Empirical essays on macroeconomic shocks and financial markets

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To my family: Kazimir, Teddy, Yvonne, and Eddy.

Thank you for your patience and strength.

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Chapter 1

Introduction

Overview

The most recent two macroeconomic shocks, the European debt crisis and the financial crisis, still determine today's economic and monetary policies. These events reignited a lively debate of researchers and political and economic commentators alike about the contribution of financial markets to theses recent two macroeconomic shocks and about the interrelation of financial markets and the real economy. This dissertation has the objective to further foster the understanding of this interrelation by examining the impact of macroeconomic shocks on financial markets.

The three chapters of this dissertation investigate the impact of macroeconomic shocks on asymmetric information, stock returns, and corporate investment activity. Chapter II provides empirical support for the assumption of Bernanke et al. (1994), who argue that financial markets can accelerate macroeconomic shocks by increasing the cost of capital and thereby decreasing economic activity. Chapter III identifies the uneven distribution of US recessions and expansions between Democratic and Republican presidencies as the source of the presidential puzzle, the return anomaly that US market returns are higher under Democratic presidents compared to Republican presidents. Chapter IV documents systematic cross-sectional differences in the way firms adapt their capital level in response to macroeconomic shocks and relates this cross-sectional heterogeneity to known stock return patterns: size premium, book-to-market premium, and investment intensity premium. In conclusion, this dissertation identifies new channels through which macroeconomic shocks impact financial markets. Thereby, this dissertation adds insights about the relation between financial markets and the real economy.

Macroeconomic shocks and their impact on the informational environment of firms and the cost of capital

Prior literature already shows that macroeconomic shocks impact the informational environment of a firm, resulting in higher trading costs and financing costs. Multiple studies document that macroeconomic shocks, defined as unexpected events such as political elections and recessions that affect all market participants, deteriorate the informational environment of a firm by increasing the uncertainty of market participants. As a result, stock market volatility, as a measure of investor uncertainty, is higher during recessions and around political elections (e.g., Hamilton and Lin (1996a); Goodell and Vähämaa (2013)). Further, stock prices are less informative during these uncertain times. Stock prices show a higher correlation during times of macroeconomic uncertainty and contain less firm-specific information (e.g., Brockman et al. (2010); Durnev (2010)). In conclusion, stock prices provide less precise information for investors and managers during macroeconomic uncertain times.

As a result, investors are less willing to hold stocks with highly uncertain prospects. Hence, stock market liquidity is lower during macroeconomic uncertain times (e.g., Næs et al. (2011)). This decrease in market liquidity during times of macroeconomic uncertainty leads to higher trading costs. Further, investors demand a higher compensation for extra uncertainty during macroeconomic uncertain times. Therefore, the market risk premium, as a measure of the price of risk, is higher during recessions and during political uncertain times (e.g., Hamilton and Lin (1996a); Pástor and Veronesi (2013)). This increase in market risk premium has also implications for financing costs of firms and governments. Financing costs are higher during times of macroeconomic uncertainty (e.g., Gao and Qi (2013)).

Financial markets and the real economy are interrelated. Changing financial market conditions during times of macroeconomic uncertainty have also an impact on the real economy. Empirically, the decrease in the informational environment of firms and the increase in financing costs have implications for the real economy by depressing the overall investment activity of firms. Higher financing costs and higher uncertainty motivate firms to postpone investment decisions (e.g., Gulen and Ion (2016)). Moreover, investments of firms are less profitable during times of macroeconomic uncertainty because stock prices as an aggregate of all available information are a noisier signal for corporate investment decisions during macroeconomic uncertain times (Durnev (2010)). In conclusion, financial markets are potential amplifiers of macroeconomic shocks by increasing the cost of capital and thereby decreasing economic activity (Bernanke et al. (1994)).

Outline of the thesis

This subsection provides a concise overview of the upcoming three chapters. Chapter II investigates the link between information asymmetry and macroeconomic uncertainty. Chapter III forwards a potential explanation for the presidential puzzle. Chapter IV employs investment-based asset-pricing models to establish a link between well-known asset-pricing patterns size, book-to-market, and investment intensity premium and a firm's ability to adjust its capital stock in response to macroeconomic shocks.

Chapter II analyzes the impact of macroeconomic shocks on information asymmetry between corporate insiders and outsiders. Thereby, this chapter answers two questions: First, do corporate insiders such as managers have superior information that enables them to evaluate the impact of a macroeconomic shock on their firm more precisely compared to outsiders? Second, does information asymmetry show cyclical patterns as assumed by Bernanke et al. (1994)?

To answer these questions, I employ an event study to measure information asymmetry by measuring the abnormal returns starting at the announcement date of an insider sale or purchase. These abnormal returns are the dependent variable within a subsequent panel regression to test whether macroeconomic shocks have a positive impact on information asymmetry. The main variables of interest are macroeconomic shock dummy variables that proxy for recessions and political elections. Multiple control variables are also included into the regression design to rule out potential alternative explanations. Moreover, insider fixed effects take care of potential unobservable insider characteristics.

The answer to the first question is that information asymmetries between insiders and outsiders are larger during times of macroeconomic uncertainty such as recessions and political elections. Even regional shocks such as gubernatorial elections are related to larger information asymmetries between insiders and outsiders. Furthermore, I find evidence that insiders exploit mispricing of their company's stock during times of macroeconomic uncertainty. Insider trading announcement returns are especially pronounced for mispriced firms and firms with a high return sensitivity towards macroeconomic shocks. All in all, these results indicate that managers have an informational advantage during macroeconomic uncertain times compared to outside investors. This advantage should allow them to make more informed decisions compared to outside investors during uncertain times.

Regarding the second question, information asymmetries behave countercyclical with high information asymmetries during recessions and low information asymmetries during expansions. This finding is in line with the notion of Bernanke et al. (1994) that information asymmetries, as a source of agency costs, are higher during recessions. In the framework of Bernanke's financial accelerator model, these higher agency costs increase financing costs. This increase in financing cost leads to lower corporate investment activity. Empirical evidence of this study also confirms that an increase in information asymmetry is related to lower investment activity. These results support the claim of Bernanke that financial markets have the potential to intensify adverse macroeconomic shocks.

