PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE

ESCUELA DE INGENIERÍA

LEADERS AND MARKETS: NATIONAL LEADERSHIP AND STOCK MARKET PERFORMANCE

MANUEL GERARDO ÁLVAREZ TAPIA

Thesis submitted to the Office of Research and Graduate Studies
in partial fulfillment of the requirements for the degree of
Master of Science in Engineering

Advisor:
TOMÁS REYES

Santiago, Chile, May 2016

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Gratefully to my parents and siblings

ACKNOWLEDGEMENTS

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ABSTRACT

We use random exits of heads of state to determine whether these exogenous transitions are associated to changes in stock market returns across countries. We focus on the cases in which the leader's rule ended due to either a sudden accident or after a long-standing illness. We find that an accident does not trigger a significant change in abnormal returns or volatility. An exit after illness, however, is associated to a positive and significant change in abnormal returns, but no change in volatility. Using data on rumors about leaders' health, we find that the start of a string of rumors is associated to a significant drop in abnormal returns, but no change in volatility. This suggests that news about a leader's ailment generates expectations of deficient rule. Further analysis suggests that the significant drop-and-rebound effect is strongest in autocratic countries and in regimes where the leader has low levels of education.

RESUMEN

En esta tesis se busca determinar si los jefes de Estado son capaces de influenciar a los mercados bursátiles. Mediante el uso de salidas repentinas de líderes de turno se analiza si estos eventos exógenos causan cambios en los retornos de los índices bursátiles transversalmente en los diferentes países. Se consideran los casos en que el término del mandato fue gatillado ya sea por un accidente mortal o por el deterioro de la salud producto de una enfermedad. Los resultados sugieren que las salidas debido a accidentes no generan un cambio significativos en los retornos ni tampoco en la volatilidad. Por otro lado, las salidas debido al deterioro de salud están asociadas a retornos anormales positivos y significativos pero no a variaciones de volatilidad. Este efecto se amplifica en el caso de líderes de regímenes autoritarios y con un bajo nivel educacional. Finalmente, el inicio de rumores respecto a problemas de salud de los jefes de Estado genera una caída significativa en los retornos anormales pero no influyen en la volatilidad. Esto sugiere que el mercado espera un deterioro en la capacidad de gestión del líder enfermo.

Palabras Claves: **Líderes políticos, retornos bursátiles y regímenes políticos**.

1. ARTICLE BACKGROUND

1.1. Introduction

The relevance of leaders and their ability to shape history is open to debate. Philosophical opinions are diverse and range from both extremes. On one hand, figures of power may just be mere pawns immersed in events that are beyond their control and are then retrospectively used as a justification to explain past developments. On the other, leaders may be active agents of change with the capabilities to influence history. Different fields of studies have addressed this debate, where the financial and economic perspectives are the most relevant for this investigation. Leaders such as CEOs, directors and heads of state are responsible of making important decision that impact others.

Recent financial and economic oriented researches have delved in this topic by studying the effect of key decision-making agents on certain performance measures. Bennedsen, Perez-Gonzalez, and Wolfenzon (2006) and Nguyen and Nielsen (2010) examine the effect of CEOs and directors on the companies' performance. Jones and Olken (2005) and Besley, Montalvo, and Reynal-Querol (2011) study the effect of heads of state (e.g. presidents, prime ministers, among others) on the countries' performance. Results suggests that leaders are relevant due to their ability to create value. In this thesis, the main subject of study is the latter of these agents, heads of state, and how they influence stock markets.

Heads of state are economically relevant as they influence policies, laws, regulations, and enforcing agencies that are strongly intertwined with market supporting institutions. Therefore, a leader's power to affect markets largely depends on the scope of his or her personal influence, the moral inclinations and managerial capabilities to administer the state. Nevertheless, in spite of the interest to study their effect on the countries' macroeconomical performance, to the best of the knowledge of the authors, there have been no inquiries concerning their impact on financial markets.

The main challenge lies in isolating the effect of heads of state in the stock market from the other multiple factors that affect it. As previous researches have done, albeit to study different performance metrics (e.g., Jones & Olken, 2005, focus on GDP growth), this is achieved by assessing the performance of equity markets around unexpected leader transitions for a short period of time. As the timing of these events is random it creates exogenous shocks on the markets that, on average, can be ascribable to the leaders. When considering a small number of trading days around the exit, on average, the most relevant event for the markets will be the transition. This shock provides an opportunity to study the overall causal effect of heads of state on stock markets. Then, given the leader's personal information and the country's political context, it is possible to identify some of its key drivers.

The remainder of the chapter is organized as follows. Section 1.2 discusses the main objectives of this thesis. Section 1.3 presents a literature review on the role of national leaders and markets. Section 1.4 presents the methodology and data used and Section 1.5 concludes adding suggestions for future research. Following this, Chapter 2 contains the main article of this thesis and it is divided in 7 sections. Sections 2.1 and 2.2 introduce the theoretical background as well as review past research related to the subject. Section 2.3 describes the main methodologies employed to study the effect of interest. Section 2.4 details the sources of the data used and how it was processed. It also presents summary statistics. Results are shown in Section 2.5 and robustness tests are presented in Section 2.6. Finally, Section 2.7 delves in the concluding remarks.

1.2. Main Objectives

This thesis' main objective is to determine the relevance for the financial markets of a figure as influential as the head of state. Specifically, the goal is to determine the causal impact that national leaders have on the stock markets. Only by understanding these effects it is possible to develop institutions that can correctly constrain a leader's power

without jeopardizing a country's performance. A secondary objective consists in elucidating the main components of this effect. A simple financial model (Gordon & Shapiro, 1956) proposes two possible, not mutually exclusive factors. The first one is a change in the expected future cash flows and the second one is a change in uncertainty and risk.

This thesis addresses these objectives by studying the period of time around the date in which an unexpected transition takes place. By doing so, it is possible to explore the market's behavior even further. Unexpected transitions included in the sample occur due to two main reasons, fatal accidents or the worsening of a long-standing illness. Even though both reasons are random, the precautions that markets take to react to each one are different, mainly due to how markets are able to anticipate one but not the other. This should prompt two different observed behaviors, that are studied in the third objective of this research. The market's reaction to surprising exits (i.e., caused by accidents) will not have a distinct behavior or pattern as it will vary from entry to entry depending on how the leader is perceived and on average, should cancel out. In the case of unsurprising exits (i.e., caused by a long-standing illness), markets should perceive the leader's sickness as a limitation to the proper fulfillment of his or her responsibilities and should react positively once his or her spell ends.

The fourth and final objective consists in identifying variables that influence the market's reaction. The leader's capabilities and how his or her quality is perceived by the market should influence its behavior. Educational attainment is used as a proxy for leader's quality and it is employed to examine the differences between the exit of a well-educated head of state versus the exit of a less-educated one. Country specific variables should also affect the market's decision-making process. Specifically, the country's political context affects the restrictions imposed on heads of state and their freedom to promote policies. Therefore, markets should react differently to exits that take place during autocratic regimens in comparison to those in democratic regimens.

1.3. Literature Review

Economic interactions among agents have been one of the main concerns of the field of finance and economics. These interactions can be influenced by diverse factors and there has been increasing attention granted to how this occurs. One area of research has focused on the question of whether the personal characteristics of figures of power shape market behavior and other economic outcomes. Bennedsen et al. (2006) and Nguyen and Nielsen (2014) focus on the importance of CEOs and how their well-being contribute to firms' performance measured via stock returns. Nguyen and Nielsen (2010) and W. B. Johnson, Magee, Nagarajan, and Newman (1985) research how companies' directors contribute to shareholder value and their influence on common stock price reactions. Other researchers have analyzed a different type of leaders, specifically those with higher degrees of influence. Jones and Olken (2005) and Besley et al. (2011), for example, study the effect of heads of state on economic growth. Their results confirm the effect and suggest that it becomes more relevant when the institutions are weak. Theory dictates that political leaders should affect and shape economic variables. In the first place, due to their influence on the policies they promote. A second reason is the social support they possessed that deemed them as the best candidates to assume power based on their ideologies, virtues, or talents (Acemoglu, Egorov, & Sonin, 2010; Besley & Coate, 1997; Caselli & Morelli, 2004; Osborne & Slivinski, 1996).

If political leaders are able to influence economic outcomes as relevant as a country's economic growth, a further inquiry is to question their impact on market behavior. This interrogation is significant due to several reasons. First, economic agents are sensible to the leader's believes and ideology. In the United States, the president's partisan affiliation shapes stock market performance. For example, Santa-Clara and Valkanov (2003) find that the excess returns in the stock markets are higher under Democratic than under Republican presidencies. Snowberg, Wolfers, and Zitzewitz (2007), using exogenous changes in expectations as to who will be the winner during the 2004 presidential election, find that markets anticipated higher equity prices under a George W. Bush presidency than under

John Kerry. In the United Kingdom, Herron (2000) reports a positive correlation between the odds of Labour Party victory and changes in British stock indexes. Although this evidence is limited to two countries, it suggests that at least one characteristic of the leader, partisan affiliation, is associated to stock market movements.

A second reason is that not all leaders are equally fit to perform complex tasks and fulfill the responsibilities demanded in a high office position. Most heads of state tend to reach that position during late middle age or old age and contrary to some the assumptions done by most studies regarding political leadership, they are likely to be afflicted by mental or physical impairment (Park, 1986; Post, 1995). These limitations may restrict their ability to correctly assess the decisions they take and have them depend too much on emotions or advisers (Reches, 2006). In light of these impairments, uncertainty over who is the person running the government is likely to increase. Confusion and unpredictability drive financial entities to refrain from investing, undermining future economic performance (Alesina & Perotti, 1996; Barro, 1991; Bloom, 2009; Gulen & Ion, 2015; Julio & Yook, 2012; Mauro, 1995; Pindyck & Solimano, 1993).

A third aspect to consider is that leaders shape the decision-making process of different agents due to the influence they exert. Policies, laws and regulations are all strongly related to the head of state. Via these elements he or she can, in turn, modify market-supporting institutions. A strong leader can lead a strong government, something that is alluring due to the benefits it can bring forth, however, depending on how power is exerted it can exceed the faculties of coercion-constraining institutions (Greif, 2008). The head of state's personal ethics and capacity to administer a large government are key in this matter and will make a difference between someone who rules for his or her own self-interest and someone who thinks in the better good.

Notwithstanding this last reason, governments rarely provide impartial contract enforcement institutions (Greif & Kandel, 1995; Williamson, 1985). In fact, evidence suggests that powerful members of society can use coercive power and other means to foster their personal interests or circumvent regulations that undermine the proper functioning of

markets (Faccio, 2006; Fisman, 2001; Glaeser & Shleifer, 2003). Fisman (2001) study the case of Suharto (Indonesia's former president) and how rumors about his health affected firms that were affiliated to the president in different degrees. The results show that market value of companies with higher political connectedness decreased more than the one of less connected companies. Knight (2006), on the other hand, study the Bush-Gore 2000 election in the U.S. where Bush-favored firms were worth 16% more than Gore-favored firms under the subsequent Bush administration. In a more general research, considering different countries, Faccio (2006) documents a positive effect in the value of a firm's equity when a businessperson involved in that firm is elected as a prime minister.

1.4. Methodology

The main methodology used in this thesis is the event study methodology. This has become the standard approach to study the effect of announcements and events on security price reactions (Binder, 1998) and it is commonly used in financial research (Peterson, 1989). This procedure, proposed by Fama, Fisher, Jensen, and Roll (1969), estimates the difference between the observed returns affected by the event and a counterfactual, a hypothetical alternative scenario in which those returns were not affected by the incident. The aforementioned difference provides relevant information concerning abnormal reactions. The nature of the event is also important. Random, exogenous incidents prevent endogeneity and conforms a natural experiment that allows to draw causal conclusions. The usefulness of this methodology relies on the market's rationality that urges it to rapidly incorporate new information into stock prices (MacKinlay, 1997).

The event study methodology requires two price series per event. The first one is a stock market index (e.g. S&P500) that belongs to the country in which the transition takes place. Consequently, this series should be affected by the market's reaction. The second one is a world stock market index that serves as a proxy for the combination of all the stock markets in the world. Due to the fact that it consists of a well-diversified portfolio, the effect of an individual country should be negligible and hence, this series should not

react to leader transitions. It is then necessary to define a benchmark model that relates both series and the one chosen in this thesis is the one Sharpe (1964) and Lintner (1965) developed, the market model, that assumes a linear relationship between the country's stock index return and the return of the world index (Patell, 1976).

The market model allows to construct the counterfactual; given the world stock index return, it estimates what would have been the local stock return around the event if the transition had not occurred. However, the model has to be first adjusted using a window of daily returns prior to the event to estimate its parameters. The abnormal return is then measured in a window around the exit as the prediction error between the observed return and the one estimated by the model (Scholes, 1972).

Archigos is the most relevant data source for this research. This data set contains information about leaders from 189 countries who took office sometime between 1875 and 2015. Among other variables, Archigos provides information on the country of each leader, the beginning and end of the leader's spell, and the manner in which a leader reached and lost power. This is useful to identify those heads of state who lost power in an unexpected manner. Once the sample of leaders is defined, the next step consists in finding daily price data for both the country and the world's stock market index. The sources of this data are Global Financial Data and Datastream.

1.5. Further Research

This research provides evidence to support the hypothesis that national leaders do matter for the stock markets. The results obtained analyze the market's reaction as whole, studying the joint effect of two related factors. One of this factors is the impact on prices of local companies and the other is the change on the country's exchange rate. Future research could aim to separate this two factors and focus only on the latter. To achieve this, a similar methodology could be applied to the spot exchange rate rather than the price of stock market index.

There are other interesting financial metrics that can be analyzed instead of the abnormal returns of the stock market index. Daily trading volume or the dispersion between the daily highest and lowest price could provide additional information concerning the market's reaction. Variations in derivatives, such as credit default swaps (CDS), could give insights on how a leader's exit shifts the market's expectations regarding the country's stability and risk in the near future as well as other time horizons. Finally, the use of multiple industry specific indexes instead of the stock market index provides the opportunity to delve into each industry's sensibility to sudden transitions. Alternatively, the aforementioned study can be combined with a measure of the leader's connection to each industry to study the value that market assigns to connections (Fisman, 2001; Kim, 2015). However, these alternatives cannot be currently implemented as the data needed is not available for a majority of the leaders in the sample. One of the reasons for this is the country's stock market being underdeveloped at the time of the exit, restricting the amount of data available. Derivatives such as CDS, on the other hand, did not exist at the time of the spell of some of the leaders in the sample or were not available to trade in their respective stock markets.

