 ***	0.66 ***	2.45 ***	0.50 **	1.09 ***	0.49 ***
F value	3.88 ***	14.24 ***	10.60 ***	8.52 ***	18.67 ***	5.87 ***
Adjusted R ²	0.030	0.113	0.157	0.126	0.169	0.040

Table XIV: Volatility Regressions Including Share

Table XIV presents average volatility models (9) using firm-election level daily volatility measures (5) over the event window (-40, 40). These models are run for each firm-year observation with a non-negative intercept constraint imposed. Local elections include all odd year elections except for 2001 due to the confounding event of September 11th 2001. Federal elections include all even year elections. Presidential elections include each year with a candidate for president and Mid-term elections include each federal election year without a presidential candidate. Pre 9/11 includes all types of elections from 1989 through 2000, while post 9/11 includes all types of elections from 2001 through 2012. Compustat variables include: Leverage is $(DLTT + DD1)/AT$, Return on Assets (ROA) is NI/AT , Tobin's Q is $MKVALT/AT$, and Size is the natural log of assets (AT). Share is the percentage of arms sales to total sales of the firm. Yearly dummy variables are included in the regression but these results are not reported in the table. The significance of mean values is reported using the t-test. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Variable	All Elections		Federal Elections		Period	
	Local no '01	Federal	Presidential	Mid-term	Pre 9/11	Post 9/11
Leverage	-6.39	18.55	-16.18	26.37	-36.17	18.49
ROA	-113.67 **	-106.88	-47.45	-167.56	-159.54 **	-42.84
Tobins_Q	13.19	-2.44	-16.59 **	2.37	-0.53	4.87
Size	2.89 **	13.30 ***	5.66 ***	13.56 ***	4.77 ***	7.49 ***
Share	-0.03	0.12	-0.12	0.07	-0.06	-0.09
F value	6.63 ***	28.20 ***	27.29 ***	15.62 ***	23.50 ***	4.17 ***
Adjusted R ²	0.155	0.457	0.506	0.360	0.382	0.080

Table XV: Volatility Models by Firm-Election

Table XV presents average volatility models (10) using firm-election level volatility measures (5) over the event window (-40, 40). A non-negative intercept constraint is imposed to ensure that each firm-election volatility model is valid. Event windows (n_1, n_2) are identified by days relative to the election. Local elections include all odd year elections except for 2001. Federal elections include all even year elections. Presidential elections include each year with a candidate for president and Mid-term elections include each federal election year without a presidential candidate. Pre 9/11 includes all types of elections from 1989 through 2000, while post 9/11 includes all types of elections from 2001 through 2012. Panel A provides the mean volatility model parameters with significance reported using the t-test. Panel B provides the median volatility model parameters with significance reported using the Wilcoxon signed rank test. Panel C presents volatility trends as shown in the hypothesis tests. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Window (n_1, n_2)	Variable	All Elections		Federal Elections		Period	
		Local no '01	Federal	Presidential	Mid-term	Pre 9/11	Post 9/11
Panel A: Mean model values for Q by firm and year							
(-40, 0)	$\alpha_{pre} + \beta_{pre}(n_1)$	0.960	1.207 **	1.067	1.347 **	1.142 **	1.338 **
	β_{pre}	0.010 ***	0.015 ***	0.022 ***	0.008 *	0.014 ***	0.003
	α_{pre}	1.365 ***	1.825 ***	1.966 ***	1.684 ***	1.701 ***	1.441 ***
(1, 40)	α_{post}	1.132 **	1.296 ***	1.473 ***	1.119 *	1.262 ***	1.155 **
	β_{post}	-0.003	-0.004 *	-0.005	-0.003	0.002	-0.010 ***
	$\alpha_{post} + \beta_{post}(n_2)$	1.027	1.119 *	1.257 **	0.982	1.360 ***	0.764 ***
Mean Adjusted R ²		0.047	0.048	0.046	0.049	0.044	0.054
Panel B: Median model values for Q by firm and year							
(-40, 0)	$\alpha_{pre} + \beta_{pre}(n_1)$	0.651 ***	0.779 ***	0.781 **	0.758	0.780 ***	0.656 ***
	β_{pre}	0.005 ***	0.004 ***	0.006 ***	0.002 ***	0.006 ***	0.001 ***
	α_{pre}	0.887 *	1.007 ***	0.992 ***	1.041 ***	1.117 ***	0.712
(1, 40)	α_{post}	0.735 ***	0.801	0.837	0.748 *	0.919	0.644 ***
	β_{post}	-0.001 *	-0.003 ***	-0.002 *	-0.004 ***	0.001	-0.005 ***
	$\alpha_{post} + \beta_{post}(n_2)$	0.678 ***	0.647 ***	0.674	0.598 ***	1.025 ***	0.350 ***
Median Adjusted R ²		0.019	0.019	0.018	0.020	0.019	0.021
Panel C: Volatility profile parameters							
mean ΔQ	$\beta_{pre}(n_1)$	0.413 **	0.656 ***	0.992 ***	0.322	0.582 ***	0.006
	$\alpha_{post} - \alpha_{pre}$	-0.219 **	-0.519 ***	-0.500 ***	-0.537 ***	-0.447 ***	-0.174
	$\beta_{post}(n_2)$	-0.126	-0.230 **	-0.288	-0.173	0.083	-0.448 ***
median ΔQ	$\beta_{pre}(n_1)$	0.182 ***	0.155 ***	0.234 ***	0.069 ***	0.221 ***	0.035 ***
	$\alpha_{post} - \alpha_{pre}$	-0.124 ***	-0.165 ***	-0.060 ***	-0.202 ***	-0.193 ***	-0.051 ***
	$\beta_{post}(n_2)$	-0.061 *	-0.128 ***	-0.097 *	-0.149 ***	0.037	-0.190 ***