Chapter III investigates the presidential puzzle, the finding that stock market returns are higher during Democratic presidencies compared to Republican presidencies. This empirical finding is a puzzle because the return difference is unexpected and not explainable with risk (Santa-Clara and Valkanov (2003)). However, it is known in economics that macroeconomic performance, measured by GDP, is also better during Democratic presidencies compared to Republican presidencies. This chapter applies this finding from economics to explain the presidential puzzle by employing recessions as a control variable to identify the, until now, unknown source for the unexpected return differential between Democrats and Republicans.

This study employs a time-series regression with monthly excess stock market returns, the return difference of a value-weighted stock index and the risk free rate, as the main dependent variable. The variable of interest is a dummy variable with a lag of one month that is one during a Democratic presidency and zero during a Republican presidency. The main control variable is a recession indicator that is one during a recession and zero during an expansion in the United States. This recession indicator is a sensible control variable because stock market returns show a two-state return distribution. One state, which coincides with economic expansions, has low expected returns and low volatility and the other state, which coincides with economic recessions, has high expected returns and high volatility (Hamilton and Lin (1996a)). Therefore, it is important to control for these return states to make meaningful comparisons of returns over time. The standard errors are Newey-West standard errors, which are commonly applied in time-series regressions, to control for heteroscedasticity and serial correlation.

The main finding of this chapter is that the uneven distribution of recessions is the source for the unexpected return difference. Republican presidents witnessed three times more recession months compared to Democratic presidents. After controlling for the occurrence of recessions, the return difference between Democrats and Republicans is not significant anymore.

In a final step, Chapter III tackles the question whether Republican politics led to economic contraction or whether Republicans simply had bad luck. For this analysis, each recession and its causes are examined separately to evaluate whether domestic policies are a potential reason for a recession. The empirical evidence of this analysis indicates that Republicans had bad luck for two reasons. First, a main driver for the return difference between Democrats and Republicans are two extreme one-off events, the Great Depression of 1929 and the Great Recession of 2007. Second, the recessions in 1969 and 2001 can be considered exogenous to the newly elected presidents Richard Nixon and Georg W. Bush. These presidents inherited recessions from their Democratic predecessors because these recessions started shortly after their election victory. After controlling only for these four recessions, the return difference between Democrats and Republicans is not present anymore. This final finding supports the notion that Republican presidents are not the source for the underperformance of the stock market.

Chapter IV examines an investment-based explanation for four known asset-pricing patterns:

- the size premium, the observation that small firms earn higher returns compared to large firms,
- the book-to-market premium, the observation that firms with a high-book-to-market ratio earn higher returns compared to firms with a low book-to-market ratio,
- the investment premium, the observation that firms with a low corporate investment intensity earn higher returns compared to firms with a high corporate investment intensity,
- and the profitability premium, the observation that highly profitable firms earn higher returns compared to unprofitable firms.

The empirical evidence of this chapter supports the idea that firm characteristics like size, book-to-market, profitability, and investment intensity are related to investment flexibility, the ability of a firm to adjust its capital stock in response to systematic shocks such as recessions.

Several theoretical studies argue that investment flexibility is a determinant for a firm's riskiness (e.g., Zhang (2005)). Firms that can easily adjust their capital stock in response to systematic shocks are less risky compared to firms that are inflexible in adjusting their capital stock. In this theoretical framework, corporate investment is a lever for firms to smooth out their payout streams by investing additional cash flows during expansions in attractive investment opportunities and by scaling back their idle capacity during recessions and distribute the proceeds of the asset sales to their shareholders. As a result, high investment flexibility firms have more stable payout streams, and therefore these firms are less risky compared to low investment flexibility firms.

This chapter employs a standard q-theory-based panel regression to gauge the investment sensitivity to systematic shocks as a measure of investment flexibility. Proxies for systematic shocks as the variable of interest are recessions, changes in political uncertainty gauged by the EPU Index, and changes in the market risk premium. The main control variables are Tobin's Q to control for differences in investment opportunities and cash flow over total assets to control for liquidity. Moreover, the regression includes firm fixed effects and calendar quarter fixed effects to control for unobservable heterogeneity.

The main finding of this study is that size, market-to-book, profitability, and investment intensity are positively related to investment flexibility. Large firms, growth firms, profitable firms, and high investment intensity firms have a higher investment sensitivity to systematic shocks compared to small firms, value firms, unprofitable firms, and low investment intensity firms. Moreover, this chapter identifies capital adjustment costs as the source of the cross-sectional differences in investment flexibility. High capital adjustment costs reduce the ability of a firm to flexibly adjust its capital stock in response to systematic shocks. Finally, this chapter presents empirical evidence that indicates that high investment flexibility firms earn lower expected returns compared to low investment flexibility firms.

In conclusion, these findings strengthen the theoretical predictions of Zhang (2005) and Livdan et al. (2009) that investment flexibility is one potential driver for known cross-sectional asset-pricing patterns: size, book-to-market, and investment premium.

Chapter 2

Do aggregate shocks increase information asymmetries between insiders and outsiders?

2.1 Introduction

Even before the election of Donald Trump, researchers were aware of the fact that macroeconomic shocks have uncertain consequences for the economy.[1] Empirical evidence indicates that this macroeconomic uncertainty is related to lower informativeness of stock prices, lower market liquidity, and higher stock volatility, as well (Veldkamp (2005); Durnev (2010); Næs et al. (2011)). The decrease in the precision of pubic information has also real effects. Firms reduce their investment intensity and make less efficient investment decisions (e.g., Durnev (2010); Gulen and Ion (2016)). To reduce their uncertainty about the

[1]I am grateful for helpful comments and suggestions from Ernst Maug, Erik Theissen, Marc Gaberro, Pascal Busch, Christoph Schneider, Christian Westheide, and seminar participants at the university of Mannheim. All errors are my own.

impact of a macroeconomic shock on their portfolio firms, investors have to learn about this impact by observing public signals. As a result, investors react more strongly towards new public information contained in earnings announcements and analyst forecast revisions during times of macroeconomic uncertainty (e.g., Loh and Stulz (2014); Schmalz and Zhuk (2015)). This chapter tackles the question whether the access to private information puts insiders at an advantage in evaluating the impact of macroeconomic shocks on their firm, resulting in larger information asymmetries between insiders and outsiders.