2. LEADERS AND MARKETS: NATIONAL LEADERSHIP AND STOCK MARKET PERFORMANCE

2.1. Introduction

Heads of state influence policies, laws, regulations, and enforcing agencies that shape market expectations. The influence of a leader, however, reaches beyond formal institutions and largely depends on the scope of his personal power. Although there has been an increasing interest to study the role of national leaders on economic outcomes (e.g., Jones & Olken, 2005), little is still known about the influence of national leaders on markets across countries. We believe this is particularly important because the personal power of a leader must be constrained to secure property rights to foster markets (North, 1990; Williamson, 1985) and because institutions that constrain a leader's personal power operate only partially and recently in a few advanced countries (Greif, 2008; Greif & Kandel, 1995).

We study the effect of leaders on stock markets. We assess the performance of equity markets around leader transitions that are unrelated to the underlying economic conditions. We focus on stock markets because they represent a large portion of the assets traded in an economy, because they reflect expectations about the future performance of the economy, and because comparable cross-country data can be collected. We focus on leader transitions in which the leader's rule ended due to either the worsening of a long illness or a sudden accident. We do this because the timing of transition is essentially random. These exit events, coupled with stock price data, provide an opportunity to study whether an exogenous change in the identity of the head of state has a significant effect on markets.

Markets should respond differently to a leader's exit due to an accident and a longstanding illness. Accidents are surprising as markets do not anticipate them. Exits triggered by illnesses, on the other hand, are likely to be preceded by market adjustments following rumors about a leader's ailment. Considering these two cases is important not only because rumors contain information about a leader's fitness to perform the activities that high office demands, but also because most of the heads of state reach high office in

their late middle age or even old age, when there is a high risk that mental illnesses or physical disabilities manifest (see, e.g., Fisman (2001) for the case of Suharto in Indonesia).[1]

We use a dataset collected by the authors on all national leaders who left office randomly between 1923 and 2015 for whom local and global equity indexes were available. We focus on leaders who left office unexpectedly. Our sample is separated into those leaders who exit power after a long-standing illness (most of them died) and those who died in an accident while still in power. We label the former as an *unsurprising* exit and the latter as a *surprising* exit. This sample contains 38 leaders from 28 different countries. Out of the 38 leaders, 23 left office after a long-standing illness and 15 left office as a result of a sudden accident. For each leader, we obtained data on local and global equity indexes from Datastream and Global Financial Data (GFD). In total, we use 10,147 days of stock index data to study unexpected exits. We also consider a placebo group comprising of 157 additional leaders from 20 different countries (a subset of the 28 countries considered for unexpected exits) whose spell ended regularly (completion of their term). For this sample, we use 31,215 days of stock index data.

We find that unsurprising exits lead to a cumulative average abnormal return (CAAR) of at least 1.3%. This CAAR is economically and statistically significant. Surprising exits, on the other hand, are not associated to a significant cumulative average abnormal return. In addition, cumulative abnormal returns (CARs) around surprising exits do not show unusually high or low values given the returns witnessed in that country at other dates. We also find that in none of the two main subsamples, surprising and unsurprising, the exit event is systematically associated to a significant change in volatility. According to the criteria used in Bloom (2009, p. 630), for example, only 2 of the 23 unsurprising exits could be labeled as *volatility shocks*. Similarly, none of the 15 surprising exits could

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[1]For example, the life expectancy of two-thirds of American presidents was 2 years shorter than that of the general population (DeMaria, 2003). Evidence from interviews to doctors and from the official record suggests that leaders' ailments may be associated to poor political decision making (see, e.g., Owen, 2003; Post, 1989, 1995). One example is the concessions Franklin D. Roosevelt arguably made to Joseph Stalin at the Yalta conference in 1945.

be deemed as a *volatility shock*. In the placebo group, none of these measures (CAAR, dispersion of CAR, and volatility) are significantly different from zero.

We also examine whether leaders matter more or less depending on whether the country is a democracy or an autocracy. Overall, we find evidence that the exit of an autocratic leader is associated to an increase in abnormal returns. The positive relationship is driven by those autocrats who exit unsurprisingly after a long-standing illness. The exit of a democratic leader is not associated to abnormal returns. In addition, we explore whether there is a relationship between leader's education and returns. We find that the exit of a relatively uneducated leader has a positive effect on abnormal returns; and this result is driven by uneducated leaders who leave office after illness. The exit of educated leaders is not systematically associated to positive or negative abnormal returns. It is important to point out that these results come from further splits of the sample, so although consistent with the previous literature (Besley et al., 2011; Jones & Olken, 2005), may be biased due to small sample size.

We then examine rumors concerning each leader's health during the final period in office. This exercise is particularly relevant, not only because health issues are likely pervasive among heads of state, but because the level effect of exits on cumulative returns is driven by those leaders with health problems. We are able to gather information about rumors for 14 out of the 23 leaders in this subsample. When a string of rumors starts, we find that abnormal returns go down significantly, about 5% on average. We do not see, however, an unusual increase in returns volatility around the date of the rumor, only 2 out of 14 rumor events can be labeled as *volatility shocks* according to Bloom (2009). These results are consistent with investors considering a leader's impairment as a negative indicator of the future quality of his rule.

The remainder of the paper is organized as follows. Section 2 discusses the existing literature on the role of national leaders and markets. Section 3 presents the methodology and section 4 the data. Section 5 presents the results and section 6 the robustness checks. Section 7 concludes.

2.2. Leaders and Markets

Economics has been, to a large extent, a field concerned with economic interactions among impersonal agents. Recently, however, increasing attention has been granted to the question of whether the personal characteristics of leaders shape economic outcomes. Jones and Olken (2005), for example, show that leaders do matter for economic growth, especially when the institutions are weak. This finding supports theoretical predictions in that leaders should shape economic variables as they influence policies and come to power as a result of political competition (arguably among citizens in democracies or among elite members in autocracies)—so selection is based on ideology, virtue, or talent (see e.g., Acemoglu et al., 2010; Besley & Coate, 1997; Caselli & Morelli, 2004; Osborne & Slivinski, 1996).[2]

Heads of state shape stock market expectations because they influence policies, laws, and regulations, which in turn affect the institutions that support markets. According to the Hobbesian view, a strong government is needed to protect property rights and ultimately foster markets. A strong government, however, might also expand the leader's coercive power. A common perception that a leader's power enables him or her to abuse others' rights, which may discourage individuals from participating in the market in the first place (Greif, 2008). The extent to which a leader can use his influence to further his self-interest by modifying market-supporting institutions (such as auditing or supervisory requirements to economic transactions or judicially punishing violators of contracts) depends on his personal ethics and capacity to administer a government. Governments, however, rarely provide impartial contract enforcement institutions (Greif & Kandel, 1995; Williamson,

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[2]Partisan identity seems to matter as well. In the U.S., for example, Santa-Clara and Valkanov (2003) find that the excess returns in the stock markets are higher under Democratic than under Republican presidencies. Snowberg et al. (2007), using exogenous changes in expectations as to who will be the winner during the 2004 presidential election, find that markets anticipated higher equity prices under a George W. Bush presidency than under John Kerry. There are more examples. In fact, there is a large literature documenting the difference in stock returns under Republican and Democratic presidents in the United States (see e.g., Alesina, Roubini, & Cohen, 1997; Drazen, 2001; Herbst & Slinkman, 1984; R. R. Johnson, Chittenden, & Jensen, 1999; Siegel & Coxe, 2002). In the U.K., Herron (2000) reports a positive correlation between the odds of Labour Party victory and changes in British stock indexes.

1985). Markets therefore should react to the unexpected exit of a powerful ruler. In fact, evidence is consistent with this idea. Knight (2006), for example, find that in the Bush-Gore 2000 election in the U.S., Bush-favored firms were worth 16% more than Gore-favored firms under the subsequent Bush administration. More broadly, using a sample of 47 countries, Faccio (2006) documents a significant increase in the value of equity of a firm when a businessperson involved in that firm is elected as a prime minister. Fisman (2001) uses data on rumors about Suharto's (Indonesia's former president) health between 1995 and 1997 to estimate the effect of such news on firms' stock returns with different degrees of connectedness to Suharto. He also finds that firms connected to Suharto lost significantly more market value than did less-dependent firms. At the time, Indonesia was considered among the most corrupt countries in the world in the "Perceived Corruption Ranking 1998." Nevertheless, the market overall declined whenever it received adverse information regarding Suharto's health.

Apart from the institutional arrangement, evidence suggests that a leader's individual characteristics also matter. An important feature is the fitness to perform the complex tasks that high office demands. Political leaders tend to achieve high office in late middle age or even old age. Although most studies of political leadership assume leaders are in full mental and physical capacity, they are likely to be afflicted by mental or physical impairment (Park, 1986; Post, 1995). The decisions of ailing leaders therefore may not reflect a fair assessment of reality, but rather emotions, illusions, or the biased advice from members of his inner circle (Reches, 2006). Evidence from the medical literature suggests that ill leaders tend to lead secretive lives, become out of touch with the people they represent and the world around them, and develop paranoiac tendencies (Owen, 2003). Leaders are likely to hide their ailments and exert power through imposition rather than popular consent. In addition, leaders' health issues may increase uncertainty as to who is actually running the government. In the face of political uncertainty, empirical evidence suggests that economic agents refrain from investing, which ultimately undermines future

economic performance (see, e.g., Alesina & Perotti, 1996; Barro, 1991; Bloom, 2009; Gulen & Ion, 2015; Julio & Yook, 2012; Mauro, 1995; Pindyck & Solimano, 1993).[3]

Our paper contributes to a growing literature on whether national leaders matter for broad-based economic variables. It provides a causal analysis as to whether heads of state matter for stock returns using a cross-country sample that covers almost 100 years. Examining the effect of leaders on markets can therefore provide a useful test for whether coercion-constraining institutions actually work at large. In addition, we study whether leader specific effects are contingent upon settings in which they are relatively unconstrained (autocratic regimens) and have relatively low levels of education. We also examine whether the health of the national leader, a common yet largely overlooked characteristic, affects stock market outcomes. Finally, we find that the overall decline in the market, following adverse news about the leader's health, is partially recovered when the impaired leader leaves office.

2.3. Methodology

The main question in this paper is whether equity indexes' abnormal returns significantly change across leaders' exits. To answer this question, we compute the abnormal returns associated to each exit, and assess whether the average and dispersion of these returns across exits are significantly different from zero.

2.3.1. Average Abnormal Returns

We compute Abnormal Returns (AR) for each day around a leader's exit in our sample. The abnormal return is the difference between the return of the country index and a benchmark return based on the world index. Following Patell (1976), and using the market model introduced by Sharpe (1964) and Lintner (1965), the AR around leader exit j at

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[3]The argument is that for investment projects that are not fully reversible, uncertainty increases the option value of waiting until some of or all the uncertainty is resolved (Bernanke, 1983; Bloom, Bond, & Van Reenen, 2007; Pindyck & Solimano, 1993; Rodrik, 1991).

time t is:

$$AR_{j,t} = R_{j,t} - \left(\hat{\alpha}_j^* + \hat{\beta}_j^* \cdot R_{w,j,t}\right),\tag{2.1}$$

where $R_{j,t}$ is the return of the country index associated to leader exit j in day t and $R_{w,j,t}$ is the return of the world index in day t.[4] Thus, $(\hat{\alpha}_j^* + \hat{\beta}_j^* \cdot R_{w,j,t})$ is the benchmark return in day t associated to leader exit j.[5] We estimate the parameters of the model, $\hat{\alpha}_j^*$ and $\hat{\beta}_j^*$, using the method proposed by Scholes and Williams (1977) to account for non-synchronous trading.[6] See Appendix B for a detailed explanation on these estimators.

The Cumulative Average Abnormal Return (CAAR) is the cross-sectional average of Cumulative Abnormal Returns (CARs) in the event window. Formally, the CAAR between trading day T_1 and trading day T_2 is computed as follows:

$$CAAR_{T_1,T_2} = \frac{1}{N}\sum_{j=1}^{N} CAR_{T_1,T_2}^j = \frac{1}{N}\sum_{j=1}^{N}\sum_{t=T_1}^{T_2} AR_{j,t}.$$

where N is the number of events.

Appendix C presents the Z statistic for the null hypothesis that the CAAR is equal to zero. Under regular assumptions, this Z statistic follows a Standard Normal distribution. Reported significance levels are computed using this Z statistic. A complementary analysis using bootstrapping is presented in Appendix D. Bootstrapped p-values based on the empirical distribution of the CAAR are also reported as part of our results.

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[4]Note that we use the convention to label t to indicate the time period to and from the event, which occurs at $t = 0$.

[5]Despite its simplicity, the market model provides a good benchmark for well-diversified indexes such as the ones used in this paper. Multifactor models such as Fama and French (1993)'s are unfeasible in our context, since Fama-French factors are not available for the global market.

[6]Most financial models assume that trading price data is available at regular, fixed-time intervals. However, the time at which trading occurs does not follow a regular process but rather takes place discretely and stochastically. The discontinuity in trading is known as non-synchronous trading and should be accounted for while estimating the parameters of the models.

2.3.2. Dispersion of Returns

Even if the CAAR is not significantly different from zero, it is plausible that extreme negative and positive CARs around the leaders' exits average out to zero. We consider a general non-parametric test to determine whether the CARs around leaders' exits are unusually extreme when compared to the CARs observed in those countries in other periods that do not include the event. In particular, we adapt the non-parametric rank test used in Jones and Olken (2005) to assess whether the CARs take on extreme values compared to their corresponding time-series means.

As a first step, for each leader j, we compute the percentile rank of the CAR around the date of exit with respect to auxiliary CARs for neighboring windows. Due to data availability we consider windows over the period ranging from -190 days before and 60 days after the leader left office.[7] Under the null hypothesis the percentile rank of the relevant CAR, $rank_j$, is uniformly distributed over the interval $[0, 1]$. In order to test the null hypothesis, we define $y_j = |rank_j - 1/2|$ and use the following test statistic:

$$K = \frac{\sum_{j=1}^{N}(y_j - \frac{1}{4})}{\sqrt{N/48}}. \tag{2.2}$$

Under the null K should have zero mean.[8] Therefore, we perform a one-sided non-parametric test of whether K is systematically larger than zero. The details on this test are presented in Appendix E.