Table XVI: Volatility Models by Uncertainty Index

Table XVI presents average election category volatility measures (6) and volatility models (9) around elections based on the top (1st) and bottom (4th) quartiles of the September national security and war uncertainty index from Baker, Bloom, and Davis (2013). Descriptive values of election categories are the same as reported in Table VII, panel A. Panels and reporting of statistics are consistent with the information in Table XII. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Window (n_1, n_2)	Variable	Local no '01 Quartile		Federal Quartile		Presidential Quartile		Mid-term Quartile	
		1st	4th	1st	4th	1st	4th	1st	4th
Panel A: Average Volatility									
(-40, 40)	mean M	0.833 ***	1.255 ***	2.426 ***	1.073	2.333 ***	1.271 ***	1.892 ***	1.211 ***
	median M	0.807 ***	1.214 ***	2.233 ***	1.029	1.943 ***	1.173 ***	1.707 ***	1.091 ***
	mean M	0.823 ***	1.169 ***	2.827 ***	1.130 ***	2.454 ***	1.275 ***	2.328 ***	1.445 ***
(-40, 0)	median M	0.811 ***	1.096 ***	2.589 ***	1.114 **	2.065 ***	1.205 ***	2.184 ***	1.420 ***
	mean M	0.844 ***	1.342 ***	2.016 ***	1.015	2.210 ***	1.267 **	1.444 ***	0.971
	median M	0.804 ***	1.294 ***	1.864 ***	0.956	1.847 ***	1.096 ***	1.449 ***	0.872
Panel B: Models of Volatility									
(-40, 0)	$\alpha_{pre} + \beta_{pre}(n_1)$	0.772 ***	0.795 ***	1.936 **	0.930	1.205	1.104	2.154 ***	1.270 **
	β_{pre}	0.003	0.019 ***	0.045 ***	0.010 **	0.062 ***	0.009	0.009	0.009
	α_{pre}	0.874 **	1.543 ***	3.718 ***	1.330 ***	3.703 ***	1.447 ***	2.502 ***	1.621 ***
(1, 40)	α_{post}	0.759 ***	1.302 **	2.542 ***	0.765	2.752 ***	0.862	1.699 ***	0.853
	β_{post}	0.004	0.002	-0.026 **	0.012 *	-0.026	0.020 **	-0.012 *	0.006
	$\alpha_{post} + \beta_{post}(n_2)$	0.928	1.382 ***	1.489 **	1.264 *	1.667	1.672 ***	1.190	1.089
	Adjusted R ²	0.004	0.206	0.253	0.094	0.126	0.064	0.224	0.247

Table XVII: Volatility Models by Share

Table XVII presents average election category volatility measures (6) and volatility models (9) around elections based on the top (1st) and bottom (4th) quartiles of the share of sales to the military. Descriptive values are the same as those reported in Table VIII, panel A. Panels and reporting of statistics are consistent with the information in Table XII. Significance levels are indicated: *** @ 1%, ** @ 5%, and * @ 10%.

Window (n_1, n_2)	Election Category	Local no 01 Quartile		Federal Quartile		Presidential Quartile		Mid-term Quartile	
		1st	4th	1st	4th	1st	4th	1st	4th
Panel A: Average Volatility									
(-40, 40)	mean M	1.012	1.205 ***	1.289 ***	1.578 ***	1.438 ***	1.558 ***	1.156 ***	1.642 ***
	median M	0.875 **	1.153 ***	1.196 ***	1.487 ***	1.197 ***	1.410 ***	1.032 *	1.410 ***
	mean M	0.948	1.249 ***	1.442 ***	1.809 ***	1.533 ***	1.676 ***	1.363 ***	1.974 ***
(-40, 0)	median M	0.901 *	1.153 ***	1.343 ***	1.707 ***	1.287 ***	1.576 ***	1.262 ***	1.679 ***
	mean M	1.077	1.160 ***	1.132 *	1.342 ***	1.342 **	1.436 ***	0.944	1.302 ***
	median M	0.857	1.153 ***	1.063	1.292 ***	1.126 **	1.289 ***	0.832 **	1.208 ***
Panel B: Models of Volatility									
(-40, 0)	$\alpha_{pre} + \beta_{pre}(n_1)$	0.763 ***	0.978	1.086	1.584 ***	1.138	1.166	1.044	2.040 ***
	β_{pre}	0.009 **	0.014 ***	0.018 **	0.011	0.020 *	0.026 ***	0.016 ***	-0.003
	α_{pre}	1.132	1.520 ***	1.799 ***	2.033 ***	1.927 ***	2.186 ***	1.682 ***	1.908 ***
(1, 40)	α_{post}	1.057	1.196 *	1.316 **	1.339 ***	1.547 *	1.384 **	1.097	1.339 **
	β_{post}	0.001	-0.002	-0.009	0.000	-0.010	0.003	-0.007	-0.002
	$\alpha_{post} + \beta_{post}(n_2)$	1.098	1.124	0.948	1.345 ***	1.136	1.488 ***	0.791	1.264 *
Adjusted R ²	0.005	0.105	0.154	0.182	0.021	0.117	0.243	0.126	