Investigating information asymmetry is especially relevant in the context of macroeconomic shocks because information asymmetries might have two detrimental effects during times of macroeconomic uncertainty. First, information asymmetries might amplify the observed decrease in the precision of public information. Empirical and theoretical evidence indicates that insider trading crowds out private information acquisition, resulting in higher cost of equity, lower price efficiency and less informative stock prices (Leland (1992); Bhattacharya and Daouk (2002); Fernandes and Ferreira (2008); Fishman and Hagerty (1992)). Second, information asymmetry itself might increase the intensity of a macroeconomic shock. Bernanke et al. (1994) show that worsening credit market conditions can increase the effect of aggregate shocks. This strengthening effect is a result of endogenously changing agency costs such as costs related to asymmetric information.

This chapter contributes to the literature that investigates the impact of aggregate shocks on financial markets.[2] To the best of my knowledge, this study is the first that systematically analyzes the impact of macroeconomic uncertainty on information asymmetry between insiders and outsiders, employing the abnormal return on the announcement day of an insider trade as a direct measure of information asymmetry. The main finding is

[2]See, for example, Hamilton and Lin (1996a); Veldkamp (2005); Brockman et al. (2010); Durnev (2010); Julio and Yook (2012); Gao and Qi (2013); Pástor and Veronesi (2013); Loh and Stulz (2014); Schmalz and Zhuk (2015); Gulen and Ion (2016); Boubakri et al. (2016); Jens (2017).

that information asymmetries are larger during times of macroeconomic uncertainty. This finding is in line with the idea that insiders have an information advantage in evaluating the impact of macroeconomic shocks on their firms. Moreover, I document that asymmetric information is negatively related to investment intensity, supporting the financial accelerator model of Bernanke et al. (1994) and thereby contributing to the debate about the role of financial markets during macroeconomic shocks.

To increase asymmetric information between insiders and outsiders, aggregate shocks have to increase the precision of insider's information, decrease the precision of outsider's information or a mix of both. Empirical evidence indicates that outsider's information regarding the value of their portfolio firms is noisier during times of macroeconomic uncertainty. For example, Hamilton and Lin (1996a) and Goodell and Vähämaa (2013) show that stock market volatility as a proxy for uncertainty is larger during recessions and politically uncertain times. Further, stock prices contain less firm-specific information during times of macroeconomic uncertainty (Durnev (2010); Brockman et al. (2010)). Hence, empirical evidence is consistent with the view that aggregate shocks decrease the precision of outsiders information.

Insiders have access to private information, which enables insiders to perform profitable trades in their company's stock (Jaffe (1974); Seyhun (1986); Jeng et al. (2003)). Insiders also possess long-term information, providing them with a timing advantage, which allows them to predict returns and cash flow innovations in the future (e.g. Ke et al. (2003); Jiang and Zaman (2010); Cohen et al. (2012)).[3] They even use their timing advantage to profit from future firm-specific events.[4] However, it is unobservable for the researcher whether

[3]For example, Ke et al. (2003) show that insider sales have predictive power for future breaks in quarterly earnings increases up to nine quarters into the future.

[4]Studies show that insiders show distinct trading patterns before events such as Chapter 11 bankruptcy filings, stock repurchases, seasoned equity offerings, earnings announcements, dividend initiations, and

insiders private information is also noisier during times of macroeconomic uncertainty. In favor of the view that private information is more precise during times of macroeconomic uncertainty speaks the study of Schmalz and Zhuk (2015). They argue that the precision of information is higher during bad times compared to good times and show that earnings announcements are related to stronger market reactions during bad times. Loh and Stulz (2014) also support this idea by showing that analyst forecast revisions are associated with stronger market reactions during times of macroeconomic uncertainty and that analyst forecasts are more precise during those time periods. However, the finding that cash flows are less persistent during recessions (Johnson (1999); DeStefano (2004)) speaks in favor of the view that private value signals might be noisier during times of macroeconomic uncertainty. Other studies even argue that insiders do not use private information but also rely on public information to motivate their insider trades. For example, Jenter (2005) presents evidence that insiders seem to employ naive contrarian trading strategies based on public information.[5] Therefore, it is an empirical question whether private information enables insiders to evaluate the impact of macroeconomic shocks and thereby increasing the information asymmetry between insiders and outsiders.

To answer this question, I employ a data set, which spans the time period of 1986 to 2013 and includes 1,015,266 insider trade disclosure days of 155,447 insiders from 12,781 firms. The baseline analysis is a panel regression that regresses a measure of information asymmetry on a measure of macroeconomic uncertainty and a set of control variables. I employ U.S. presidential elections and U.S. recessions as macroeconomic shocks that induce uncer-

earnings restatements (e.g., John and Lang (1991); Karpoff and Lee (1991); Lee et al. (1992); Seyhun and Bradley (1997); Agrawal and Cooper (2015)).

[5]Jenter (2005) finds also no long-term abnormal returns for insider trades after controlling for contrarian trading. This finding is also in line with the finding of Lakonishok and Lee (2001), who document lower long-term abnormal returns after controlling for contrarian trading. Moreover, Lakonishok and Lee (2001) do not find large insider trading announcement returns.

tainty.[6] The advantage of using macroeconomic uncertainty is that those macroeconomic events are exogenous from the perspective of the single insider. This fact circumvents the endogeneity issue of uncertainty due to firm-specific events because the insider has no superior knowledge about the macroeconomic event itself compared to any other investor. Furthermore, recessions and presidential elections are rare and unique events. Therefore, investors cannot rely on past experience to reduce their learning effort to evaluate the impact of these shocks on their portfolio firms.

I also use firm fixed and even insider fixed effects to account for unobservable heterogeneity in the cross-section. In addition, I employ control variables, which are motivated by recent findings in the insider trading literature and studies about the impact of macroeconomic shocks on financial markets (e.g., Huddart and Ke (2007); Lakonishok and Lee (2001); Næs et al. (2011)). Therefore, I control for insider trading intensity, size, liquidity, contrarian trading and cross-sectional differences in information asymmetry to make sure the results are not driven by already known determinants of informed insider trading.

In general, I find that the market reaction towards insider purchases is stronger during times of macroeconomic uncertainty. For the presidential election analysis, I document a stronger market reaction towards insider purchases after a change in presidency. This finding supports the notion that insiders have an advantage in evaluating the impact of the election shock on their firm because impact uncertainty should be larger for newly elected presidents. The results also show that information asymmetries are cyclical with lower information asymmetries during expansions and higher information asymmetries during recessions. This result holds for insider purchases and insider sales, which are generally considered a weaker signal. All in all, these findings are consistent with the view

[6] These events are related to higher uncertainty (e.g., Hamilton and Lin (1996a); Goodell and Vähämaa (2013)).

that information asymmetries between insiders and outsiders are increasing following a macroeconomic shock. All of these results hold regardless of how I measure macroeconomic uncertainty.