2.3.3. Volatility of Returns

To test whether the exit events are systematically associated to significant changes in volatility, we follow Bloom (2009) and see if each exit in our sample can be deemed as

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[7]Due to the same reason, when studying the effect of rumors, we consider a window with the same length but from day -106 to day 144 after the rumor was published. Similarly, we consider a window from day -167 to day 83 to study the placebo group.

[8]Since under the null, $E(y_j) = 1/4$ and $Var(y_j) = 1/48$.

a *volatility shock* or not. For each exit, we compute 49 monthly volatilities; one for the calendar month of the exit, and one for each of the 24 months before and after. Each monthly volatility is computed as the standard deviation of daily stock return within the relevant calendar month. Then, we standardized the monthly volatility around the exit by subtracting the mean and dividing by the standard deviation of the 49 volatilities associated to that leader. We identify a *volatility shock* by comparing this standardized volatility 1.65, the 5% one-tailed critical value of the Normal distribution.

As an alternative, we also study changes in both volatility and betas, by comparing average values before and after the exit events. For each exit, we define two non-overlapping windows of equal length, one immediately before (i.e., $[-n, -1]$) and one immediately after (i.e., $[1, n]$) the day that the event takes place (day 0). Within these windows, we compute volatilities as standard deviations of daily stock returns, and betas using the method proposed by Scholes and Williams (1977) to account for non-synchronous trading. Finally, using a t-statistic we test whether the cross-average volatility or beta before the exit is significantly different than the one after.

2.4. Data

2.4.1. Leaders

We are interested in identifying cases in which the head of state exits power surprisingly (due to an accident) and unsurprisingly (due to long-standing ailment). We build our sample from Archigos (Goemans, Gleditsch, & Chiozza, 2009). This dataset contains information about leaders from 189 countries who took office within 1875 and 2015. Archigos includes information on the country of each leader, the beginning and end of the leader's spell, and the manner in which a leader reached and lost power.

We are interested in national leaders who left power in an irregular manner (e.g. retired due to ill health, died as a result of an accident or natural cause). To identify these leaders, we start by removing all the entries in Archigos for which the variable *Exit* takes the value

"Regular". This reduces the number of entries from the original 3,329 to 1,117. We then exclude the entries for which the variable *Exit* takes the value "Foreign" to eliminate any leader deposed by another state. After doing so, our sample comprises 1,045 exits. In addition, we exclude entries with values of *Exit*: "Still in Office" (173 leaders), "Suicide" (3 leaders) and those for which there is no information available (3 leaders). The remaining sample contains 866 leaders that do not overlap with our placebo group.

Some of these 866 exits, however, may still be triggered by underlying economic conditions. To refine our sample, we use the variable *Exitcode*, which provides more specific information about a leader's exit. We remove any exit prompted by a third party as it is deemed as predictable. This includes leaders removed by popular protests (39 leaders), rebel forces (53), military actors (281), and other similar agents (99). The final sample consists of 394 leaders.[9]

2.4.2. National Stock Market Indexes

The 394 leaders who left office in an irregular manner belong to 123 different countries. We need stock market data for each of these countries. We only consider stock market indexes' returns since detailed information on other metrics such as variation in trading volume or intra-day variation on prices (e.g., high-low or bid-ask) are not available for the broad set of leaders in our sample. We retrieve stock market data from Datastream and Global Financial Data (GFD).

While searching in Datastream we focus on series tagged as "Equity Indices" for each country. Most series in Datastream are available only in local currency. Since to compute CAARs we need all series in the same currency, in these cases we also need local exchange rates to convert prices to US dollars. While searching in GFD we focus on series classified as "Stock Indices - Composites" under "Equity" for each country, using both GFDatabase

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[9]As a validation procedure, we compare our sample with the one used by Besley et al. (2011). They use a total of 183 political leaders who were in office between 1875 and 2004. From this list, 174 leaders are also included in our sample. For details, see Appendix A.

and Eurostat. GDF provides series in US dollars or local currency, we use the former option.

Although we limit our search results to equity indexes, there is still a large number of series remaining to choose from. Most of them are country specific indexes provided by different sources and covering different time periods and subsets of companies. We employ four criteria to select the most relevant series. First, we prefer the longest series available for each country. Second, we prioritize the series with high relative relevance within each database (both Datastream and GFD sort their search results according to relevance). Third, we discard industry-specific indexes because they are not available for all countries. Fourth, we prefer series without gaps and, if needed, we download multiple series in order to cover the longest possible period of time.

Following this procedure, we obtain 139 series from Datastream and 163 series from GFD representing 71 and 83 different countries respectively. For 39 of the 123 countries in our sample of leaders whose spell ended unexpectedly, we did not find any series that met the aforementioned criteria. In contrast, for some countries we gather up to 5 different time series.

2.4.3. World Stock Market Index

As previously mentioned, we compute abnormal returns using a benchmark that depends directly on the world stock market index. To obtain this index, we search for suitable series in Datastream and GFD following the same procedure described in section 2.4.2, but specifying the as location "World." There are two series with daily information that provide data from 1970 onward: MSWRLD$ from Datastream and _MIWO00D from GFD. The correlation between the returns of these two indexes is 99.8%. We choose the one from Datastream as our main world stock exchange index as it spans a longer period of time in comparison to the one from GFD.

For exits before 1970, we construct a world index using country-specific indexes. Specifically, we compute a weighted average of daily country-specific-index returns using GDP as weight. We re-balance the portfolio annually. GDP data is obtained from the Maddison Project Database (Bolt & van Zanden, 2014). The resulting index contains stock market data from 40 countries that represent, on average, 81% of the world's GDP. As a robustness check, we compute daily returns of our index for the period after 1970 and correlate them with the ones obtained from the world index downloaded from Datastream. The correlation coefficient obtained is 77%.

2.4.4. Final Sample

The final step consists in coupling each one of the 394 leader exits in our sample with one country-specific stock market index. We inspect each series to confirm it contains daily data that includes the date of exit of one of the 394 leaders considered. Leaders that cannot be paired are discarded. We were able to find daily closing price data for 42 leader exits.

As a further validation check, we search elsewhere for specific information about each leader's unexpected exit. For our purposes, we find that Archigos misclassified 4 of these 42 leaders. Both Ghandi, I. (India) and Premadasa (Sri Lanka) should be removed as they were assassinated. Fahd (Saudi Arabia) and Yen Chia-Kan (Taiwan) are also removed as their exit should be classified as regular. Fahd ceded power voluntarily and Yen Chia-Kan ended his term as supposed.

Therefore, our final sample consists of the 38 unexpected exits displayed in Table 2.1. It is crucial to our analysis whether the leader's exit was preceded by a long-standing illness or not. We combine the information in the column "Reason of Exit" of Table 2.1 with the information available in Archigos to split the leaders into two subsets. The first subset (referred to as *surprising* henceforth) contains 15 leaders who lost power in a surprising manner. They are leaders for which the Archigos' variable *Exit* takes the value "Natural Death" and died due to either a heart attack, stroke, plane crash, or drowning.

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The second subset (referred to as *unsurprising* henceforth) is the complement of the one just described and encompasses leaders who left power due to aggravation of a medical condition.

Finally, we use the data available in Archigos to build a placebo group. It contains leaders who stepped down from their position in a regular manner (e.g. completion of their term) for the same countries of the 38 leaders who left office unexpectedly. The resulting set contains 157 additional leaders.
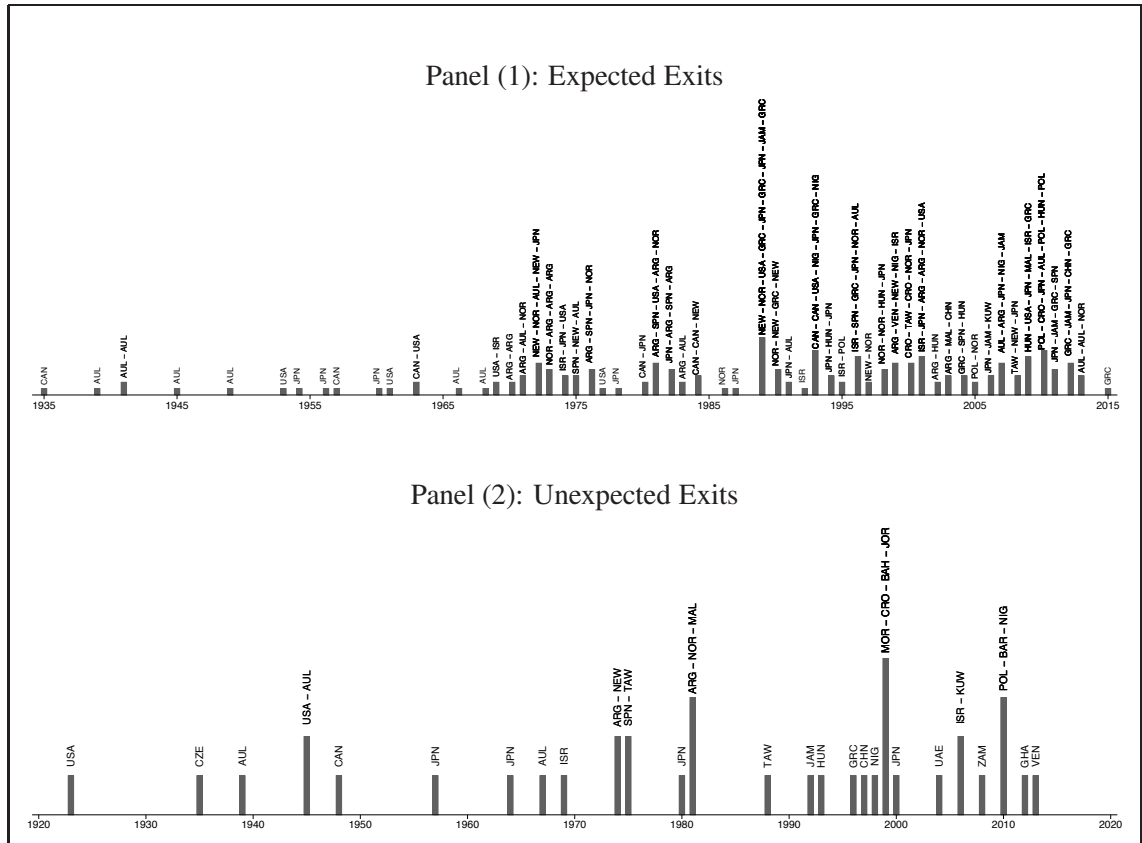
Figure 2.1. Temporal distribution of the leaders with expected and unexpected exits. Panel (1) shows the timeline of the leaders with regular exits, i.e., those who left power in a regular manner. The column's height indicates the number of leaders per year and it ranges from 0 to 9. There is total of 157 leaders spread out across 20 countries. Panel (2) shows an annual timeline of the leaders with unexpected exits. The column's height indicates the number of leaders per year and it ranges from 0 to 4. There is total of 38 leaders spread out across 28 countries.

Figure 2.1 and Figure 2.2 present the time span and geographic coverage of the leaders in our main samples. Panel (1) in Figure 2.1 shows the temporal distribution of the entries in our placebo group from 1935 until 2015. Panel (2) in Figure 2.1 shows that our sample of unsurprising exits spans the period of 1920 to 2013. It also shows that although most of the exits that could be matched to stock market data occur after 1970, 10 out of 38 occur before 1970. Figure 2.2 shows that our sample of unexpected exits contains leaders in countries at different stages of development and spreads out across six different continents.

Figure 2.2. Geographical distribution of the leaders with unexpected exits. The greyscale indicates the number of leaders per country and it ranges from 0 (white) to 4 (black). There is total of 38 leaders spread out across 28 countries.