APPENDIX F – OUTLINE OF SAS CODE

- * ELECTIONS AND ASSET PRICING: The Politically Sensitive Equity of US Military Contractors ;
- * This code identifies the sample firms and gets data for the military contractors ;
- * Compustat provides only firms with positive CEQ ;
- * CRSP provides only firms with a full estimation period and daily returns thru the election day ;
- * Some output is produced in excel format for figure 1 ;

```
libname sas "C:\Documents and Settings\ej1095\Desktop\Data_3FEB14\SAS" ;
```

```
data elec_dates;
```

```
%let wrds=wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
```

```
rsubmit;
libname comp '/wrds/comp/sasdata/nam'; * Access annual firm data from compustat ;
data temp1;
endrsubmit;
```

```
rsubmit;
proc upload data=elec_dates out=elec_dates;
endrsubmit;
```

```
rsubmit;
proc sql;
data temp2;
libname compm '/wrds/comp/sasdata/nam/company'; * Access annual firm data from compustat ;
data temp3;
proc sql;
endrsubmit;
```

```
rsubmit;
proc download data = temp4 out = temp4 ;
endrsubmit;
```

```
data temp5;
proc sort data = temp5 out = mil_firms_compustat ;
data sas.mil_firms_compustat;
data mil_firms;
```

```
%let wrds=wrds.wharton.upenn.edu 4016;
options comamid=TCP remote=WRDS;
signon username=_prompt_;
```

```
rsubmit;
proc upload data = mil_firms out = mil_firms ;
data e_dates ;
endrsubmit;
```

```
rsubmit;
proc sort data = e_dates nodupkey;
proc sql;
```



```

endrsubmit;

rsubmit;
proc sort data=temp1;
data CRSP_firms;
endrsubmit;

rsubmit;
proc sort data= mil_firms ;
proc sort data=CRSP_firms ;
endrsubmit;

rsubmit;
proc sql;
proc sort data = elec_return ;
endrsubmit;

rsubmit;
data return3;
data event;
proc sort data=event;
data event;
endrsubmit;

rsubmit;
%let window_b = -40; * begin event window period ;
%let window_f = 40 ; * end event window period ;
data event_2;
endrsubmit;

rsubmit;
data return4;
data return5;
data return6 ;
endrsubmit;

rsubmit;
data index;
proc sort data=index;
proc sort data= return6 ;
data GARCH_data;
endrsubmit;

rsubmit;
proc sort data= GARCH_data ;
proc reg data = GARCH_data noprint outest=beta;
data beta;
data beta;
endrsubmit;

rsubmit;
data GARCH_data_2 ;
data GARCH_data_3 ;
endrsubmit;

```

```

rsubmit;
proc download data = GARCH_data_3 out = ar ;
endrsubmit;

data sas.ar_1165 ;

rsubmit;
data final_sample ;
proc download data = final_sample out = final_sample ;
endrsubmit;

proc univariate data = final_sample noprint ;
data weight_data ;
proc sort data = weight_data nodupkey ;
data weight_data_2 ;
PROC EXPORT DATA= WORK.weight_data_2
proc sort data = final_sample ;
data final_sample_firms ;
proc sql;

rsubmit;
proc upload data= final_firms out= final_firms ;
endrsubmit;

rsubmit;
libname crspa '/wrds/crsp/sasdata/a_stock';
data all_firms ;
proc sql;
data names_sic ;
proc sort data = names_sic ;
endrsubmit;

rsubmit;
proc sort data = final_firms ;
data names_firms2 ;
proc download data= names_firms2 out=names_firms2 ;
endrsubmit;

data ff48;
data ff48_missing;
data ff48_missing2;
data ff48;
proc sql ;
proc sort data = names_firmsff ;
data sas.names_89_12 ;

* Next step is the code Table_2_3 to create data for tables 2 and 3 ;