Recent studies of Jens (2017) and Gao and Qi (2013) use gubernatorial elections as a source of uncertainty. I investigate whether regional shocks such as gubernatorial elections are also associated with larger information asymmetries between insiders and outsiders. The advantage of gubernatorial elections is that these events enable me to use time-series and cross-sectional variation in gubernatorial elections by performing a differences-in-differences analysis. I document that the market reaction towards insider purchases of firms located in a state subject to a gubernatorial election is stronger compared to firms located in a state without a gubernatorial election. Hence, even regional shocks are associated with larger information asymmetries between insiders and outsiders.

Next, I follow the empirical strategy employed by studies in the insider trading literature to gauge the informativeness of insider trades by analyzing the long-term returns of insider trades over a period of up to six months as an additional dependent variable. These studies argue that insiders trade on long-term information and have predictive power for future returns (e.g., Lakonishok and Lee (2001); Cohen et al. (2012)). I employ a calendar-time portfolio approach and I control for known risk factors by using the Fama-French three and five factor models. I find that insider purchases conducted during recessions and the first year of a presidential term exhibit also long-term abnormal returns.[7] Furthermore, insider purchases announced during recessions and the first year of a presidency yield higher abnormal returns compared to purchases announced during expansions and other years of the presidential term. These results indicate that insiders indeed possess valuable long-term information during times of macroeconomic uncertainty allowing insiders to predict

[7] My trading strategy is also applicable for outside investors.

future stock returns. This result supports prior findings that information asymmetries are larger during times of macroeconomic uncertainty. Moreover, this result indicates that insiders also earn higher abnormal returns with their insider trades during times of macroeconomic uncertainty.

I also examine the cross-section of insider trading announcement returns during times of macroeconomic uncertainty. I analyze whether the market reacts stronger towards insider trades of mispriced stocks, stocks with a higher sensitivity towards systematic risk, and better informed insiders during times of macroeconomic uncertainty.

First, larger information asymmetries between insiders and outsiders should lead to larger mispricing of stocks.[8] Therefore, I expect stronger market reactions towards insider trades in mispriced stocks following a macroeconomic shock compared to times without a macroeconomic shock. I employ established measure of mispricing to identify mispriced stocks (e.g., Rozeff and Zaman (1998); Ben-David and Roulstone (2010)). I find that insider trading announcements of mispriced firms are related to stronger market reactions during times following a macroeconomic shock compared to times without a macroeconomic shock. These results also support the notion that macroeconomic shocks are related to larger information asymmetries, which result in larger mispricing.

Second, macroeconomic shocks should have a stronger impact on firms with a higher sensitivity to systematic risk. Therefore, uncertainty about the impact of a macroeconomic shock should lead to larger information asymmetries for firms with a higher sensitivity to systematic risk if insiders have an advantage evaluating the impact of a shock on their firm. I document that the market reacts stronger towards insider trades in firms with a high sensitivity to systematic risk compared to insider trades in firm with a low sensitivity to

[8]Huddart and Ke (2007) show analytically by using a Kyle (1985) model that expected mispricing of a stock is larger for stocks with larger information asymmetries between insiders and outsiders.

systematic risk during times of macroeconomic uncertainty. This finding strengthens the idea that insiders have an advantage in evaluating the impact of macroeconomic shocks on their firms, resulting in larger information asymmetries between insiders and outsiders.

Finally, the information-hierarchy hypothesis posits that insiders, who are more involved in the day-to-day business of their firm possess more precise private information (e.g., Seyhun (1986)). I examine whether insider trades of informed insiders are related to stronger market reactions during times of macroeconomic uncertainty. I document that insider purchases of informed insiders show especially large announcement returns compared to uninformed insiders during recessions and the first year following a presidential election. This finding indicates that informed insiders also possess more precise information compared to uninformed insiders during times of macroeconomic uncertainty.

In a last analysis, I empirically examine the notion of Bernanke et al. (1994) that asymmetric information is negatively related to the investment intensity of a firm. I conduct a standard investment panel regression including a variable that captures the cumulative average abnormal returns of all insider purchases (sales) during a fiscal quarter as a measure for asymmetric information. I document that asymmetric information is negatively related to investment intensity of a firm. This finding supports the notion of Bernanke et al. (1994), who argue that asymmetric information is a potential amplifier of adverse economic shocks by reducing economic activity, such as corporate investment, through increasing financing costs of firms.

In addition to my contribution to the literature about the impact of macroeconomic shocks on financial markets, this study also contributes to the insider trading literature. Several insider trading studies are concerned with the impact of firm and insider characteristics (e.g., Aboody and Lev (2000); Fidrmuc et al. (2006); Cohen et al. (2012)) on the information asymmetry between insiders and outsiders. For example, Aboody and Lev (2000) present evidence that R&D intensity of a firm is positively related to information asymmetry between insiders and outsiders. In contrast to these aforementioned studies, I show that exogenous macroeconomic events also increase the information asymmetry between insiders and outsiders. This chapter presents evidence in line with the idea that insiders have an informational advantage in evaluating the impact of macroeconomic shocks on their firms. Thereby, this chapter adds a time-series component to the existing insider trading literature.

2.2 Data and methodology

In this section, I describe the sample construction, the empirical methodology and the variables used in this study.

2.2.1 Sample construction

The main financial data on insider trades is provided by Thomson Reuters Insider Filing Data Feed (IFDF). Following the definition of Section 16 of the Security and Exchange Act of 1934, corporate insiders are companies' officers and directors, and any beneficial owners of more than 10% of a company's stock. Insiders are obliged to disclose their transactions with the SEC within ten days after the end of the month in which the trade took place. Since August 29, 2002, this ten day deadline was reduced to a two day deadline. IFDF collects information about these insider transactions from three forms insiders have to file with the SEC: Form 3 ("Initial Statement of Beneficial Ownership of Securities"), Form 4 ("Statement of Changes of Beneficial Ownership of Securities"), and Form 5 ("Annual Statement of Beneficial Ownership of Securities"). I include all open market and private transactions between January 1, 1986 and December 31, 2013 with complete data (e.g., CUSIP, transaction date, disclosure date, transaction price, and number of transacted shares). I supplement this data with firm-level data from CRSP and Compustat.