Table 2.1. Final Sample

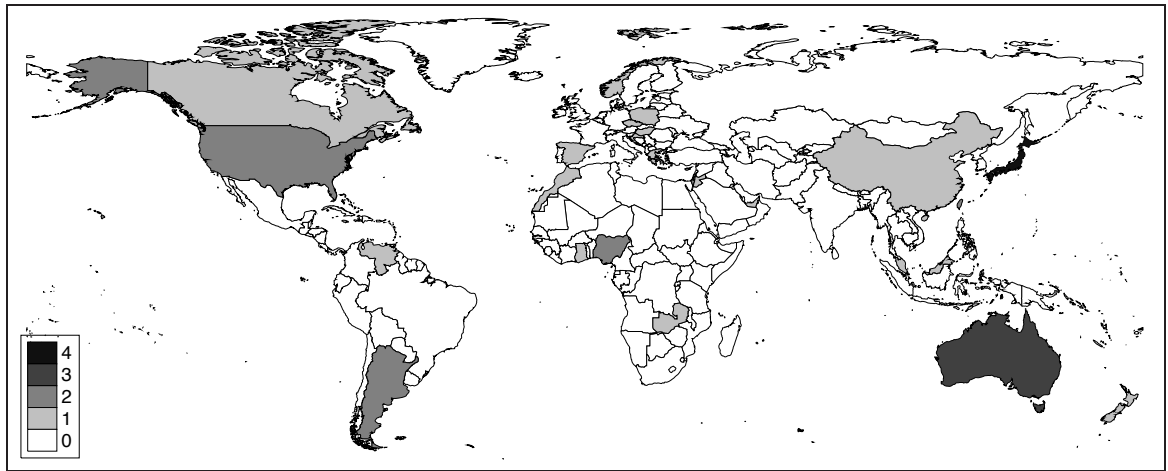| ID	Name	Country	Series' Ticker	Source	World Series	Reason of Exit	Unsurprising Exit	Date
GRC-1993	Andreas Papandreou	Greece	_ATGD	GFD	MSWRLD$	Heart Failure	Yes	1/16/1996
ISR-2001	Ariel Sharon	Israel	_TA100D	GFD	MSWRLD$	Stroke	Yes	4/14/2006
TAW-1978	Chiang Ching-Kuo	Taiwan	_TWIID	GFD	MSWRLD$	Heart Attack	No	1/13/1988
TAW-1950	Chiang Kai-Shek	Taiwan	_TWIID	GFD	MSWRLD$	Kidney Failure	Yes	4/5/1975
BAR-2008	David Thompson	Barbados	BBLOCD	GFD	MSWRLD$	Cancer: Pancreatic	Yes	10/23/2010
CHN-1980	Deng Xiaoping	China	_SSECD	GFD	MSWRLD$	Parkinson Desease	Yes	2/19/1997
SPN-1939-2	Francisco Franco Bahamonde	Spain	_SMSID	GFD	MSWRLD$	Parkinson Desease	Yes	10/30/1975
CRO-1990	Franjo Tudjman	Croatia	_CRBEXD	GFD	MSWRLD$	Cancer: Stomach	Yes	11/26/1999
USA-1933	Franklin D. Roosevelt	United States	_SPXD	GFD	Own	Cerebral Hemorrhage	Yes	4/12/1945
AUL-1966	Harold E. Holt	Australia	_AORDD	GFD	Own	Drowning	No	12/19/1967
MOR-1961	Hassan II	Morocco	_CFG25D	GFD	MSWRLD$	Heart Attack	No	7/23/1999
JPN-1960	Hayato Ikeda	Japan	_TOPXD	GFD	Own	Pneumonia (Following Treatment Cancer: Laryngeal)	Yes	10/25/1964
VEN-1999	Hugo Rafael Chávez Frías	Venezuela	_IBCD	GFD	MSWRLD$	Heart Attack	No	3/5/2013
JOR-1952	Hussein Bin Talal El-Hashim	Jordan	_AMMAND	GFD	MSWRLD$	Cancer: Non-Hodgkin's Lymphoma	Yes	2/7/1999
MAL-1976	Hussein Bin Onn	Malaysia	_KLSED	GFD	MSWRLD$	Heart Attack	Yes	7/19/1981
BAH-1971	Isa Bin Salman Al Khalifa	Bahrain	_BAXD	GFD	MSWRLD$	Heart Attack	No	3/6/1999
KUW-1991	Jaber III Al-Ahmad Al-Jaber Al-Sabah	Kuwait	_KWSED	GFD	MSWRLD$	Cerebral Hemorrhage	Yes	1/15/2006
GHA-2009	John Atta Mills	Ghana	IFFMGHL	Datastream	MSWRLD$	Stroke	No	7/24/2012
AUL-1941-2	John Curtin	Australia	AU34ORDD	GFD	Own	Heart Failure	Yes	4/30/1945
AUL-1932	Joshep Aloysius Lyons	Australia	AU34ORDD	GFD	Own	Heart Attack	No	4/7/1939
HUN-1990	Jozsef Antall	Hungary	BUXINDX	Datastream	MSWRLD$	Cancer: Non-Hodgkin's Lymphoma	Yes	12/12/1993
ARG-1973-3	Juan Domingo Perón	Argentina	_IBGD	GFD	MSWRLD$	Heart Attack	No	6/29/1974
JPN-1998	Keizö Obuchi	Japan	_TOPXD	GFD	MSWRLD$	Stroke	Yes	4/3/2000
POL-2005	Lech Kaczynski	Poland	_WIG20D	GFD	MSWRLD$	Plane Crash	No	4/10/2010
ISR-1963	Levi Eshkol	Israel	_TA100D	GFD	Own	Heart Attack	No	2/26/1969
ZAM-2002	Levy Mwanawasa	Zambia	ZAMALSH	Datastream	MSWRLD$	Stroke	No	8/19/2008
JPN-1978	Masayoshi Ohira	Japan	_TOPXD	GFD	MSWRLD$	Heart Attack	No	6/12/1980
JAM-1989	Michael Manley	Jamaica	JMCOMPD	GFD	MSWRLD$	Cancer: Prostate	Yes	3/28/1992
NEW-1972-2	Norman Eric Kirk	New Zealand	_NZCID	GFD	MSWRLD$	Heart Attack	No	8/31/1974
NOR-1976	Odvar Nordli	Norway	MSNWAYL	Datastream	MSWRLD$	Resigned: Health Reasons	Yes	1/31/1981
ARG-1981-1	Roberto Eduardo Viola	Argentina	_IBGD	GFD	MSWRLD$	Heart Failure	Yes	11/21/1981
NIG-1993-2	Sani Abacha	Nigeria	_NGSEIND	GFD	MSWRLD$	Heart Attack	No	6/8/1998
JPN-1956	Tanzan Ishibashi	Japan	_TOPXD	GFD	Own	NA	Yes	2/23/1957
CZE-1918	Tomás Garrigue Masaryk	Czechoslovakia	CZPRAGD	GFD	Own	Pneumonia	Yes	12/14/1935
NIG-2007	Umaru Musa Yar'Adua	Nigeria	_NGSEIND	GFD	MSWRLD$	Heart Failure	Yes	2/9/2010
CAN-1935	W. L. Mackenzie King	Canada	CAXXMD	GFD	Own	Pneumonia	Yes	11/15/1945
USA-1921	Warren Gamaliel Harding	United States	USNYTCOD	GFD	Own	Heart Attack	No	8/2/1923
UAE-1971	Zayed bin Sultan Al Nahyan	United Arab Emirates	TOTMKAE	Datastream	MSWRLD$	Ill Health	Yes	11/2/2004

Notes: The first column indicates the ID used by Archigos to identify each leader. The second and third columns show the leader's name and country, respectively. The fourth and fifth columns display the ticker of the selected stock price series and its source respectively. The sixth column shows the world series used. The seventh column shows the reason of exit. The eighth column displays if the leader's exit is deemed as unsurprising or not. The ninth column displays the date of the exit.

2.5. Results

Historical investigation suggests that unexpected or "random" leader exits should impact equity prices, and the size of this effect depends on whether the exit is due to a sudden accident or not. For example, Figure 2.3 shows two dramatic types of unexpected exits: surprising deaths caused by accidents (heart attack, stroke, plane crash, or drowning) and unsurprising exits (all the other, primarily death due to a long-standing illness).

In each graph the dashed line represents the exact exit date. Panel (1) in Figure 2.3 presents the surprising exits of two leaders: Lech Kaczynski (Poland, died in a plane crash) and Norman E. Kirk (New Zealand, died of a sudden heart attack). On the other hand, Panel (2) shows the unsurprising exits of two other leaders: Andreas Papandreou (Greece, heart failure after a long bout with pneumonia) and Francisco Franco (Spain, heart failure following Parkinson disease).

In the case of Lech Kaczynski, we see a close association between the world market index and the local index in Poland throughout the days around the exit. At the time of the event, the local index shows a slight jump upwards (perhaps because of the end of his divisive and ineffective rule) preceded by a small decline. For Norman E. Kirk, the New Zealand's stock index consistently outperformed the world index during the period around his exit. Prime Minister Kirk's death, however, did not seem to affect the local stock index's cumulative return. The cases in Figure 2.3 Panel (2) show a different pattern. Andreas Papandreou's exit was associated to a small and short decline in the local index followed by a considerable jump (of around 3 percent points). Similarly, Francisco Franco's exit was related to a jump (of around 12 percent points) in the local index up until 20 days after his death.

Figure 2.3. Cumulative return for individual leaders over a window of 61 calendar days. The starting point is 30 days before the exit. Each graph presents two series, the country and world stock indexes. The values displayed are relative to the first value in each series to facilitate comparisons.

Although these associations may be coincidental, they are part of the main pattern in our sample: overall, leader exits are associated to a *positive* cumulative abnormal return. As we will show, unsurprising exits drive this result as surprising exits are not systematically associated to abnormal returns different than zero. In what follows we present the detailed analysis leading to these conclusions. We study the effect of leader exits on abnormal returns using three sub-samples: The whole sample of unexpected exits, the sample of surprising exits, and the sample of unsurprising exits.

Table 2.2 shows our main results. Significance levels are computed based on the Z statistic presented in Appendix C, which under regular assumptions follows a Standard Normal Distribution. The first section presents the cumulative average abnormal return (CAAR) for the whole sample of unexpected exits. The CAAR is positive and significant for all 5 windows considered: [-3,3]; [-3,7]; [-3,15]; [-1,15]; and [-5,15]. The first number in each pair represents the bottom left bound of the window and the second represents the upper right bound, where 0 is the day of the exit. As the table shows, stock markets' abnormal returns vary from 0.8% to 1.8% across these windows for the unexpected sample. The CAAR for leaders who exited surprisingly for each of the windows behaves differently. The point estimate in each window is low and not statistically different from zero. On the other hand, for the sample of unsurprising exits, the CAAR is positive and significantly different from zero in each window. CAARs in this case range from 1.3% to more than 3%.

Given that our sample is relatively small, we complement the Z statistic used to test the null hypothesis that each CAAR is zero (defined in Appendix C), with two different bootstrapped p-values based on the empirical distribution of the CAAR (see Appendix D). The first one, from left to right, shows that the effect for unsurprising exits is significant but at lower levels than when computed with the Z statistic. The p-values range from 7% to 15%. The second bootstrapped p-value, on the other hand, takes into account outliers by winsorizing them. In these cases, the results are quantitatively very similar to the ones first reported and confirm that the effect of unsurprising exits is statistically different from zero.

Table 2.2. Unexpected Exits - Cumulative Average Abnormal Return (CAAR)

Sample	Window	Number of observations	CAAR	Z p-Value	Bootstrapped p-Value	Winsorized p-Value
Unexpected Exits	$[-3, 3]$	38	0.0082	0.1327	0.1473	0.0390
Unexpected Exits	$[-3, 7]$	38	0.0181**	0.0201	0.0634	0.0026
Unexpected Exits	$[-3, 15]$	38	0.0177*	0.0564	0.1270	0.0164
Unexpected Exits	$[-1, 15]$	38	0.0157	0.1200	0.1671	0.0271
Unexpected Exits	$[-5, 15]$	38	0.0171*	0.0774	0.1700	0.0326
Surprising Exits	$[-3, 3]$	15	0.0010	0.7584	0.4846	0.7155
Surprising Exits	$[-3, 7]$	15	0.0039	0.5955	0.3049	0.3722
Surprising Exits	$[-3, 15]$	15	-0.0008	0.8406	0.5245	0.5476
Surprising Exits	$[-1, 15]$	15	0	0.7244	0.4919	0.6129
Surprising Exits	$[-5, 15]$	15	-0.0035	0.9281	0.5977	0.6706
Unsurprising Exits	$[-3, 3]$	23	0.0129**	0.0292	0.1197	0.0061
Unsurprising Exits	$[-3, 7]$	23	0.0274**	0.0105	0.0725	0.0003
Unsurprising Exits	$[-3, 15]$	23	0.0298***	0.0089	0.1004	0.0013
Unsurprising Exits	$[-1, 15]$	23	0.0260**	0.0224	0.1480	0.0023
Unsurprising Exits	$[-5, 15]$	23	0.0306**	0.0191	0.1273	0.0024

Notes: Cumulative average abnormal returns (CAAR) over different windows as well as their corresponding Z statistic and bootstrapped p-values. The results for the whole sample of unexpected exits is presented first and it is then split into surprising (due to an accident) and unsurprising (due to long-standing ailment) exits. Column 5 presents the p-value, for the null $H_0 : CAAR = 0$, computed from the Z statistic described in Appendix C. Columns 6 and 7 show two alternative bootstrapped p-values, based on the empirical distribution of the CAAR, described in Appendix D. Significance at the 10%, 5% and 1% are denoted by *, ** and ***, respectively, and based on the Z statistic's p-value.

Figure 2.4 illustrates these results. It depicts the variation of the CAAR for each window through time, from window [-3,-3] to window [-3,15]. It shows that for surprising exits, the CAARs across windows linger around zero, and for unsurprising exits the CAARs increase to converge to roughly 3%.

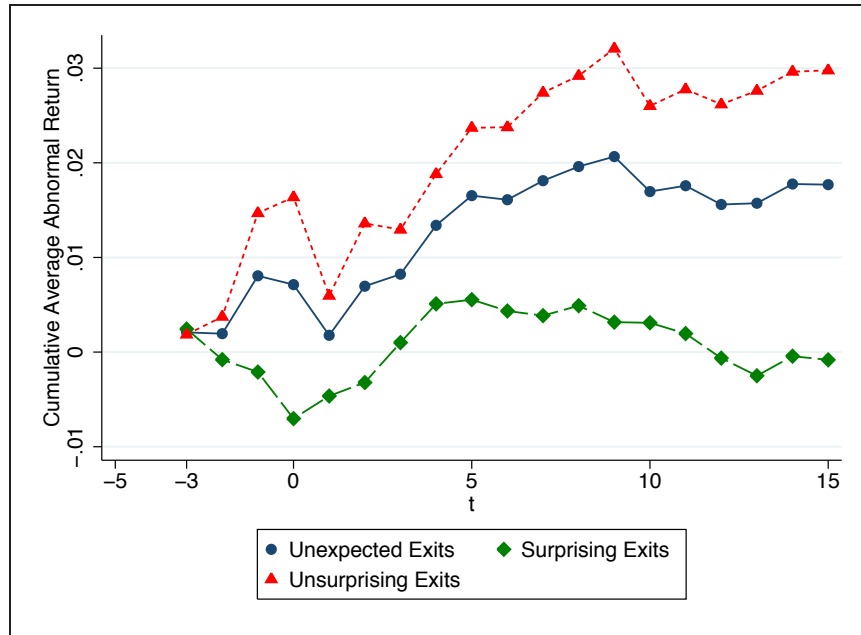Figure 2.4. Accumulated average abnormal return day by day for unexpected, surprising and unsurprising exits. The starting point is 3 trading days before the exit and ranges from 3 to 15 trading days after.

In contrast, there is no relevant effect around regular exits. Table 2.3 shows the CAARs for the placebo group considering the same windows as before. The results are not statistically significant at any conventional level.