```

- * ELECTIONS AND ASSET PRICING: The Politically Sensitive Equity of US Military Contractors ;
- * This uses sample firms from Sample_89-12 to produce all the output for Tables 2 and 3 ;
- * This code only extracts data from the file sas.names_89_12 which comes from Sample_89_12.sas ;

```
libname sas "C:\Documents and Settings\ej1095\Desktop\Data_3FEB14\SAS" ;
```

```
data names_firmsff ;
data sas.names_firmsff ;
proc univariate data = names_firmsff noprint ;
proc sort data = names2 ;
proc sort data = names_firmsff ;
data names3 ;
proc sort data = names3 ;
PROC EXPORT DATA= WORK.names3
proc univariate data = names_firmsff noprint ;
data share_stats ;
PROC EXPORT DATA= WORK.share_stats
proc sql number ;
data count_table2_ind_all ;
PROC EXPORT DATA= WORK.count_table2_ind_all
proc sort data = names_firmsff out = observations nodupkey ;
proc sort data = names_firmsff out = observations nodupkey ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_rank ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_arms_sales ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_share ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_at ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_sale ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_NI ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_Tobins_Q ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_OIBDP_Assets ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_OIDBP_sales ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_Cash_flow_per_sales ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_ROE ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_ROA ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_Profit_margin ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_tobinsq_alt;
proc univariate data = names_firmsff noprint ;
data tableIII_A_OIATR ;
proc univariate data = names_firmsff noprint ;
data tableIII_A_CERDATR ;
```


- * ELECTIONS AND ASSET PRICING: The Politically Sensitive Equity of US Military Contractors ;
- * Produces abnormal returns and raw data for GARCH modeling ;
- * Creates correlation information and does t-tests of estimation vs. event periods ;

```
libname sas 'C:\Documents and Settings\ej1095\My Documents\Magic Briefcase\SAS' ;
```

```
data ar ;
proc sort data= ar ;
proc univariate data = ar noprint ;
data ar_est ;
proc sql;
data ar_all_2 ;
proc sort data= ar_all_2 ;
proc means data = ar_all_2 noprint;
data results ;
proc means data = ar_all_2 noprint;
data results_2 ;
proc means data = ar_all_2 noprint;
data results_3 ;
data results_all ;
data sas.h_uncon_results ;
data corr_ar_test ;
proc sort data= corr_ar_test ;
PROC TRANSPOSE DATA= corr_ar_test
proc corr data= transpose_ar outp= pearson_gen noprint; * outs= spearman_gen ;
data pearson_gen_2;
proc means data = pearson_gen_2 noprint ;
data pearson_gen_3;
data corr_mean_2;
PROC TRANSPOSE DATA= corr_mean_2
data pearson_ar_4 ;
data corr_h_test ;
proc sort data= corr_h_test ;
PROC TRANSPOSE DATA= corr_h_test
proc corr data= transpose_h outp= pearson_h noprint; * outs= spearman_gen ;
data pearson_h_2;
proc means data = pearson_h_2 noprint ;
data pearson_h_3;
data corr_mean_h_2;
PROC TRANSPOSE DATA= corr_mean_h_2
data pearson_h_4 ;
data pearson_all;
data sas.pearson_all;
data sas.pearson_ar_4;
data sas.pearson_h_4;
PROC EXPORT DATA= WORK.pearson_all
PROC EXPORT DATA= WORK.pearson_ar_4
PROC EXPORT DATA= WORK.pearson_h_4
proc sort data= ar ;
data ar_est ;
proc univariate data = ar_est noprint ;
proc sql;
data ar_all_2 ;
```

```

proc ttest data= ar_all_2 ;

data ar_fed ;
data ar_fed_est ;
proc univariate data = ar_fed_est noprint ;
proc sql;
data ar_fed_3 ;
proc ttest data= ar_fed_3 ;
data ar_pres ;
data ar_pres_est ;
proc univariate data = ar_pres_est noprint ;
proc sql;
data ar_pres_3 ;
proc ttest data= ar_pres_3 ;
data ar_local ;
data ar_local_est ;
proc univariate data = ar_local_est noprint ;
proc sql;
data ar_local_3 ;
proc ttest data= ar_local_3 ;
proc means data = ar_local_3 noprint;
data data_for_GARCH ;
proc sort data=data_for_GARCH;
%macro Garch_output;
  %do i = 1989 %to 2012;
    data data_for_GARCH_&i ;
    proc export data = WORK.data_for_GARCH_&i
  %end;
%mend Garch_output;
%Garch_output

%macro Garch_output_event;
  %do i = 1989 %to 2012;
    data data_for_GARCH_event_&i ;
    proc export data = WORK.data_for_GARCH_event_&i
  %end;
%mend Garch_output;
%Garch_output_event