Table 2.1 presents an overview of the data cleaning and construction process. I extract 4,642,594 transactions for 226,824 insiders from 23,014 firms. I delete 1% of transactions because of incomplete IFDF data. In a next step, I match the transactions with complete IFDF data with CRSP and Compustat. This step costs 22% of observations because the companies are not listed on CRSP. To exclude privately negotiated transactions, I drop all transactions for which the number of transacted shares by an insider as reported by IFDF exceeds the number of shares transacted in the overall market on the same day as reported by CRSP. This corresponds to 1% of the sample. The empirical analysis focuses on the market's reaction towards insider trades to measure the informativeness of these trades (e.g., Jaffe (1974); Chang and Suk (1998); Friederich et al. (2002); Fidrmuc et al. (2006)). To summarize the informational content of an insider's SEC filing, I aggregate multiple trades by the same insider on a given SEC reporting date (e.g., a purchase of 1,000 shares and a purchase of 2,000 shares add up to a total purchase of 3,000 shares). I also aggregate sales and purchases and construct a net transaction figure (e.g., a sale of 1,000 shares and a purchase of 2,000 shares add up to a net purchase of 1,000 shares). As a result of all these adjustments, the sample covers 1,015,266 insider trade disclosure days of 155,447 insiders from 12,781 firms.

2.2.2 Research design and definition of variables

To gauge the impact of macroeconomic uncertainty on the information asymmetry between insiders and outsiders, I run the following baseline regression:

$$CAR_{it} = \alpha + \beta_1 Uncertainty_t + Control_{jt} + \eta_j + \varepsilon_{it} \tag{2.1}$$

where *i* indexes insiders, *j* firms, and *t* years. The main dependent variable is the 5-day CAR against the value-weighted CRSP index, starting at the SEC disclosure date of an insider trade. The primary explanatory variable is *Uncertainty.* For the presidential election analysis, *Uncertainty* equals one for all insider trades conducted during a post-election year and zero for all other years.[9] For the recession analysis, *Uncertainty* equals one for all insider trades conducted during a recession and zero for all insider trades conducted during an expansion. I also include several control variables that are known to be related to the informativeness of insider trades such as firm size, insider trading intensity, contrarian trading, stock liquidity, and asymmetric information. The regression also includes firm fixed effects to control for unobserved heterogeneity in the cross-section. I adjust the regression's standard errors for heteroscedasticity and cross-sectional correlation using clustered standard errors at the firm level.[10]

Dependent variable

To measure information asymmetry between insiders and outsiders, I measure the stock-price reaction at the SEC insider trading disclosure date (e.g., Fidrmuc et al. (2006); Lakon-

[9]The main *Uncertainty* variable for the presidential election analysis is called *First Year* and equals one during the first year of a presidency and zero otherwise.

[10]I perform these regressions at the insider level. The results remain unchanged, if I redo the analysis at the firm level.

ishok and Lee (2001)). I calculate abnormal returns (AR) by employing a market return model:

$$AR_{jt} = Ret_{jt} - MarketRet_t \tag{2.2}$$

Here, AR_{jt} denotes the abnormal return of firm j on insider trading announcement day t; Ret_{jt} denotes return of firm j on insider trading announcement day t; and $MarketRet_t$ denotes the market return on insider trading announcement day t. The CRSP value-weighted and equally-weighted return index are the proxies for the market return. I use the abnormal returns to compute the main dependent variable the cumulative abnormal return (CAR) for different event windows, ranging from one to twenty trading days starting at the disclosure day.

Macroeconomic shocks

I employ two major macroeconomic events: political elections and recessions. First, to identify political elections and to construct election related variables; I collect information about U.S. federal elections (e.g., election date, party of the incumbent, party of the winner, party of the defeated, and election turnout). I use Wikipedia as the main source of election data. I also cross-check the election data with data reported by uselectionatlas.org and the World Bank's 2012 Database of Political Institutions (Beck et al. (2001)).

Table A.2 in the appendix provides an overview of all congress and presidential elections since 1986. The data covers seven presidential elections, which resulted three times in a change in political power, either from Democrats to Republicans or vice versa. The elections of 2000 and 2004 are the closest elections measured by the popular vote and electoral vote margin.[11] Congressional elections take place every even-numbered year; hence the data provides information about fifteen Congress elections. These elections resulted three times in a change in the party majority in the U.S. Senate and House of Representatives, respectively. The Republican (Democratic) Party had six (seven) times the majority of the Senate and nine (six) times the majority of the House of Representatives.

Second, to identify recessions and to construct business cycle related variables, I employ the FRED database[12]. I use the National Bureau of Economic Research (NBER) recession indicators to mark periods of economic contraction and economic expansion. The NBER Business Cycle Dating Committee defines a recession as "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales."[13] I employ all recessions and expansions in the United States starting from 1986. Three recessions took place during this time period with a duration ranging from 8 to 18 months. I further divide expansions (recessions) into six business cycle stages: peak, trough, first half and second half of a expansion (recession) following the procedure of DeStefano (2004) (see Figure 4). I divide expansions (recessions) in half based on the total length measured in months of each expansion (recession).

Control variables

The selection of the control variables is motivated by recent empirical findings. Past research established a positive relationship between announcement returns of an insider's trade and insider trading intensity (e.g., Seyhun (1986); Jaffe (1974)). Therefore, I include

[11]The popular vote is the aggregate of all voters from all states in America. The electoral vote is the aggregate of all members of the electoral college.

[12]https://fred.stlouisfed.org/

[13]http://www.nber.org/cycles/general_statement.html

two measures of insider trading intensity into the regression design: a variables capturing the number of insiders trading at the same announcement day (*No. Insiders*) and a variable measuring the relative size of an insider trade (*Trade Size*). Lakonishok and Lee (2001) show that insiders act as contrarian investors and that contrarian trades are related to higher stock returns. To account for this pattern, I measure the average return over the last three months before the insider trading announcement and include this variable into my regression design (*L.Ret3*). Lakonishok and Lee (2001) also document that insider trades in small firms earn higher returns compared to insider trades in large firms. Therefore, I include firm size measured as the natural logarithm of market capitalization (*Size*). Næs et al. (2011) find that stock liquidity is lower during recessions. Insider trading announcement returns should be larger during times of lower stock liquidity because the price impact of single trades is larger during times of low liquidity. Therefore, I also control for stock liquidity, using the bid-ask spread (*Bid/Ask*). I also employ a dummy variable capturing the investment in R&D of a specific firm because Aboody and Lev (2000) show that R&D investment is related to larger information asymmetries, and therefore higher insider trading returns (*dRD*). The construction of all these variables is described in detail in appendix A.1.