Table 2.3. Expected Exits - Cumulative Average Abnormal Return (CAAR)

Window	Number of Observations	CAAR	Z p-Value	Bootstrapped p-Value	Winsorized p-Value
$[-3, 3]$	157	-0.0004	0.6340	0.5446	0.9130
$[-3, 7]$	157	0.0028	0.7321	0.3041	0.2184
$[-3, 15]$	157	-0.0002	0.6282	0.5082	0.5167
$[-1, 15]$	157	-0.0038	0.1556	0.7370	0.9322
$[-5, 15]$	157	0.0038	0.9454	0.2926	0.3555

Notes: Cumulative average abnormal returns (CAAR) over different windows for the placebo group as well as their corresponding Z statistic and bootstrapped p-values. The 157 observations correspond to leaders that belong to the same countries contained in the main sample who lost power in a regular manner. Z is the test statistic described in Appendix C for the null $H_0 : CAAR = 0$. Significance at the 10%, 5% and 1% are denoted by *, ** and ***, respectively, and based on the Z statistic's p-value. Column 5 and 6 show two alternative bootstrapped p-values described in Appendix D.

These results indicate that not all transitions are alike and markets respond differently according to the nature of the exit. In particular, they seem to respond positively to unsurprising leader exits, but not to surprising leader exits. As noted by Jones and Olken (2005), the zero effect of surprising exits may be the result of averaging out the positive effect of bad leaders and the negative effect of good leaders. The histograms in Panel (1) of Figure 2.5 suggest this may be actually the case. These histograms show cumulative abnormal returns (CARs) in windows [-3,15] and [-5,15] for leaders who left office surprisingly. Both histograms show that CARs are evenly spread out to both sides of zero. However, when compared to the histograms in Panel (2), which are for CARs from unsurprising exits, we observe that the dispersion of CARs from surprising exists is relatively small compared to the one from unsurprising ones. Moreover, CARs for unsurprising exits are also more positive than negative for both windows.
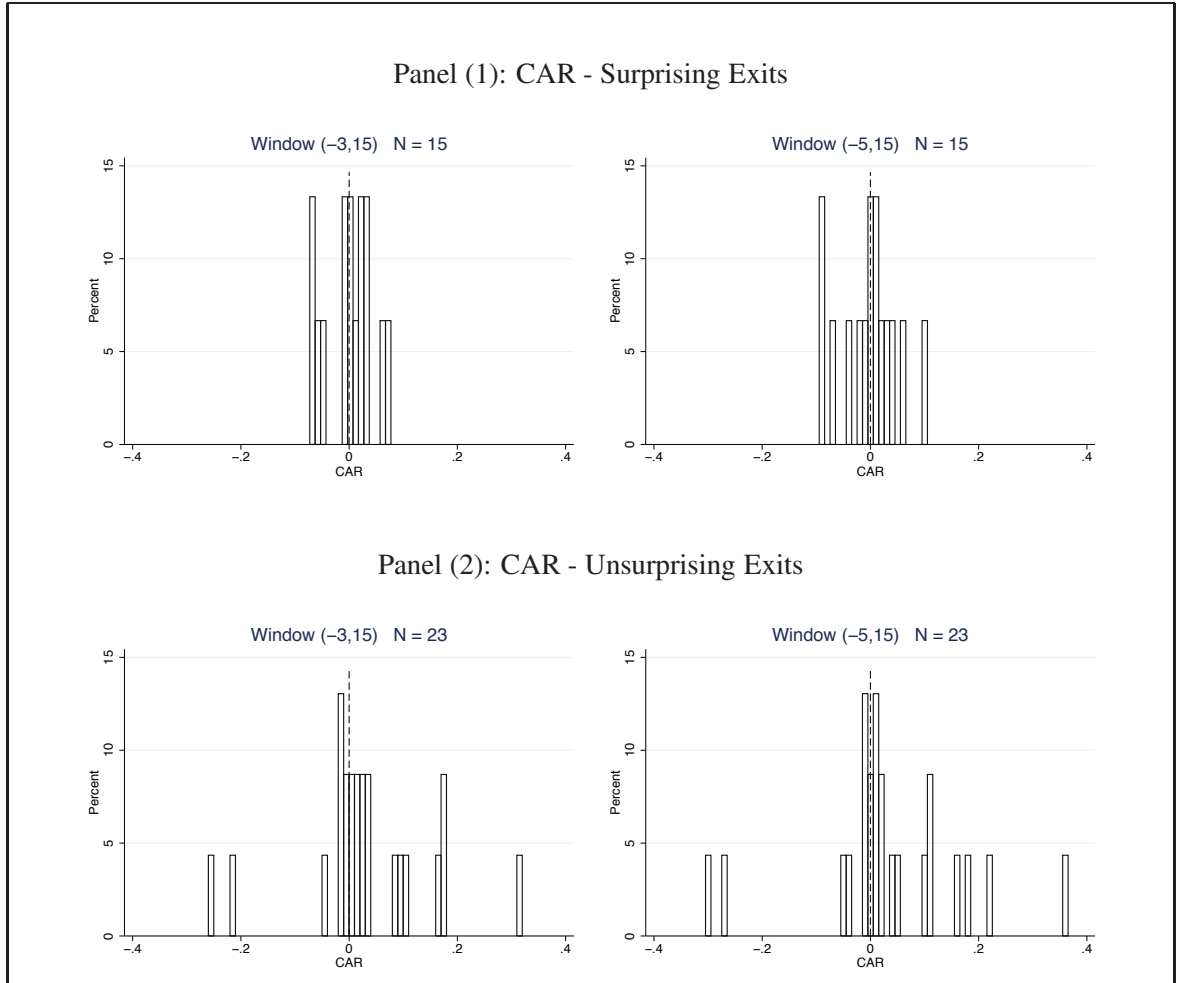
Figure 2.5. Histograms of cumulative abnormal returns (CAR) for both surprising and unsurprising exits. For each sample, we present histograms for two different windows. The first window starts 3 trading days before the exit and lasts until 15 trading days after. On the other hand, the second windows ranges from 5 trading days before the exit until 15 trading days after. The dashed vertical line lies over the day the exit took place.

We use the K statistic described in section 2.3.2 to test whether CARs associated to surprising exits take on extreme values compared to their corresponding time-series counterparts. The K statistic is large when, on average, the CAR around the event is extreme compared to surrounding *auxiliary* CARs. These auxiliary CARs are computed

before and after the exit's CAR.[10] On the other hand, the K statistic is low when the CAR around the exit is, on average, similar to the median surrounding CAR.

Table 2.4 shows that the value of the K statistic varies between -1.495 and -0.314 and it is not significant at any relevant level for the set of surprising exits. As a result, we see no evidence to conclude that surprising exits lead to systematic time-series changes in cumulative abnormal returns. Unsurprising exits on the other hand, show a different pattern. The K statistic associated to unsurprising exits is positive and significantly different from zero. Values range from 1.042 to 1.923 and they are significant at the 1% level. This suggests that the effect of unsurprising exits is not only significant locally around the exit but that it is also significantly different from both previous and future behavior.

Table 2.4. Unexpected Exits - K Statistic

Sample	Window	Total CARs	Average K	p-Value
Surprising Exits	$[-5, 5]$	22	-0.730	0.881
Surprising Exits	$[-3, 3]$	35	-0.314	0.781
Surprising Exits	$[-3, 7]$	22	-1.069	0.960
Surprising Exits	$[-1, 3]$	49	-1.495	1
Unsurprising Exits	$[-5, 5]$	22	1.923	<0.01
Unsurprising Exits	$[-3, 3]$	35	1.181	<0.01
Unsurprising Exits	$[-3, 7]$	22	1.042	<0.01
Unsurprising Exits	$[-1, 3]$	49	1.235	<0.01

Notes: Average K statistic for different windows, for both surprising and unsurprising exits. The third column shows the number of non-overlapping CARs used. The analysis considers 251 trading days, starting 190 days before the exit until 60 days after. Average K statistics were computed using Monte Carlo simulations as described in Appendix E.

Given that our sample is relatively small, we opted to compute the empirical distribution of K using Monte Carlo simulations. The histograms in Panel (1) of Figure 2.6 show

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[10]Given the fixed length of the analysis period, the window's length used to compute the auxiliary CARs will determine how many of them will be available to compute the percentiles ranks, which are necessary to compute the K statistic. In order to increase the number of CARs, we use windows covering a period of up to 11 trading days.

that the distribution of K from surprising exists is skewed to the left of zero. In contrast, histograms in Panel (2) of the figure show that the distribution of K from unsurprising exits is skewed to the right.
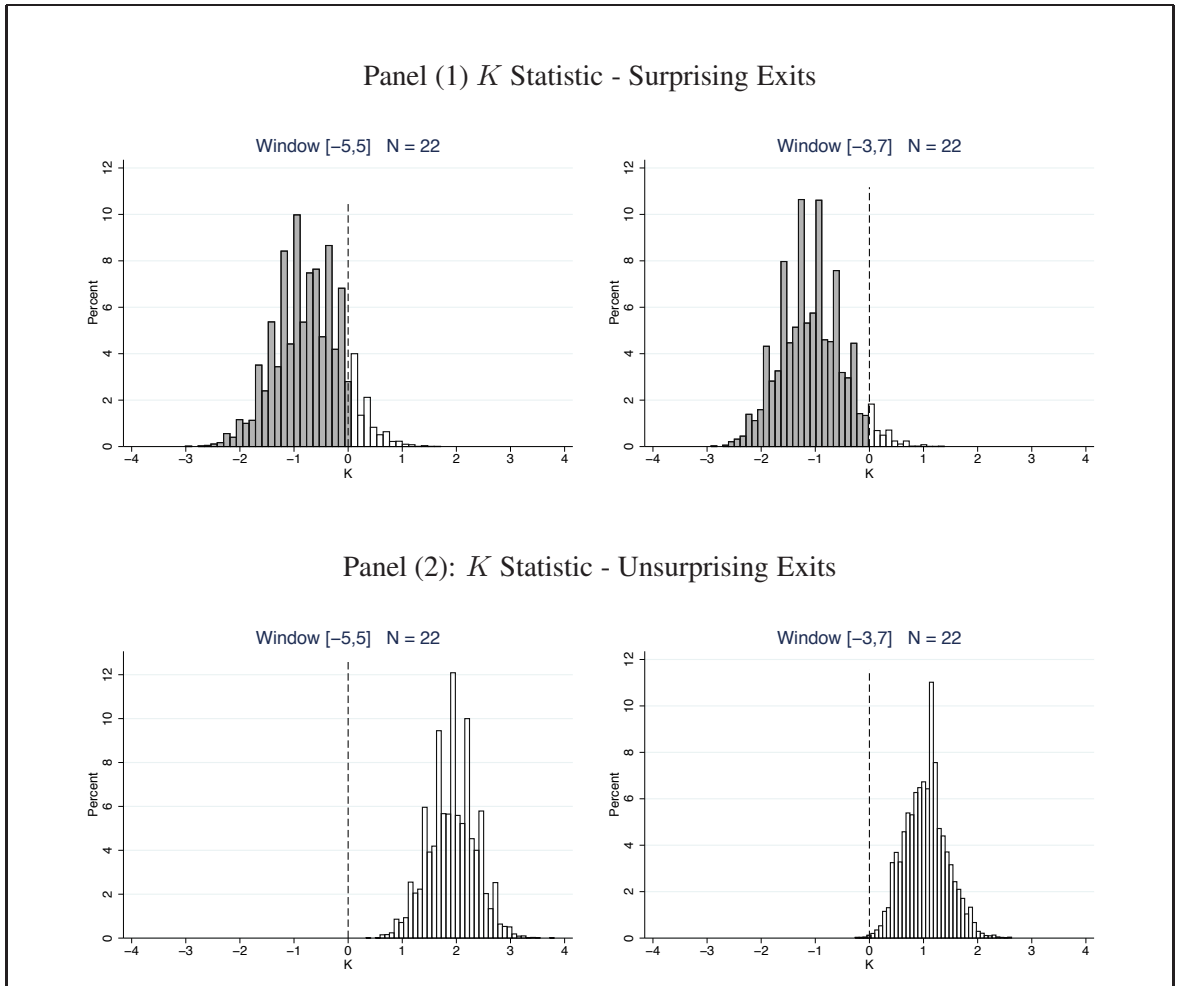
Figure 2.6. Histograms for both surprising and unsurprising exits of the K statistic over different windows' lengths. The K statistic is positive when a leader's CAR around his exit is extreme in comparison to cumulative abnormal returns in previous and subsequent non-overlapping windows. The analysis considers 251 trading days, starting 190 days before the exit until 60 days after. The dashed vertical line lies over 0. The distributions were obtained from Monte Carlo simulations as described in Appendix E. Any column to the left of the line is shaded to make it easier to identify as a negative value.

We also study the dispersion of the CARs in the placebo group using the same procedure as before. The results of this analysis are shown in Table 2.5. The K statistic is positive and significant for the different windows considered. This suggests that the CARs around the date of exit are different from the ones during the period before and after the event. However, this effect cancels out when calculating the cross-sectional average (i.e., the CAAR) as shown in Table 2.3.

Table 2.5. Expected Exits - K Statistic

Window	Total CARs	Average K	p-Value
$[-5, 5]$	22	1.943	< 0.01
$[-3, 3]$	35	2.455	< 0.01
$[-3, 7]$	21	1.687	< 0.01
$[-1, 3]$	50	0.796	0.022

Notes: Average K statistic for different windows, for expected exits. The second column shows the number of non-overlapping CARs used. The analysis considers 251 trading days, starting 167 days before the exit until 83 days after. Average K statistics were computed using Monte Carlo simulations as described in Appendix E.

Our results suggest that equity markets thrive (at least in the short run) when an indisposed leader exits, but they seem to adjust quickly after a surprising exit. In the following section we use our data to disentangle the mechanisms underlying this phenomenon.

2.5.1. Volatility of Returns

The second question we address in this paper is whether the volatility of returns changes around leader transitions, as this could explain the changes in stock market returns. We describe three measures for whether leaders' exits are associated to an increase in volatility. We argue that this is not the case for either surprising nor unsurprising exits.

Therefore, the positive and significant CAAR obtained in previous sections for unsurprising exits is most likely explained by an increase in expected dividends across firms and not by a shift in country risk. For more details on the relationship between these two channels see Appendix F.