```

APPENDIX G – OUTLINE OF GAUSS CODE

```

new; cls;
format /m1 /rd 3,3;
format /m1 /rd 9,8;

/* This program converts Excel data files to matrix files of returns (ymat) and value weighted returns (xmat) */

fromdir = "C:\\Ross_garch\\gauss";
outdir = "C:\\Ross_garch\\garch\\gauss_output\\"; /* output */

let n = 46 48 48 49 52 49 49 44 45 46 45 40 47 49 60 61 57 50 48 50 48 43 42;
@The number of firms in the year of question@
let yr = 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24;
@let yr = 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12;@
@The last two digits of the year here @

st_data=-540;
ed_data=-41;
TL=(ed_data-st_data+1);
nn = 1 ;

do while nn<=24; @ nn<=24 @
fromstr1 = fromdir $+ ftocv(yr[nn,.],1,0) $+ "_1165.xls" ;
outstr1 = outdir $+ ftocv(yr[nn,.],1,0) $+ "ymat.xls" ;
outstr2 = outdir $+ ftocv(yr[nn,.],1,0) $+ "xmat.xls" ;
outstr3 = outdir $+ ftocv(yr[nn,.],1,0) $+ "idvar.xls" ;

vls = reshape(error(0), 9,1);
vls[4] = 9999.99;
ret1 = xlsreadm(fromstr1,"a2", 1,vls);
t1=rows(ret1);
c1=cols(ret1);
nfirms=n[nn,.];
idvar=zeros(1,nfirms); @idvar is the vector of permno values@
indi=ret1[.,2];
firmid=indi[2:t1]-indi[1:t1-1];
ii=(firmid.ne.0);
firmn=sumc(ii)+1; @ number of firms @
firmi=1+cumsumc(ii)+1;
ymat=zeros(TL,nfirms);
xmat=zeros(TL,nfirms);

i=1;
do while i<=firmn;
    j=1;
    subdata=zeros(1,c1);
    idvar[1,i]=ret1[TL*i,2]; @records a vector of permno id variables @
do while j<=t1;
if firmi[j]==i;
subdata=subdata|ret1[j,.];
endif;
j=j+1;
endo;
i=i+1;
endo;

```

```
subdata=trimr(subdata,1,0);

st_point=1;
yy=100*subdata[:,3];
xx=100*subdata[:,6];
start=subdata[1,4]-st_data+1;
yymat[:,i]=yy;
xmat[:,i]=xx;
if start>st_point;
    st_point=start;
endif;
i=i+1;
endo;

ymat=trimr(yymat,st_point-1,0);
xmat=trimr(xmat,st_point-1,0);

outxls1 = xlsWriteM(yymat, outstr1 , "a2", 1, vls);
outxls2 = xlsWriteM(xmat, outstr2 , "a2", 1, vls);
outxls3 = xlsWriteM(idvar, outstr3 , "a2", 1, vls);

output on;
nn;
output off;

nn=nn+1;
endo;
end;
```



```

/* This code determines the GARCH(1,1) parameters */

new; cls;
rndseed 5184;
library optimum, pgraph;
format /ml /rd 9,4;

st_data=-540; @starting point of estimation period in trading days prior to the event@
ed_data=-41; @end point of estimation period in trading days prior to the event@
TL=(ed_data-st_data+1); @TL should be 500 @

fromdir = "C:\\Ross_garch\\garch\\gauss_output\\";
outdir = "C:\\Ross_garch\\garch\\gauss_output\\";

let n = 46 48 48 49 52 49 49 49 44 45 46 45 40 47 49 60 61 57 50 48 50 48 43 42;
let yr = 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24;
longmat=zeros(9,1165);

nn = 1 ;
gg = 0 ;
do while nn<=24; @ nn is the number of years in the sample (2012 - 1989 + 1) = 24 @
instr1 = fromdir $+ ftocv(yr[nn,],1,0) $+ "ymat.xls" ;
instr2 = fromdir $+ ftocv(yr[nn,],1,0) $+ "xmat.xls" ;
instr3 = fromdir $+ ftocv(yr[nn,],1,0) $+ "idvar.xls" ;
vls = reshape(error(0), 9,1);
vls[4] = 9999.99;
ymat = xlsreadm(instr1,"a2", 1,vls);
xmat = xlsreadm(instr2,"a2", 1,vls);
idvar = xlsreadm(instr3,"a2", 1,vls);
file1 = outdir $+ ftocv(yr[nn,],1,0) $+ "param.xls" ;
file2 = outdir $+ "all_param.xls" ;
redomax=3;

ii=1;
t=rows(ymat);
k=cols(ymat);
x=ones(t,1)~xmat[:,1];
np=5;
residmat=zeros(t+2,k);
hmat=zeros(t+2,k);
parammat=zeros(np,k);
all_mat=zeros(9,k);
like_mat=zeros(redomax+2,k);

jj=1;
do while jj<=k;
PRF=zeros(redomax,np);
XX=zeros(redomax,np);
FV=zeros(redomax,1);
minfout=800;
redo=0;
y=ymat[:,jj];
do while redo<redomax;
paraml=1*rndn(1,np);