2.2.3 Descriptive statistics

Table 2.2 presents summary statistics for all control variables employed in this study. Panel A of Table 2.2 compares insider sales and insider purchases. The results are in line with prior findings: insiders act as contrarian investors by purchasing following bad performance and selling following good performance and insider sales are more prevalent for larger firms. Insider sales are conducted during times of lower uncertainty and lower informativeness of prices compared to insider purchases.

Panel B and C of Table 2.2 present descriptive statistics of insider trades for the first year of presidency in comparison to all other years of a presidential term and for recessions in comparison to expansions. Insider trading announcements during recessions and the first year of a presidency are characterized by higher uncertainty and lower stock returns. The idiosyncratic volatility before insider trading announcements is higher and average stock returns over the last three months before an insider trading announcement are also lower during the first year of a presidency compared to all other years of a presidential term and during a recession compared to expansions.

Panel D presents summary statistics for the dependent variable. It shows the cumulative average abnormal returns (CAAR) for insider purchases and sales, respectively. The results presented in Panel D are in line with prior studies. Insider purchases contain more valuable information compared to insider sales and insiders with preferential access to firm-specific information execute more informative trades.[14] I also find first evidence that the market reacts stronger to insider trades during times of macroeconomic uncertainty.

2.3 Results

This section is split into four main parts: First, I analyze the impact of elections and recessions on information asymmetry between insiders and outsiders by employing insider trading announcement returns as a direct measure of information asymmetry. Second, I use an alternative measure of information asymmetry, the long-term performance of insider trades. This approach will also provide insights whether insiders are able to earn

[14]This finding is in line with the information hierarchy argument forwarded by Seyhun (1986) that insiders closer to the day-to-day business such as CEOs and officers possess more private information compared to directors and chairmen.

larger returns during times of macroeconomic uncertainty. Third, I investigate the impact of presidential elections and recessions on the cross-section of insider trading announcement returns. Finally, I examine real effects of asymmetric information, by analyzing the impact of asymmetric information on corporate investment.

2.3.1 Are insider trades more informative during recessions and political uncertain times?

Presidential elections

The investigation starts with a simple univariate analysis. I compare the CAAR of insider trades announced during the year following a presidential election to the CAAR of insider trades announced during all other years of a presidential term. The CAAR are calculated for different event windows ranging from one to twenty trading days starting at the disclosure day. The results are depicted in Figure 2.1. Figure 2.1a shows the graph for insider purchases and Figure 2.1b for insider sales. For insider purchases a clear difference in announcement returns over different event windows ranging from one to twenty days is visible. Insider purchases are accompanied by larger announcement returns during the first year following a presidential election compared to all other years of a presidential term. Insider sales show weaker market responses during the year following a political election. These results provide a first indication that insider purchases seem to be more informative during the year following a presidential election.

In a next step, I employ the panel structure of the data and I also include further control variables. The results are summarized in Table 2.3. Panel A shows that insider purchases are associated with higher CAAR during the year following a presidential election. The main prediction, that insider purchases are more informative following presidential elections, is tested in Model 1 to 6 with the dummy variable *First Year*. To investigate the market reaction of insider purchase announcements over the presidential cycle, I include two further dummy variables *Second Year* and *Third Year*, which equal one during the second and third year of presidency respectively, and zero otherwise. The reference year for these analyses is the fourth year of a presidential term. All specifications confirm the prediction, insider purchases conducted during the first year after the presidential election show 5-day CAAR of 1.964%. This corresponds to an almost two times stronger market reaction compared to all other years of a presidential term. The third year shows the lowest abnormal returns, whereas year two and four of the presidential term are comparable in terms of CAAR for insider purchases. Model 5 also accounts for insider fixed effects. An abnormal return differential with respect to the fourth year of the presidential term is still present. Hence, the abnormal returns during the first year of a presidency are not explained by unobservable insider characteristics such as skill.

Pástor and Veronesi (2013) argue that political decisions cause uncertainty because ex ante the effect of a specific new policy is unknown. The authors call this uncertainty impact uncertainty. I expect impact uncertainty to be larger for elections that resulted in a change in political power because investors were not able to learn about the candidate's economic policy during his first term of presidency. A change in political power should therefore increase the uncertainty about the prior belief during the year following the election compared to the first year following an election with no change in power.[15] In Model 3 to 6, I employ a measure of impact uncertainty.[16] I test this assumption by augmenting the

[15]Investors also have to learn about the abilities of CEOs of their portfolio firms. Pan et al. (2015) show that return volatility decrease with tenure of a CEO, supporting the prediction of Bayesian learning.

[16]A political election is the source of two kinds of uncertainty: uncertainty about the outcome of the election (*outcome uncertainty*), e.g., "Who is going to be next president?" and uncertainty about the impact of the election result on the economy (*impact uncertainty*), e.g., „Which firm/industry benefits from the election result?" (Goodell and Vähämaa (2013); Pástor and Veronesi (2013)).

federal election regression with a *New President x First Year* dummy, which equals one during the first year of a new president and zero otherwise. The results of the election uncertainty regression confirm that higher election uncertainty is associated with larger CAARs for insider purchases. I find that the dummy variable *New President x First Year* is positive and significant for insider purchases. Thus, the measure of impact uncertainty is associated with an increase in CAARs during the first year of a presidency for insider purchases. This result is also economically significant. The disclosure day CAAR of insider purchases during the first year of a presidency following an election with a change in power is 1.290% larger compared the first year of a presidency following an election with no change in power. Further, the first presidential term is in general related to higher CAARs. The *New President* dummy, which is one for the first term of a president and zero for the second term of a president, is positive and significant. These results indicate that a change in political power provides insiders with a larger informational advantage because investors are more uncertain about the impact of the economic policy agenda of the new president on their portfolio firms.