First, we use Bloom's (2009) criterion to label an exit as a *volatility shock* if the volatility of daily stock returns during the month of the exit is significantly higher than the volatility of adjacent months. Specifically, we compute the volatility of daily stock returns for 49 calendar months centered around each exit. Then, we compare the standardized volatility during the month of the exit with the 5% one-tailed critical value of a Normal distribution. Results are presented in Figure 2.7. The histogram shows the distribution of the standardized volatilities for all unexpected exits, as well as for unsurprising exits. As the figure shows, there are only 2 events that fulfill Bloom's criterion and both of them correspond to unsurprising exits.
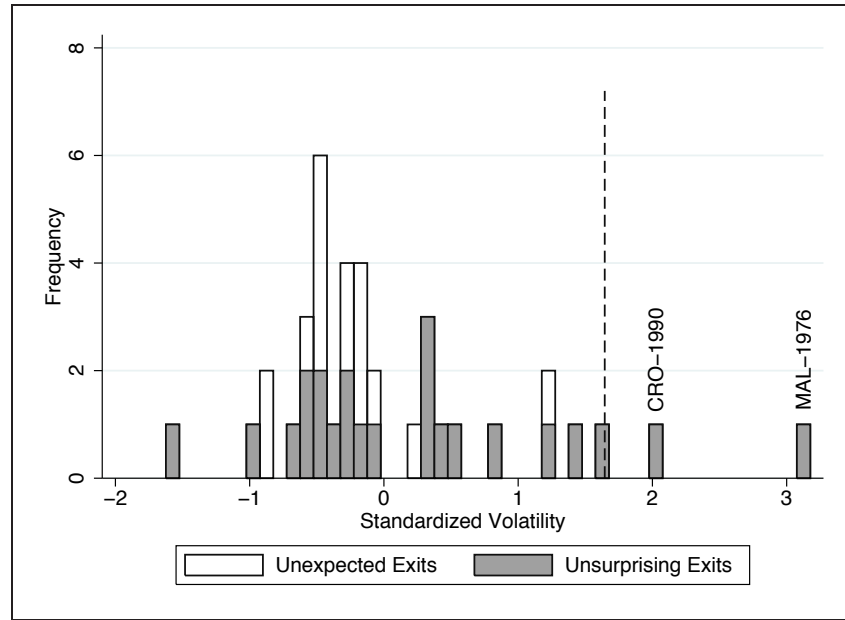
Figure 2.7. Frequency histogram of standardized volatilities. The histogram displays the standardized volatility of the month in which the exit takes place for both the whole sample of unexpected exits and unsurprising exits. The vertical dashed line shows a 1.65 threshold (5% one-tailed significance level). Any value laying on the right of this line corresponds to a *volatility shock*.

Second, we use the standard deviation of daily stock returns to assess whether leaders' exits affect the volatility of market indexes by comparing their values in the period immediately prior (pre) to the ones immediately after (post). Table 2.6 shows the average volatility of indexes returns 20, 60, and 100 days before and after leaders' exits, grouped by unexpected, surprising and unsurprising exits. Results show no significant differences between before and after volatilities for any of the samples. This is consistent with intuition, since a long-term shift in volatility is very uncommon in stock markets.

Third, we study variations in equities' betas before and after the events. Betas are a measure of systematic risk, which should be closely related to total risk, measured by volatilities. Table 2.7 shows 60, 100, and 200 days pre and post-exit betas and their differences. These betas are computed as in section 2.3.1 using the Scholes-Williams estimator.

We use longer windows in comparison to the ones used to compute volatilities in order to obtain a better fit from ordinary least squares (OLS). Our results confirm that there is no significant difference between pre and post-betas in any of the samples.

Overall, these results suggest that unexpected exits are not generating a risk shift that could affect the country's cost of capital. Therefore, positive and significant CAAR for unsurprising exits should be related to an increase in expected dividends across firms in the economy and not to a shift in risk.[11]

Table 2.6. Effect of Unexpected Exits - Volatility

Sample	Days Around Exit (n)	Number of Observations	$\sigma_{PRE[-n,-1]}$	$\sigma_{POST[1,n]}$	$\triangle\sigma_{POST-PRE}$	p-Value	
						$H_a : \triangle\sigma < 0$	$H_a : \triangle\sigma > 0$
Unexpected Exits	20	38	0.008	0.008	0	0.475	0.525
Unexpected Exits	60	38	0.009	0.009	0	0.555	0.445
Unexpected Exits	100	37	0.008	0.009	0	0.640	0.360
Surprising Exits	20	15	0.009	0.009	0	0.612	0.388
Surprising Exits	60	15	0.010	0.011	0.001	0.680	0.320
Surprising Exits	100	15	0.009	0.010	0.001	0.701	0.299
Unsurprising Exits	20	23	0.007	0.007	0	0.308	0.692
Unsurprising Exits	60	23	0.008	0.007	0	0.272	0.728
Unsurprising Exits	100	22	0.008	0.008	0	0.433	0.567

Notes: Cross-sectional average volatility over different time periods for unexpected, surprising and unsurprising exits. The volatility is computed using daily returns in windows of 20, 60 and 100 trading days for both the period before the exit $[-n, -1]$ and the period after $[1, n]$, where 0 is the day of the exit. The difference between the post and pre-exit value is displayed in the sixth column. Columns 7 and 8 test the equality of the post and pre-exit averages. The former shows the p-value under the alternative hypothesis, $H_a : \triangle\sigma < 0$. The latter shows the p-value under the alternative hypothesis, $H_a : \triangle\sigma > 0$.

[11]This results are consistent with Pástor and Veronesi (2012). In their case, firm profits depend on the realization of the government policy, which in our case can be interpreted as the change of political regime due to the leader's exit.

Table 2.7. Unexpected Exits - Betas

Sample	Days Around Exit (n)	Number of Observations	$\beta_{PRE[-n,-1]}$	$\beta_{POST[1,n]}$	$\triangle\beta_{POST-PRE}$	p-Value	
						$H_a : \triangle\beta < 0$	$H_a : \triangle\beta > 0$
Unexpected Exits	60	37	0.309	0.473	0.163	0.852	0.148
Unexpected Exits	100	36	0.287	0.455	0.168	0.883	0.117
Unexpected Exits	200	36	0.338	0.349	0.011	0.535	0.465
Surprising Exits	60	14	0.301	0.260	-0.042	0.423	0.577
Surprising Exits	100	14	0.339	0.284	-0.055	0.392	0.608
Surprising Exits	200	14	0.348	0.224	-0.124	0.266	0.734
Unsurprising Exits	60	23	0.314	0.602	0.288	0.909	0.091
Unsurprising Exits	100	22	0.253	0.564	0.310	0.945	0.055
Unsurprising Exits	200	22	0.332	0.429	0.097	0.720	0.280

Notes: Cross-sectional average beta over different time periods for unexpected, surprising and unsurprising exits. Beta is computed using daily returns in windows of 60, 100 and 200 trading days for both the period before the exit $[-n, -1]$ and the period afterwards $[1, n]$, where 0 is the day of exit. In order to account for non-synchronous trading, the market model parameters are computed using the method proposed by Scholes and Williams (1977). The difference between the post and pre-exit values is displayed in the sixth column. Columns 7 and 8 test the equality of the post and pre-exit averages. The former shows the p-value under the alternative hypothesis, $H_a : \triangle\beta < 0$. The latter shows the p-value under the alternative hypothesis, $H_a : \triangle\beta > 0$.

We then study whether the exits in the placebo group can be deemed as *volatility shocks* or not. According to the criteria described in section 2.3.3 there is a total of 17 of these cases out of a total of 157 entries (i.e., 10.8%). Figure 2.8 shows a histogram with the standardized volatilities.

We also study the changes in volatilities and betas before and after regular exits take place. Table 2.8 shows average volatilities for the same windows in Table 2.6 (20, 60, and 100 days before and after the leaders' exits). Table 2.9 on the other hand, shows the Scholes-Williams estimator before and after the events take place for the same windows as in Table 2.7 (60, 100 and 200 trading days for both the period before the exit and the period afterwards). In both cases, the results show no significant variations between before and after.
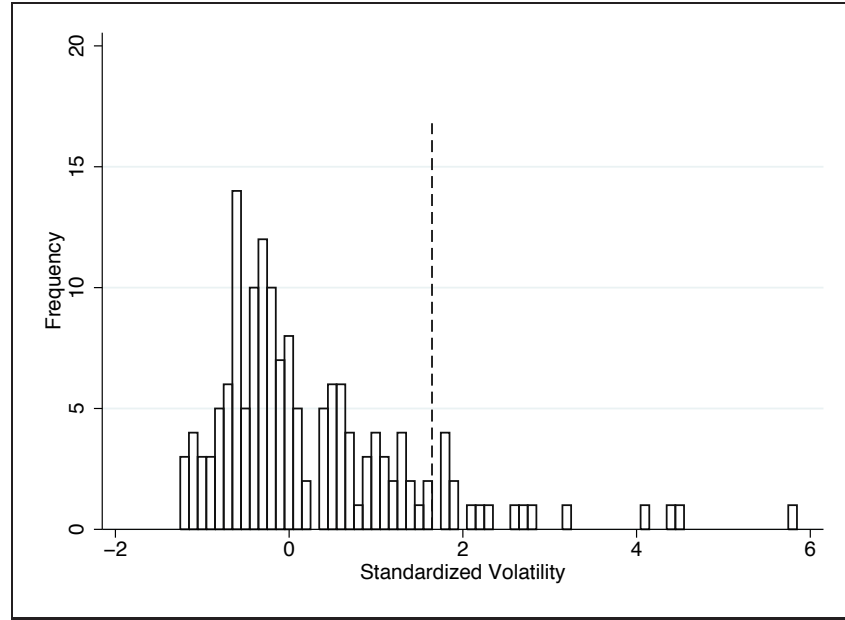
Figure 2.8. Frequency histogram of standardized volatilities. The histogram displays the standardized volatility of the month in which the exit takes place for the placebo sample. The vertical dashed line shows a 1.65 threshold (5% one-tailed significance level). Any value laying on the right of this line corresponds to a *volatility shock*.

Table 2.8. Effect of Expected Exits - Volatility

Days Around Exit (n)	Number of Observations	$\sigma_{PRE[-n,-1]}$	$\sigma_{POST[1,n]}$	$\triangle\sigma_{POST-PRE}$	p-Value $H_a : \triangle\sigma < 0$	$H_a : \triangle\sigma > 0$
20	157	0.016	0.017	0.001	0.716	0.284
60	157	0.015	0.016	0.001	0.835	0.165
100	156	0.015	0.016	0.001	0.761	0.239

Notes: Cross-sectional average volatility over different time periods for the placebo group. The volatility is computed using daily returns in windows of 20, 60 and 100 trading days for both the period before the exit $[-n, -1]$ and the period after $[1, n]$, where 0 is the day of the exit The difference between the post and pre-exit value is displayed in the fifth column. Columns 6 and 7 test the equality of the post and pre-exit averages. The former shows the p-value under the alternative hypothesis, $H_a : \triangle\sigma < 0$. The latter shows the p-value under the alternative hypothesis, $H_a : \triangle\sigma > 0$.

Table 2.9. Effect of Expected Exits - Betas

Days Around Exit (n)	Number of Observations	$\beta_{PRE[-n,-1]}$	$\beta_{POST[1,n]}$	$\triangle\beta_{POST-PRE}$	p-Value	
					$H_0 : \triangle\beta < 0$	$H_0 : \triangle\beta > 0$
60	156	0.658	0.716	0.058	0.779	0.221
100	156	0.699	0.721	0.022	0.630	0.370
200	156	0.729	0.738	0.009	0.564	0.436

Notes: Cross-sectional average beta over different time periods for the placebo group. Beta is computed using daily returns in windows of 60, 100 and 200 trading days for both the period before the exit $[-n, -1]$ and the period afterwards $[1, n]$, where 0 is the day of exit. In order to account for non-synchronous trading, the market model parameters are computed using the method proposed by Scholes and Williams (1977). The difference between the post and pre-exit values is displayed in the fifth column. Columns 6 and 7 test the equality of the post and pre-exit averages. The former shows the p-value under the alternative hypothesis, $H_a : \triangle\beta < 0$. The latter shows the p-value under the alternative hypothesis, $H_a : \triangle\beta > 0$.

2.5.2. Interactions With Level of Democratization

The results above suggest a causal effect of leader's exit on return levels. However, the institutional arrangement in place may affect the extent to which leaders matter. Given the results in Jones and Olken (2005), we expect that the positive market reaction to un-surprising exits is mainly explained by ill autocratic leaders, as opposed to democratic leaders, who died in office. We conduct the event analysis described in section 2.3.1 for two different sets of leaders, splitting the sample of unexpected exits according to whether a country is considered a democracy or not.

We use the variable POLITY2 in the PolityIV (Marshall & Jaggers, 2007) database to classify the countries in our sample accordingly. POLITY2 ranges from -10 to +10 where the former indicates a strongly democratic regimen and the latter a strongly autocratic one. The entries in Table 2.10 compare leaders whose countries receive a negative or zero score ("autocrats") with those leaders whose countries receive a positive score ("democrats"). This criterion coincides with the one used by Besley et al. (2011) and Persson and Tabellini (2006). The results indicate that autocrats' exits have a strong positive effect on abnormal

returns overall. The magnitude of this effect is substantial (around 8%) and driven by those who left office after health problems.