```



```

@ This code calculates q values for each firm-year-day @

new; cls;
rndseed 5184;
library optimum, pgraph;
format /ml /rd 9,4;

st_data=-40; @starting point of event period in trading days prior to the event@
ed_data=40; @end point of event period in trading days prior to the event@
T=(ed_data-st_data+1); @TL should always be 81 @

fromdir = "C:\\Ross_garch\\garch\\gauss_output\\";
outdir = "C:\\Ross_garch\\garch\\gauss_output\\";

let n = 46 48 48 49 52 49 49 49 44 45 46 45 40 47 49 60 61 57 50 48 50 48 43 42;
let yr = 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24;
let yr2 = 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012;

long_q=zeros(T+2,1165);
longer_Q=zeros(T*1165,4); @ cols are year, permno, time, Q @
long_m=zeros(T*rows(n),3);
mtmat=zeros(T,rows(n));
h_dif=zeros(T,rows(n));
nn = 1 ;
gg = 0 ;
qq = 0 ;

do while nn<=24; @ nn is the number of years in the sample (2012 - 1989 + 1) = 24 @
instr1 = fromdir $+ ftocv(yr[nn,],1,0) $+ "param.xls" ;
instr2 = fromdir $+ ftocv(yr[nn,],1,0) $+ "ymat_event.xls" ;
instr3 = fromdir $+ ftocv(yr[nn,],1,0) $+ "xmat_event.xls" ;
vls = reshape(error(0), 9,1);
vls[4] = 9999.99;

parameters = xlsreadm(instr1,"a2", 1,vls); @This is the file with parameters from the estimation period@
ar_est = xlsreadm(instr1,"a4", 2,vls);
ymat = xlsreadm(instr2,"a2", 1,vls);
xmat = xlsreadm(instr3,"a2", 1,vls);
file1 = outdir $+ ftocv(yr[nn,],1,0) $+ "_h_out.xls" ;
file2 = outdir $+ "Mstats.xls" ;

firms=cols(ymat);
x=ones(t,1)~xmat[:,1];
t_est=rows(ar_est);
residmat=zeros(t,firms);
residout= zeros(t+2,firms);
hmat=zeros(t,firms);
hout=zeros(t+2,firms);
exp_h=zeros(4,firms);
sum_gamma=zeros(t,firms);
h_sum=zeros(t,firms);
h_ahead=zeros(t,firms);
h_delta=zeros(t,firms);

```

```

stats_h=zeros(4,firms);
stats_h[1,]=parameters[1,];
stats_h[2,]=parameters[2,];
h_est=zeros(t_est,firms);
ab_h=zeros(t_est,firms);
EIDRV=zeros(t,firms);
Q=zeros(t,firms);
M_day=zeros(t,3);
Q_all=zeros(t,firms);
jj=1;
do while jj<=firms;
h_est[.jj]=(ar_est[.jj])^2;
mean_h=sumc(h_est[.jj])/t_est;
stats_h[3,jj]=mean_h; @ mean of est period conditional variance @
ab_h[.jj]=(h_est[.jj]-mean_h)^2;
stats_h[4,jj]=sumc(ab_h[.jj])/(t_est-1); @ variance of est period conditional variance @
residmat[.jj]=ymat[.jj]-xmat[.jj]*parameters[4,jj];
hmat[1,jj]=parameters[5,jj]+parameters[6,jj]*(parameters[9,jj])^2 +parameters[7,jj]*parameters[8,jj] ;
exp_h[1,jj]=parameters[5,jj];
exp_h[2,jj]=parameters[6,jj]+parameters[7,jj];
exp_h[3,jj]=parameters[6,jj]*parameters[8,jj];
exp_h[4,jj]=parameters[7,jj]*(parameters[9,jj])^2;
h_ahead[1,jj]=exp_h[1,jj]+exp_h[3,jj]+exp_h[4,jj]; @eqn #3 in Bialkowski@
EIDRV[1,jj]=(h_ahead[1,jj]*(firms-2)/firms)+ (h_ahead[1,jj]/firms^2);
h_sum[1,jj]=hmat[1,jj] ;
k=2;
do while k<=T;
hmat[k,jj]= parameters[5,jj]+parameters[6,jj]*(residmat[k-1,jj])^2 +parameters[7,jj]*hmat[k-1,jj];
j=2 ;
sum_gamma[1,jj]=1 ;
do while j<=k;
sum_gamma[j,jj]=sum_gamma[j-1,jj]+exp_h[2,jj]^j ;
j=j+1;
endo;
h_ahead[k,jj]=(exp_h[1,jj]*sum_gamma[k,jj]) +(exp_h[3,jj]*exp_h[2,jj]^(k-1)) +(exp_h[4,jj]*exp_h[2,jj]^(k-1)) ;
h_sum[k,jj]=h_sum[k-1,jj]+h_ahead[k,jj] ;
h_delta[k,jj]=(hmat[k,jj] - stats_h[3,jj])/stats_h[4,jj];
k=k+1;
endo;
jj=jj+1;
endo;

EIDRV=(h_ahead*(firms-2)/firms)+ (sumr(h_ahead)/firms^2);
jjj=1;
do while jjj<=firms;
Q[1,jjj]= (((firms*residmat[1,jjj]) - sumr(residmat[1,.])^2)/(EIDRV[1,jjj]*firms^2);
M_day[1,3] = sumr(Q[1,.])/(firms-1); @This is eqn #5 from Bialkowski@
M_day[1,1] = yr2[nn] ;
M_day[1,2] = st_data ;
longer_Q[(t*(jjj-1)+qq+1),1]= yr2[nn] ;
longer_Q[(t*(jjj-1)+qq+1),2]= parameters[2,jjj];
longer_Q[(t*(jjj-1)+qq+1),3]= st_data ;
longer_Q[(t*(jjj-1)+qq+1),4]= Q[1,jjj] ;
kk=2;