Panel B summarizes the results for insider sales. Insider sales following a presidential election exhibit weaker market reactions compared to all other years of the presidential term. Insider sales executed during the fourth year of a presidential term are associated with the economically largest abnormal returns. The CAARs during the fourth year of a presidential term range from -0.125% to -0.463%, depending on the model specification. This finding should be interpreted with caution because insider sales are a noisier signal compared to insider purchases. Insider sales have more diverse trading motives such as diversification and liquidity needs. Moreover insider sales are more prone to litigation and reputational risk (Jagolinzer and Roulstone (2009)).

All in all, these results indicate that insider purchases are more valuable for outside investors during the year following a presidential election compared to all other years of the presidential term, underpinning the notion that insiders have a larger informational advantage during times of macroeconomic uncertainty. Further, insiders seem to be able to evaluate the impact of a change in presidency, providing insiders with an informational advantage compared to outside investors.

Gubernatorial elections

Now, I examine whether the election effect is also present for gubernatorial elections as a proxy for a regional shock. This analysis has the advantage that I can exploit the cross-sectional and time-series variation in gubernatorial election dates by using gubernatorial elections to study the impact of political uncertainty on insider trade announcement returns.[17] I employ a standard difference-in-differences regression design for the gubernatorial election analysis:

$$CAR_{it} = \alpha + \beta_1 Treated_{it} + \beta_2 PostEvent_{it} + \beta_3 TreatedxPostEvent_{it}$$

$$+Control_{jt} + \eta_j + \nu_t + \varepsilon_{it} \tag{2.3}$$

where *i* indexes insiders, *j* firms, and *t* years. The main dependent variable is the 5-day CAR against the value-weighted CRSP index, starting at the SEC disclosure date of an insider trade. The treatment of interest is a gubernatorial election.[18] Multiple gubernatorial

[17]Gao and Qi (2013) ,Çolak et al. (2017), and Jens (2017) employ gubernatorial election as a source of political uncertainty.

[18]Table A.3 summarizes information about all U.S. gubernatorial elections since 1994 such as: number of elections, number of unique firms, number of changes in political power, and the average winning margin per state. The table also depicts for each state the CAAR over five days following the insider trade disclosure day for sales and purchases, respectively.

elections take place during a year. The election date usually lies between the 2nd and 8th of November. I analyze all insider trades conducted within ten months centered at November 1st each year.[19] The pre-event period is the five months period before the 1st of November and the post-event period is the five months period following November 1st. The *PostEvent* dummy is zero during the first five months and one during the last five months. I construct the control and treatment group based on the occurrence of a gubernatorial election. The *Treated* dummy is one for insider trades of firms with special economic focus on a state with a gubernatorial election during the ten months event window. This variable is zero for insider trades of firms with a special focus on a state with no upcoming gubernatorial election.

To gauge the geographic focus of a firm, I use the data provided by Smajlbegovic (2014). Smajlbegovic (2014) employs the methodology of Bernile et al. (2015) by counting the number of times a firm mentions various U.S. states in its 10-K annual reports. I classify a firm as being geographically focused on one specific state, if this state is mentioned more than 50% of times in its annual statement. For example firm A mentions two states in its annual report: California and Florida. Florida appears in 60% of cases, therefore firm A has a special focus on Florida.

The main variable of interest is *Treated x PostEvent*, which is an interaction between *Treated* and *PostEvent* and measures the average treatment effect. Further, I implement the same control variables as for the federal election analysis to control for trading intensity, firm size, contrarian trading, liquidity, and information asymmetry. I also include firm fixed and state fixed effects for some specifications to account for unobservable heterogeneity on the state and firm level. For some specifications, I implement year fixed effects to control for

[19] I choose ten month because a longer period would have reduced the control sample due to overlapping election periods.

general differences over time that are common to treatment and control group, such as presidential elections. I cluster the standard errors at the firm level.

To test whether the common trend assumption holds, I compute a graph, which shows the 5-day CAAR for the treatment and control group for the five months before and five months after a gubernatorial election. The graph is depicted in Figure 2.3a and shows that the common trend assumption holds because the difference in the 5-day insider purchase announcement CAAR is stable before the gubernatorial election. Further, insider purchases of the treatment group are less informative compared to the control group before an election. This pattern might be a result of uncertainty about the election outcome, which is also unknown for insiders, rendering their trades less valuable for outsiders. After the treatment the informativeness of insider trades for the treatment group increases and stabilizes at the CAAR level of the control group one month after the event. This finding indicates that the impact uncertainty following a gubernatorial election is concentrated in the election month and that this uncertainty is short-lived. For insider sales, the common trend assumption does not hold as depicted in Figure 2.3b. In a next step, I conduct a difference-in-difference analysis.

Table 2.4 shows the results of the difference-in-difference analysis and validates the finding of the federal election analysis. Insider purchases show higher CAARs following an election. I examine all gubernatorial elections between 1994 and 2012. The data starts in 1994 because the geographical-focus data starts at this point in time. Further, only a sub sample of firms has a special focus on one specific U.S. state. Hence, the number of observations for insider purchases and sales drops to 86,179 and 159,932, respectively. Consistent with the findings of the federal election analysis, insider purchases show larger CAARs following a gubernatorial election. The coefficient on the *Treated x PostEvent* variable takes values in the range of 0.706% to 0.963% and is always statistically significant. Specifications 4 to 6 present the corresponding results for insider sales. In line with the findings of the presidential election analysis, gubernatorial elections are also not associated with stronger market reactions towards insider sales.

The market reaction towards insider purchases is also stronger after the occurrence of regional shocks such as gubernatorial elections. This finding supports the idea that insiders have an advantage in evaluating the impact of a macroeconomic shock on their firm, resulting in larger information asymmetries between insiders and outsiders.

Recession analysis

For the recession analysis, I start the investigation with a simple univariate analysis by comparing the CAARs of insider trades announced during recessions to the CAARs of insider trades announced during expansions for different event windows, ranging from one to twenty days. The results are depicted in Figure 2.2a for insider purchase and Figure 2.2b for insider sales. I find that insider purchases and sales are related to stronger market reactions during recessions compared to expansions. To control for further determinants of insider trading announcement returns, I conduct a panel regression.