Table 2.10. Interactions With Type of Political Regime - CAAR

Sample	Window	Autocrats (Polity IV)				Democrats (Polity IV)			
		N	CAAR	Z p-Value	Bootstrapped p-Value	N	CAAR	Z p-Value	Bootstrapped p-Value
Unexpected Exits	$[-3,3]$	11	0.040***	<0.01	<0.01	26	-0.005	0.7730	0.7789
Unexpected Exits	$[-3,7]$	11	0.072***	<0.01	<0.01	26	-0.004	0.8800	0.6797
Unexpected Exits	$[-3,15]$	11	0.090***	<0.01	<0.01	26	-0.012	0.5740	0.8625
Unexpected Exits	$[-1,15]$	11	0.091***	<0.01	<0.01	26	-0.016	0.3980	0.9356
Unexpected Exits	$[-5,15]$	11	0.092***	<0.01	<0.01	26	-0.014	0.6370	0.8478
Surprising Exits	$[-3,3]$	4	0.008	0.4560	0.1526	11	-0.001	0.4190	0.5958
Surprising Exits	$[-3,7]$	4	0.022	0.1940	<0.01	11	-0.003	0.8710	0.6713
Surprising Exits	$[-3,15]$	4	0.036	0.1370	<0.01	11	-0.014	0.2580	0.9417
Surprising Exits	$[-1,15]$	4	0.037	0.1780	<0.01	11	-0.013	0.2210	0.9759
Surprising Exits	$[-5,15]$	4	0.042	0.1440	<0.01	11	-0.013	0.2210	0.9796
Unsurprising Exits	$[-3,3]$	7	0.058***	<0.01	<0.01	15	-0.007	0.7540	0.785
Unsurprising Exits	$[-3,7]$	7	0.101***	<0.01	<0.01	15	-0.005	0.9530	0.6375
Unsurprising Exits	$[-3,15]$	7	0.121***	<0.01	<0.01	15	-0.011	0.8190	0.7158
Unsurprising Exits	$[-1,15]$	7	0.123***	<0.01	<0.01	15	-0.018	0.9470	0.8368
Unsurprising Exits	$[-5,15]$	7	0.121***	<0.01	<0.01	15	-0.010	0.8230	0.6542

Notes: Cumulative average abnormal return (CAAR) over different windows for unexpected, surprising and unsurprising exits. Each sample is split by the country's level of democratization. The level of democratization is determined using the variable POLITY2 in the PolityIV database. Democrats are defined as those leaders who rule in a country with a value higher than 0. Autocrats, on the other hand, are defined as those leaders who rule in a country with a value smaller than or equal to 0. Z is the test statistic described in Appendix C for the null $H_0 : CAAR = 0$. Significance at the 10%, 5% and 1% are denoted by *, ** and ***, respectively, and based on the Z statistic's p-value. Columns 6 and 10 show bootstrapped p-values as described in Appendix D. The CARs are not winsorized in this analysis due to the small number of observations.

2.5.3. Interactions With Leader's Educational Level

Our previous results suggest that health issues seem to induce expectations in the market of an ineffective ruling. Therefore, we should expect that a leader's human capital may also affect those expectations and ultimately market returns on the event of his or her exit. Recent literature has studied the effect of the leader's education in the country's growth and firm's performance (e.g., Besley et al., 2011; Nguyen & Nielsen, 2010). Following these authors, in this section, we study the relevance of this variable.

We classify the educational attainment of each one of our leaders using a scale similar to Ludwig (2002): 1) illiterate, 2) literate without formal education, 3) primary education, 4) high/secondary school, 5) post-secondary no-college (including military formation), 6) college degree, 7) master's degree, and 8) doctorate. We are able to hand collect this information for 35 out of 38 entries in our sample. Due to the somewhat reduced sample size we split it in only two groups, those with high education (a college or higher degree) and those with low.

The results in Table 2.11 show evidence that abnormal returns are significantly positive when leaders with low education exit from office. The magnitude of this effect is substantial (around 6% for unexpected exits) and driven by relatively uneducated leaders who exit office after an illness. In the latter case, the effect increases to around 10%.

Table 2.11. Interactions With Leader's Education - CAAR

Sample	Window	Education<6				Education≥6			
		N	CAAR	Z p-Value	Bootstrapped p-Value	N	CAAR	Z p-Value	Bootstrapped p-Value
Unexpected Exits	$[-3,3]$	12	0.029	0.2011	<0.01	23	-0.004	0.7039	0.7575
Unexpected Exits	$[-3,7]$	12	0.054***	0.0086	<0.01	23	-0.002	0.6448	0.5757
Unexpected Exits	$[-3,15]$	12	0.057**	0.0325	<0.01	23	-0.008	0.9122	0.7241
Unexpected Exits	$[-1,15]$	12	0.062**	0.0250	<0.01	23	-0.011	0.8196	0.8276
Unexpected Exits	$[-5,15]$	12	0.061**	0.0283	<0.01	23	-0.011	0.8436	0.7742
Surprising Exits	$[-3,3]$	6	0.004	0.432	0.4296	7	-0.007	0.617	0.9425
Surprising Exits	$[-3,7]$	6	0.006	0.895	0.3050	7	-0.003	0.831	0.7032
Surprising Exits	$[-3,15]$	6	-0.002	0.616	0.5339	7	-0.010	0.535	0.9066
Surprising Exits	$[-1,15]$	6	-0.001	0.721	0.5240	7	-0.006	0.492	0.8146
Surprising Exits	$[-5,15]$	6	0	0.831	0.5091	7	-0.018	0.451	0.9743
Unsurprising Exits	$[-3,3]$	6	0.054***	0.0095	<0.01	16	-0.003	0.4317	0.6395
Unsurprising Exits	$[-3,7]$	6	0.101***	0.0001	<0.01	16	-0.001	0.6807	0.5210
Unsurprising Exits	$[-3,15]$	6	0.116***	0.0004	<0.01	16	-0.006	0.5873	0.6224
Unsurprising Exits	$[-1,15]$	6	0.124***	0.0004	<0.01	16	-0.014	0.8562	0.7889
Unsurprising Exits	$[-5,15]$	6	0.121***	0.0009	<0.01	16	-0.009	0.7931	0.6416

Notes: Cumulative average abnormal return (CAAR) over different windows for unexpected, surprising and unsurprising exits. Each sample is split by the leader's educational attainment. The whole sample contains 35 entries and it is then split into two groups containing 13 and 22 observations. Educational attainment is classified using a scale similar to Ludwig (2002) that ranges from 1 to 8 where the former indicates an illiterate leader and the latter indicates that the leader had a doctorate. College education (coded as 6) is used as a threshold to distinguish between well-educated leaders from those less educated. Z is the test statistic described in Appendix C for the null $H_0 : CAAR = 0$. Significance at the 10%, 5% and 1% are denoted by *, ** and ***, respectively, and based on the Z statistic's p-value. Columns 6 and 10 show bootstrapped p-values as described in Appendix D. The CARs are not winsorized in this analysis due to the small number of observations.

2.6. Rumors About The Leader's Health

For most of the unsurprising exits, the leader's health condition was public knowledge before his death. In these cases, the market should have reacted when the rumors about his deteriorating health started. In this section, we apply the same analysis described in sections 2.5 and 2.5.1 to the event in which a string of rumors started appearing in the news. We are interested in whether the market responds to news about the national leader's health before his or her exit from office.

2.6.1. Rumor Data

We use LexisNexis Academic to search for news containing rumors or information about each leader's health in the unsurprising subgroup (for a similar procedure see Fisman, 2001). This database provides access to full-text news in both English and non-English sources. The latter are displayed translated to English.

In our search, we use three sets of words that must be jointly present somewhere in the news articles retrieved by LexisNexis. In the first set, we specify that either the leader's first or last name must be present. In the second set, at least one of the following must appear in the results: the country's name, the ruler's title (such as "prime minister" or "king") or the word "leader". In the third set, we required one of the following words: "ill", "diseased", "health", "illness" or "sick". We restrict the results to newspapers and hand collect the date of the first article concerning a rumor of the leader's health. We were not able to find any news concerning leaders that lost power before 1970.[12]

In the case of David Thompson for example, we found the following extract published May 15, 2010 among the search results:

> David Thompson says he has been suffering from stomach pains since
> early March.

While searching for rumors regarding Francisco Franco Bahamonde's health, on the other hand, we found an article published on July 10, 1974 with the following extract:

> Gen. Franco of Spain has been hospitalized for phlebitis. Study indi-
> cates that about 1/2 of those who suffer from phlebetis are hospitalized
> at some time and that 21% suffer from some long-term ill effects. Con-
> dition can lead to death, although fatalities are uncommon.

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[12]Due to this limitations we were unable to consider Franklin D. Roosevelt, Tomas Garrigue Masaryk, W. L. Mackenzie King, Tanzan Ishibashi, Hayato Ikeda, and John Curtin in this analysis.

In total we were able to find information for 14 out of the 23 national leaders who left office in an unsurprising manner. Table 2.12 shows the list.

Table 2.12. Rumors Data

ID	Name	Country	Reason of Exit	Date of Rumor
ISR-2001	Ariel Sharon	Israel	Stroke	12/19/2005
TAW-1950	Chiang Kai-Shek	Taiwan	Kidney Failure	9/1/1972
BAR-2008	David Thompson	Barbados	Cancer: Pancreatic	5/15/2010
CHN-1980	Deng Xiaoping	China	Parkinson Disease	12/25/1996
SPN-1939-2	Francisco Franco Bahamonde	Spain	Parkinson Disease	7/10/1974
CRO-1990	Franjo Tudjman	Croatia	Cancer: Stomach	3/12/1999
JOR-1952	Hussein Bin Talal El-Hashim	Jordan	Cancer: Non-Hodgkin's Lymphoma	8/26/1992
MAL-1976	Hussein Bin Onn	Malaysia	Heart Attack	2/8/1981
KUW-1991	Jaber III Al-Ahmad Al-Jaber Al-Sabah	Kuwait	Cerebral Hemorrhage	9/22/2001
HUN-1990	Jozsef Antall	Hungary	Cancer: Non-Hodgkin's Lymphoma	10/5/1993
JPN-1998	Keizö Obuchi	Japan	Stroke	4/3/2000
JAM-1989	Michael Manley	Jamaica	Cancer: Prostate	3/7/1992
NOR-1976	Odvar Nordli	Norway	Resigned: Health Reasons	1/31/1981
NIG-2007	Umaru Musa Yar'Adua	Nigeria	Heart Failure	9/1/2008

Notes: The first column indicates the ID used by Archigos to identify each observation. The second and third columns show the leader's name and country, respectively. The fourth column shows the reason why the leader died or resigned. The fifth column displays the date of the first rumor concerning the leader's health.

2.6.2. Results Around Rumors

The results in Table 2.13 are consistent with a negative stock market reaction due to the rumors. In all the windows considered, cumulative abnormal returns are significantly negative with values around -5%. Additionally, Table 2.14 shows that the market's behavior around the rumor is statistically different from the one displayed historically. The K statistic is positive and statistically significant for almost all windows. This together with the positive reaction due to the posterior exit of these leaders (shown in previous sections) is consistent with a drop and rebound in stock market returns. Markets react adversely to the rumors and take precautions to withstand the period during which the leader will not be able to fulfill his duties thoroughly. Then, when the head of state's spell ends due to a

complication of his illness, the market reacts positively as it lies in wait for the successor. In other words, since the exiting leader is seriously ill, the market expects the successor to perform better and the expected equity value to be higher. This seems to suggest that markets are more resilient to surprising exits, due to the tragic accidental death of a national leader, than to news about leaders' health complications. This could be explained by the uncertainty in the quality of the successor, in contrast to the quality of the leader leaving office in a surprising manner.

Table 2.13. Rumors of Possible Exits - Cumulative Average Abnormal Return (CAAR)

Window	Number of Observations	CAAR	Z p-Value	Bootstrapped p-Value	Winsorized p-Value
$[-9, 6]$	14	-0.0492**	0.0260	0.0154	0.0184
$[-9, 7]$	14	-0.0514**	0.0390	0.0250	0.0259
$[-9, 8]$	14	-0.0535**	0.0350	0.0180	0.0196
$[-9, 9]$	14	-0.0518*	0.0570	0.0256	0.0202
$[-10, 6]$	14	-0.0489**	0.0410	0.0174	0.0213
$[-10, 7]$	14	-0.0510*	0.0580	0.0283	0.0281
$[-10, 8]$	14	-0.0532*	0.0520	0.0215	0.0236
$[-10, 9]$	14	-0.0515*	0.0800	0.0300	0.0236
$[-10, 10]$	14	-0.0535*	0.0560	0.0172	0.0111

Notes: Cumulative average abnormal return (CAAR) over different windows around the date in which the first rumor was published as well as their corresponding Z statistic and bootstrapped p-values. The 15 observations correspond to a subsample of unsurprising exits. Z is the test statistic described in Appendix C for the null $H_0 : CAAR = 0$. Significance at the 10%, 5% and 1% are denoted by *, ** and ***, respectively, and based on the Z statistic's p-value. Column 5 and 6 show two alternative bootstrapped p-values described in Appendix D.

The intervals of trading days considered while studying the effect of rumors are different and slightly longer than the ones used to study the effect of unexpected exits. The main difference lies on the number of trading days considered in the period before the event takes place. One of the reasons to do this is that rumors might have a build-up period before being published. The second reason is that the sources for some of the rumors, specially for older leaders from less developed countries, came from large international

newspapers. In these cases, it is likely that local media covered the news earlier, generating a lag with respect to our sources.

Table 2.14. Rumors of Possible Exits - K Statistic

Window	Total CARs	Average K	p-Value
$[-9, 6]$	15	0.405	0.230
$[-9, 7]$	14	1.408	<0.01
$[-9, 8]$	13	1.603	<0.01
$[-9, 9]$	13	2.094	<0.01
$[-9, 10]$	11	1.316	0.018
$[-10, 6]$	14	1.331	<0.01
$[-10, 7]$	13	1.135	0.031
$[-10, 8]$	13	1.806	<0.01
$[-10, 9]$	11	2.425	<0.01
$[-10, 10]$	11	1.599	<0.01

Notes: Average K statistic for different windows around the date of the first rumor concerning the leader's health. The second column shows the number of non-overlapping CARs used. The analysis considers 251 trading days, starting 106 days before the publication until 144 days after. Average K statistics were computed using Monte Carlo simulations as described in Appendix E.