```

```

do while kk<=T;
Q[kk,jjj] = (((firms*residmat[kk,jjj]) - sumr(residmat[kk,.])^2)/(EIDRV[kk,jjj]*firms^2)) ;
M_day[kk,3] = sumr(Q[kk,.])/(firms-1); @This is eqn #5 from Bialkowski@
M_day[kk,1] = yr2[nn] ;
M_day[kk,2] = (kk+st_data-1) ;
longer_Q[(t*(jjj-1)+qq+kk),1]= yr2[nn] ;
longer_Q[(t*(jjj-1)+qq+kk),2]= parameters[2,jjj];
longer_Q[(t*(jjj-1)+qq+kk),3]= (kk+st_data-1) ;
longer_Q[(t*(jjj-1)+qq+kk),4]= Q[kk,jjj] ;
kk=kk+1;
endo;
jjj=jjj+1;
endo;
mtmat[.,nn]=M_day[.,3]; @ yr2[kk] ~ (kk+st_data-1) ~ @
hout=ones(1,firms)*nn|parameters[2,.]|hmat ;
residout=ones(1,firms)*nn|parameters[2,.]|residmat ;
EIDRV2=ones(1,firms)*nn|parameters[2,.]|EIDRV ;
Q_all= ones(1,firms)*nn|parameters[2,.]|Q ;
long_q[.,(gg+1):(gg+firms)]=Q_all;
long_M[(t*(nn-1)+1):(t*nn),.]=M_day;
qq=qq+firms*t ;
gg=gg+firms ;
nn=nn+1;
endo;

h_dif2= yr2|h_dif ;
mtmat2=yr2|mtmat ;
long_Q2 = long_q' ;
LQ1=zeros(sumc(n[1:13])*t,4); @ all observations (49410) from 1989 to 2001 @
LQ2=zeros(sumc(n[14:rows(n)])*t,4); @ all observations (44955)from 2002 to 2012 @
LQ1[1:sumc(n[1:13])*t,.] = longer_Q[1:sumc(n[1:13])*t,.] ;
LQ2[1:sumc(n[14:rows(n)])*t,.] = longer_Q[sumc(n[1:13])*t+1:sumc(n[1:rows(n)])*t,.] ;

outxls10 = xlsWriteM(long_Q2, file2 , "a2", 1, vls);
outxls11 = xlsWriteM(long_M, file2 , "a2", 2, vls);
outxls12 = xlsWriteM(mtmat2, file2 , "a2", 3, vls);
outxls13 = xlsWriteM(LQ1, file2 , "a2", 4, vls);
outxls14 = xlsWriteM(LQ2, file2 , "a2", 5, vls);

end;

```

```

/* This code produces the bootstrap results used to create the distribution */

new; cls;
rndseed 5184;
library optnum, pgraph;
format /ml /rd 9,4;

st_data=-540; @starting point of estimation period in trading days prior to the event@
ed_data=-41; @end point of estimation period in trading days prior to the event@
t=(ed_data-st_data+1); @TL should be 500 @

fromdir = "C:\\Ross_garch\\garch\\gauss_output\\";
outdir = "C:\\Ross_garch\\garch\\gauss_output\\";

let n = 46 48 48 49 52 49 49 49 44 45 46 45 40 47 49 60 61 57 50 48 50 48 43 42;
let yr = 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24;
let yr2 = 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002
2003 2004 2005 2006 2007 2008 2009 2010 2011 2012;

fraction = .5; @ 500*.34 = 170 days @ @ remember that 81+170 = 251 @
long_m=zeros(rows(n)*t*fraction,4);
mtmat=zeros(t,rows(n));
h_dif=zeros(t,rows(n));
nn = 1 ;
gg = 0 ;

vls = reshape(error(0), 9,1);
vls[4] = 9999.99;
file1 = outdir $+ "est_M_for_boot.xls" ;
do while nn<=24; @ nn is the number of years in the sample (2012 - 1989 + 1) = 24 @
instr1 = fromdir $+ ftocv(yr[nn,],1,0) $+ "ymat.xls" ;
instr2 = fromdir $+ ftocv(yr[nn,],1,0) $+ "xmat.xls" ;
instr3 = fromdir $+ ftocv(yr[nn,],1,0) $+ "param.xls" ;
ymat_in = xlsreadm(instr1,"a2", 1,vls);
xmat_in = xlsreadm(instr2,"a2", 1,vls);
parameters = xlsreadm(instr3,"a2", 1,vls);
resid_in = xlsreadm(instr3,"a2", 2,vls); @Est period residual values (AR) @
hmat_in = xlsreadm(instr3,"a2", 3,vls); @Est period h values @
firms=cols(ymat_in);
exp_h=zeros(4,firms);
ymat = ymat_in[1:(t*fraction),.];
xmat = xmat_in[1:(t*fraction),.];
residmat = resid_in[1:(t*fraction+2),.];
hmat = hmat_in[1:(t*fraction+2),.];
sum_gamma=zeros(fraction*t,firms);
h_sum=zeros(fraction*t,firms);
h_ahead=zeros(fraction*t,firms);
EIDRV=zeros(fraction*t,firms);
Q=zeros(fraction*t,firms);
M_day=zeros(fraction*t,4);
Q_all=zeros(fraction*t,firms);
jj=1;
do while jj<=firms;
exp_h[1,jj]=parameters[5,jj];

```



```

exp_h[2,jj]=parameters[6,jj]+parameters[7,jj];
exp_h[3,jj]=parameters[6,jj]*hmat[3,jj]; @uses the 1st h value in the estimation period@
exp_h[4,jj]=parameters[7,jj]*residmat[3,jj]^2; @uses the 1st ar value in the estimation period@
h_ahed[1,jj]= hmat[3,jj] ;
EIDRV[1,jj]=(h_ahed[1,jj]*(firms-2)/firms)+ (h_ahed[1,jj]/firms^2);
h_sum[1,jj]=hmat[1,jj] ;
k=2;
do while k<=(fraction*t);
j=2 ;
sum_gamma[1,jj]=1 ;
do while j<=k;
sum_gamma[j,jj]=sum_gamma[j-1,jj]+exp_h[2,jj]^j ;
j=j+1;
endo;
h_ahed[k,jj]=(exp_h[1,jj]*sum_gamma[k,jj]) +(exp_h[3,jj]*exp_h[2,jj]^(k-1)) +(exp_h[4,jj]*exp_h[2,jj]^(k-1)) ;
h_sum[k,jj]=h_sum[k-1,jj]+h_ahed[k,jj] ;
k=k+1;
endo;
jj=jj+1;
endo;
EIDRV=(h_ahed*(firms-2)/firms)+ (sumr(h_ahed)/firms^2);
jjj=1;
do while jjj<=firms;
kk=2;
Q[1,jjj]= (((firms*residmat[3,jjj]) - sumr(residmat[3,.]))^2)/(EIDRV[1,jjj]*firms^2);
M_day[1,1] = yr2[nn] ;
M_day[1,2] = st_data ;
M_day[1,3] = sumr(Q[1,.])/(firms-1) ; @This is eqn #5 from Bialkowski @
M_day[1,4] = sumr(Q[1,.])/(firms-1) - 1 ; @after it is demeaned@
do while kk<=(fraction*t);
Q[kk,jjj] = (((firms*residmat[kk+2,jjj]) - sumr(residmat[kk+2,.]))^2)/(EIDRV[kk,jjj]*firms^2) ;
M_day[kk,1] = yr2[nn] ;
M_day[kk,2] = (kk+st_data-1) ;
M_day[kk,3] = sumr(Q[kk,.])/(firms-1) ; @This is eqn #5 from Bialkowski @
M_day[kk,4] = sumr(Q[kk,.])/(firms-1) - 1 ; @after it is demeaned@
kk=kk+1;
endo;
jjj=jjj+1;
endo;

output on;
nn;
output off;

long_M[(fraction*t*nn-fraction*t+1):(fraction*t*nn),.]=M_day;
gg=gg+firms;
nn=nn+1;
endo;

bootmax = 10000 ; @ 10000 @
boots = zeros(bootmax,81);
boots2 = zeros(bootmax,81);
critv = zeros(3,81);
trial = zeros(2,81);

```

```

boot=1;
do while boot<=bootmax;
www=1;
do while www<=81;
random=rndn(rows(long_m),1);
sel = random ~ long_M ;
sorted = sortc(sel,1);
trial[1,www] = sorted[1,5]; @ M - 1@
if www>1;
    trial[2,www] = trial[2,(www-1)]+trial[1,www];
endif;
www=www+1;
endo;
boots[boot,.] = trial[1,.] ;
boots2[boot,.] = trial[2,.] ;
output on;
boot;
output off;
boot=boot+1;
endo;
bt = zeros(bootmax,1);
e = { .9, .95, .99 }; /* quantile levels */
bbb=1;
do while bbb<=81;
bt = boots2[.,bbb];
critv[.,bbb] = quantile(bt,e);
bbb=bbb+1;
endo;

outxls1 = xlsWriteM(long_M, file1 , "a2", 1, vls);
outxls2 = xlsWriteM(boots2, file1 , "a2", 2, vls);
outxls3 = xlsWriteM(critv, file1 , "a2", 3, vls);

end;

```

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ABSTRACT**ELECTIONS AND ASSET PRICING: THE POLITICALLY SENSITIVE EQUITY OF
US MILITARY CONTRACTORS**

by

MATTHEW MARK ROSS**August 2014****Advisor:** Dr. Mbodja Mougoué**Major:** Business Administration (Finance)**Degree:** Doctor of Philosophy

I quantify the relationship between political uncertainty and equity volatility in the months around US elections from 1989-2012. The Economic Policy Uncertainty Index and Stockholm International Peace Research Institute (SIPRI) data are employed to measure political uncertainty faced by military contractors, capitalizing on the unique monopsony-oligopoly business environment of these firms. I employ a GARCH (1,1) model with cross-sectionally correlated moments to produce daily firm-election volatility measures. Volatility increases 11% for local, 27% for midterm, and 43% for presidential elections. These measures demonstrate that all election categories: local, federal, presidential, and midterm exhibit differential effects on equity volatility. My results contrast prior equity volatility research, showing that equity volatility increases much earlier but more gradually for US elections than for international (parliamentary) elections. I show that the political uncertainty index values in September predict the equity volatility before, during, and after November elections. I present a parsimonious piecewise function to model the distinct and predictable daily equity volatility profile in the months around US elections.

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