2.6.2.1. Volatility of returns

As we did with the date of exit, we look for a change in volatility using three different, but complementary, procedures. First, we identify any exit that could be classified as a *volatility shock* according to Bloom's (2009) paper. Figure 2.9 shows the results of this analysis and it suggests that most of the events cannot be classified as such. Second, we

study the market's volatility around the rumor's date. Table 2.15 shows the results. There are no statistical differences between the market's volatility before and after the dates in which the rumors started. Finally, we estimate the betas for different windows before and after the rumor's date and obtain similar results. As Table 2.16 presents, there is no significant difference between the betas before and after the rumors. Overall, this evidence leads us to believe that the negative and significant CAAR associated to the rumors is not caused by market uncertainty (volatility) but rather by a decrease in expected future cash flows.
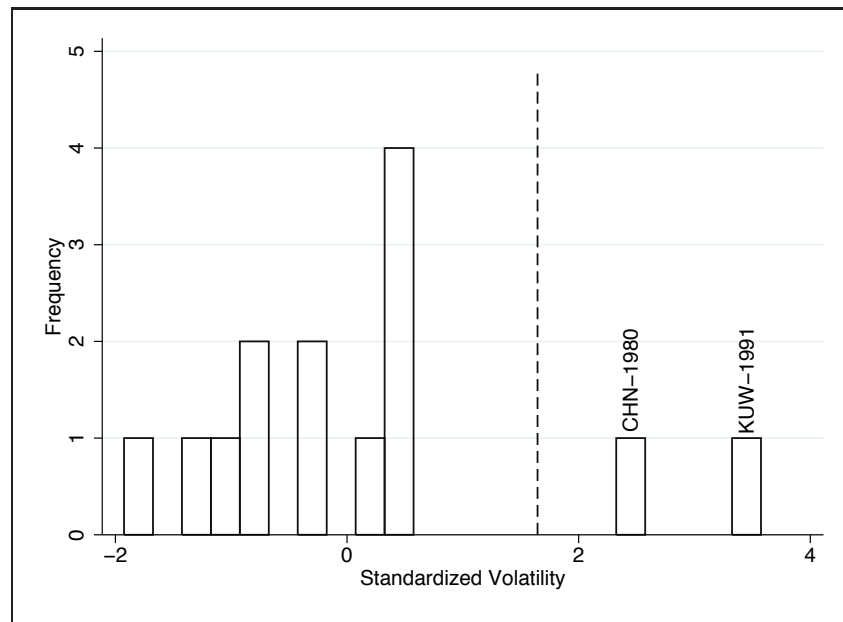

Figure 2.9. Frequency histogram of standardized volatilities. The histogram displays the standardized volatility of the month in which the rumor is published. The vertical dashed line shows a 1.65 threshold (5% one-tailed significance level). Any value laying on the right of this line corresponds to a *volatility shock*.

Table 2.15. Rumors of Possible Exits - Volatility

Days Around Rumor (n)	Number of Observations	$\sigma_{PRE[-n,-1]}$	$\sigma_{POST[1,n]}$	$\triangle\sigma_{POST-PRE}$	p-Value	
					$H_a : \triangle\sigma < 0$	$H_a : \triangle\sigma > 0$
20	14	0.015	0.013	-0.002	0.331	0.669
60	14	0.015	0.013	-0.002	0.272	0.728
100	14	0.016	0.014	-0.001	0.337	0.663

Notes: Cross-sectional average volatility over different time periods around the date in which the first rumor concerning the leader's health was published. The volatility is computed using daily returns in windows of 20, 60 and 100 trading days for both the period before the exit $[-n, -1]$ and the period after $[1, n]$, where 0 is the publication date. The difference between the post and pre-publication date values is displayed in the fifth column. Columns 6 and 7 test the equality of the post and pre- publication averages. The former shows the p-value under the alternative hypothesis, $H_a : \triangle\sigma < 0$. The latter shows the p-value under the alternative hypothesis, $H_a : \triangle\sigma > 0$.

Table 2.16. Rumors of Possible Exits - Betas

Days Around Rumor (n)	Number of Observations	$\beta_{PRE[-n,-1]}$	$\beta_{POST[1,n]}$	$\triangle\beta_{POST-PRE}$	p-Value	
					$H_0 : \triangle\beta < 0$	$H_0 : \triangle\beta > 0$
60	14	0.331	0.240	-0.091	0.328	0.672
100	14	0.373	0.436	0.063	0.608	0.392
200	13	0.429	0.400	-0.029	0.450	0.550

Notes: Cross-sectional average beta over different time periods around the date in which the first rumor concerning the leader's health was published. Beta is computed using daily returns in windows of 60, 100 and 200 trading days for both the period before the publication $[-n, -1]$ and the period afterwards $[1, n]$, where 0 is the publication date. In order to account for non-synchronous trading, the market model parameters are computed using the method proposed by Scholes and Williams (1977). The difference between the post and pre-publication date values is displayed in the fifth column. Columns 6 and 7 test the equality of the post and pre-publication betas. The former shows the p-value under the alternative hypothesis, $H_a : \triangle\beta < 0$. The latter shows the p-value under the alternative hypothesis, $H_a : \triangle\beta > 0$.

2.7. Conclusion

Recent popular literature and scholarly writings emphasize the importance of national leaders on stock market performance around the globe. This paper uses exogenously timed leader transitions to identify the causal effect that leaders have in stock markets.

We find that the effect of leadership transitions across countries depends on the nature of their exit. Surprising deaths due to accidents, for instance, are not associated to systematic changes in cumulative abnormal returns or structural shifts in volatility. Exits due to the worsening of long-standing illness, on the other hand, are associated to a positive cumulative abnormal return across countries. Our results suggest that this positive impact is due to a rebound effect from the negative impact that initial news about these leader's health problems had on the markets.

These results contribute to the growing literature on the importance of leaders shaping economic outcomes. In particular, the results on this paper are consistent with the idea that investors perceive a leader's illness as an impediment for good governance. Our results also suggest that stock markets (and countries with relatively strong institutional arrangements to sustain them) cope, on average, better with the tragedy of suddenly losing healthy national leaders.

An important extension to this analysis would be to gather data on stock prices of individual companies across countries. This approach could shed light on how political connectedness of the leader affects particular firms and industries. In addition, it would permit an analysis of resource allocation and overall performance of the market. It would also be potentially interesting to explore additional leader and country characteristics that may mediate the effect of a leader's exit on market performance. Finally, it would be interesting to explore the details and strategic interactions within a leader's inner circle of a government when the leader is not performing governing activities in full capacity. Sometimes the leader or his close circle do not disclose the full severity of the leader's ailment to avoid relinquishing power. The main issue would be to gather comparable data on the composition of the leader's inner circle.

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APPENDIX

A. COMPARISON TO BESLEY ET AL. 2011

As a validation procedure, we compare our sample of unexpected exits with the one used by Besley et al. (2011). They use a total of 183 political leaders who were in office between 1875 and 2004. From this list, 174 leaders are also included in the initial sample we constructed from Archigos 3.0 (before trying to pair each entry with stock market data). Table A.1 presents the remaining 9 cases and the reason why they are not included in our sample. Out of these 9 cases, 6 are not included in our version of Archigos, one is labeled as a regular exit in Archigos, one is recorded in Archigos under a different name, and another one corresponds to an exit influenced by a third party.

Table A.1. Missing Leaders from Besley's List

Name	Country	Reason
Rosie Douglas	Dominica	No entries from this country in Archigos 3.0
Juhu K. Paasikivi	Finland	Regular exit according to Archigos 3.0
Herbert A. Blaize	Grenada	No entries from this country in Archigos 3.0
Ntsu Mokhehle	Lesotho	Exit influenced by third party according to Archigos 3.0
Amata Kabua	Marshall Islands	No entries from this country in Archigos 3.0
Richard John Seddon	New Zealand	Not included in Archigos 3.0
Ibn Saud	Saudi Arabia	Name should be corrected to Aziz according to Archigos 3.0
Mehmed V Reshad	Ottoman Empire	No entries from this country in Archigos 3.0
Ionatana Ionatana	Tuvalu	No entries from this country in Archigos 3.0

Notes: Observations that were included in the sample used by Besley et al. (2011) but were not included in our sample due to the reason displayed in the third column.

B. PARAMETER ESTIMATION OF THE MARKET MODEL FOR ABNORMAL RETURNS

We estimate the parameters of the model, $\hat{\alpha}_j^*$ and $\hat{\beta}_j^*$, using the method proposed by Scholes and Williams (1977) to account for non-synchronous trading. $\hat{\beta}_j^*$ is computed as follows:

$$\hat{\beta}_j^* = \frac{\hat{\beta}_j^- + \hat{\beta}_j + \hat{\beta}_j^+}{1 + 2\hat{\rho}_w},$$

where $\hat{\beta}_j^-$, $\hat{\beta}_j$ and $\hat{\beta}_j^+$ are OLS estimates from the regression of $R_{w,j,t-1}$, $R_{w,j,t}$ and $R_{w,j,t+1}$ on $R_{j,t}$ respectively, and $\hat{\rho}_w$ corresponds to the estimated first-order autocorrelation coefficient of $R_{w,j,t}$. We used an estimation window for these parameters of 200 trading days, from day -250 to day -50 before each leader's exit.

The parameter $\hat{\alpha}_j^*$ is computed as follows:

$$\hat{\alpha}_j^* = \overline{R_{j,Est}} - \hat{\beta}_j^* \cdot \overline{R_{w,j,Est}},$$

where $\overline{R_{j,Est}}$ and $\overline{R_{w,j,Est}}$ are the mean return of the country and world index, associated to the exit of leader j over the estimation window, respectively.

C. TEST STATISTIC FOR THE CAAR

We follow Patell (1976) to compute the test statistic used to test if the null hypothesis that the CAAR is zero is correct.

The variance of the abnormal returns in the event window is estimated by their variance in the estimation window. We use the following unbiased estimate:

$$s_{A_j}^2 = \frac{\sum_{k=E_1}^{E_2} AR_{j,k}^2}{M_j - 2}.$$

(C.1)

Where E_1 and E_2 are the start and end of the estimation window, respectively, and M_j is the number of trading days on it. We subtract 2 from M_j due to the number of degrees of freedom of the market model. The adjusted variance or adjusted standard error is:

$$s_{A_{j,t}}^2 = s_{A_j}^2 \cdot \left[1 + \frac{1}{M_j} + \frac{\left(R_{w,j,t} - \overline{R_{w,j,Est}}\right)^2}{\sum_{k=E_1}^{E_2} \left(R_{w,j,k} - \overline{R_{w,j,Est}}\right)^2} \right]$$

(C.2)

Using the former expression, we can compute the standardized prediction error or standardized abnormal return (SAR):

$$SAR_{j,t} = \frac{AR_{j,t}}{s_{A_{j,t}}}$$

(C.3)

Under the null, $SAR_{j,t}$ follows a Student's t distribution with $M_j - 2$ degrees of freedom.

We now need to accumulate the $SARs$ over the event window to obtain the cumulative standardized abnormal return ($CSAR$).

$$CSAR_{T_1,T_2}^j = \sum_{t=T_1}^{T_2} SAR_{j,t} \tag{C.4}$$

The expected value of this new variable is zero and its variance, Q_{T_1,T_2}^j, is equal to the sum of the variances of each $SAR_{j,t}$.

$$Q_{T_1,T_2}^j = \sum_{t=T_1}^{T_2} \frac{M_j - 2}{M_j - 4} = (T_2 - T_1 + 1) \cdot \frac{M_j - 2}{M_j - 4} \tag{C.5}$$

We then standardize $CSAR$ using its standard deviation and obtain a new statistic, Z_{T_1,T_2}^j, that distributes as N(0,1) under the null. Z_{T_1,T_2}^j is defined as follows:

$$Z_{T_1,T_2}^j = \frac{1}{\sqrt{Q_{T_1,T_2}^j}} \cdot \sum_{t=T_1}^{T_2} SAR_{j,t} \tag{C.6}$$

Finally, we accumulate the Z_{T_1,T_2}^j statistic over the number of exits and standardize the result in order to obtain Z_{T_1,T_2}, which allows us to tests if $CAAR_{T_1,T_2} = 0$.

$$Z_{T_1,T_2} = \frac{1}{\sqrt{N}} \cdot \sum_{j=1}^{N} Z_{T_1,T_2}^j \tag{C.7}$$

Under regular assumptions, Z_{T_1,T_2} follows a Standard Normal distribution under the null.

D. BOOTSTRAPPING

For any given subsample (e.g., unsurprising or surprising exits) and window size we have N independent observations of CARs (CAR_1, CAR_2, ... , CAR_N) where N is the number of exits in the subsample. These observed values follow an unknown probability distribution, of which we are interested in determining the mean. We do this by bootstrapping, i.e., we randomly draw multiple subsets with replacement and average them. We compute the p-value by counting how many of these values are smaller than or equal to 0.

Specifically, the procedure used consists in resampling the CARs 10,000 times and in each iteration i, obtaining a bootstrapped $CAAR_i$. To determine if we can reject the null hypothesis, we calculate the p-value for a one-sided test by dividing the number of bootstrapped values that are smaller than or equal to 0 (or greater than or equal to 0 when studying the effect of rumors) by the total number of iterations. In order to remove the effect of outliers, we also take a second approach. Before resampling we first winsorize the set of CARs. Due to the small number of entries in some of our subsamples we do this at the 10th and 90th percentiles, since at lower levels no values would be winsored. After this step the procedure is identical to the one described above.

E. MONTE CARLO SIMULATIONS

Recall that the first step to compute K for leader j, is to obtain the percentile rank of his or her CAR (i.e., the CAR associated to leader j around his or her date of exit) with respect to auxiliary CARs for neighboring windows. By using Monte Carlo simulation we can compute multiple K's associated to leader j by resampling the auxiliary CARs from which the percentile rank is computed. Using this method, with 10,000 iterations, we build empirical distributions of the K statistic, and used them to test its significance.

F. WHAT DRIVES STOCK MARKETS AROUND RANDOM TRANSITIONS?

The well-known dividend discount model, developed by Gordon and Shapiro (1956), provides a simple benchmark to understand what may be driving stock markets around unexpected exits. In this model, asset prices are given by:

$$P_0 = \sum_{t=1}^{\infty} \frac{Div_t}{(1 + r_E)^t}$$

where Div_t is the expected dividend payment of the asset in period t and r_E is the expected equity cost of capital. Therefore, the asset's price today, P_0, is equal to all future expected dividends discounted at the corresponding cost of capital. The equity cost of capital embeds the associated risk of the future dividend and is usually computed using the capital asset pricing model (CAPM) model as follows:

$$r_E = r_f + \beta_E \cdot (r_M - r_f)$$

where r_f is the expected risk free rate, $r_M - r_f$ is the expected market risk premium, and β_E is the equity beta that measures the asset's systematic risk.

Accordingly, a positive price jump on an asset should entail an increase on its expected dividends (cash-flows), or a decrease on its expected cost of capital, or both. If the risk free rate and the market premium remain unchanged, a change on the cost of capital would be proportional to a change on beta. Moreover, in a well-diversified portfolio, such as a market index, idiosyncratic risk should be fully diversified and a change on volatility would also lead to a change on beta, and therefore, on the cost of capital.

Since we do not find any significant change in volatility or beta, that could be changing the equity cost of capital, our evidence suggests the change in prices is due mainly to an increase (or decrease in the case of rumors) on future expected cash-flows.