Table 2.5 summarizes the regression results for the recession analysis. Insider purchase announcements during a recession show significantly larger CAARs compared to insider purchase announcements during an expansion. These results are summarized in Model 1 to 4. Recessions are associated with larger insider trading announcement returns for all regression specifications. For example in Model 1, insider purchases conducted during recessions show 5-day CAAR of 2.341%. This corresponds to a two times stronger market reaction compared to insider purchases conducted during economic expansions. The finding of larger information asymmetries during recessions is robust to the inclusion of different control variables, firm fixed effects, and even insider fixed effects.

I also have a closer look at different business cycle stages. To do so, I further divide the business cycle into several stages following the procedure of DeStefano (2004) (see figure 4). I expect stronger market reactions towards insider trades around business cycle turning points if insiders are able to evaluate the impact of a macroeconomic shock more precisely compared to outsiders. Empirically, market timing is especially valuable around business cycle turning points (Peláez (2015)). Further, uncertainty about the timing and impact of a change from expansion to recession and vice versa should be largest around the business cycle turning points. The results of this analysis, which are summarized in Model 5, support this notion. The second half of the expansion is the reference period for this analysis. For insider purchase announcements, the trough and the second part of the contraction show the largest CAARs. This finding is in line with Marin and Olivier (2008), who show that insider purchase intensity increases shortly before stock price jumps indicating that insiders are able to time the market.

In contrast to the presidential election regression, insider sale announcements are also accompanied by stronger market reactions during recession periods compared to expansion periods as depicted in Panel B. The CAARs during recessions are -0.099% to -0.196% lower compared to expansion periods. Model 5 summarizes the results for the insider sales analysis for different business cycle stages. Here, the peak and the first half of a contraction exhibit the strongest market reactions towards insider sales, indicating that even insider sales contain information for investors to gauge the impact of a recession on their portfolio firms.

The recession analysis indicates that information asymmetry between insiders and outsiders shows a cyclical pattern with high information asymmetry during recessions and lower information asymmetry during expansions. This finding supports the notion of Bernanke et al. (1994) that information asymmetry is closely related to business cycle conditions.

Robustness checks

In this subsection, I perform a number of robustness tests to check whether the results are sensitive to a different measure of political uncertainty, an alternative reference index to calculate abnormal returns, an alternative definition of the variable *First Year* and *Recession,* and the inclusion of different fixed effects. I include month fixed and firm fixed effects into all regressions. By including these fixed effects, I control for potential seasonality's and unobservable heterogeneity at the firm level. Whenever possible, I also include year fixed effects to control for general differences over time. The main results remain unchanged.[20]

The results of Table 2.6 and 2.7 confirm the robustness of the prior findings. Panel A presents results for insider purchases and Panel B for insider sales. Table 2.6 summarizes the results for the presidential election analysis. In Specification 1, I use the equally-weighted CRSP index as a reference index to calculate cumulative abnormal returns over the 5-days following the disclosure day. The results for insider purchases and sales are still statistically significant. The CAARs are smaller (larger) for insider purchases (sales) compared to the value-weighted references index. The equally-weighted index has a larger weight on small stocks, which show on average a better performance than larger stocks. Hence, the equally-weighted index is a stricter benchmark for insider purchases and an easier benchmark for insider sales.

[20] I also employ general measures for uncertainty such as market volatility to test whether insider trades are more informative during times of systematic uncertainty. I document that the informativeness of insider trades is positively related to market volatility. See Appendix A.5.

Specification 2 compares the informational content of insider trades conducted up to five months after the election with trades executed up to five months prior to the elections. I choose five months for this specification to include the first 100 days in office of the new president and the president's inaugural speech, which most presidents use to lay out their vision and goals for their presidential term. The variable of interest is *PrevsPost,* which equals one during the five months after the presidential election and zero during the five months leading up to the presidential election. Consistent with the baseline results, insider purchases exhibit larger CAARs during the time after the election compared to the five months leading up to the election.

In Specification 3, the variable of interest is *President_1Q*, which equals one during the five months after a presidential election and zero for the rest of the presidency. The result remains unaltered, insider purchases exhibit higher CAARs after an election compared to times without an election.

In Specification 4, I employ a different political uncertainty measure the economic policy uncertainty index (*EPU*). This index was developed by Baker et al. (2016). It is a weighted average of three components: (1) news coverage of policy-related uncertainty, (2) number of federal tax code provisions set to expire in coming years, and (3) the extent of disagreement among macroeconomic forecasters. The index is normalized to 100. Although, this index does not distinguish between uncertainty about implementation and uncertainty about the impact of public policies, it will provide further insights about the impact of political uncertainty in general. I expect it to be positively (negatively) related to disclosure CAARs of insider purchases (sales). The variable of interest is *EPU* and corresponds to the the logarithm of the EPU index. The results are in line with the main findings. Insider purchases are more informative during times of higher political uncertainty.

Panel B summarizes the results for the insider sales analysis. Except for Specification 2 and 3, insider sales are related to stronger market reactions during times of higher political uncertainty.

For the recession analysis in Table 2.7, I also perform several robustness checks. In specification 1, I use the equally-weighted market index as a reference index. Specification 2 employs an alternative recession dummy based on historical GDP growth (Chauvet and Hamilton (2006)). In Specification 3, I use a measure for the recession probability also based on historical GDP growth. Again, all results remain unchanged. Panel B summarizes the results for the insider sales analysis and shows for Specification 1 and 3 that the market reacts stronger towards insider sales during recessions. This result also confirms prior findings.

In conclusion, the main result that insider purchases show higher CAARs following a presidential election and during recessions is robust to different measure of political uncertainty, an alternative reference index to calculate abnormal returns, an alternative definition of the variable *First Year* and *Recession*, and the inclusion of different fixed effects.

2.3.2 Long-term performance of insider trades

In this section, I check whether insider trades conducted after an election and during a recession show also larger abnormal returns in the long run as an alternative measure for the informativeness of insider trades. Moreover, this test will provide insights about the longevity of the informational advantage of insiders during times of macroeconomic uncertainty. Several studies analyze the long-term performance of insider trades (e.g., Jaffe (1974); Rozeff and Zaman (1998); Lakonishok and Lee (2001); Jeng et al. (2003); Cohen et al. (2012)). These authors argue that insiders trade on long-term information, which will be later revealed to the market. Insider trading regulation also motivates this long-term view as Section 16(b) of the Security and Exchange Act of 1934 prohibits insiders to realize short-swing profits. Insiders are not allowed to close a trade within any six-month period. These studies assume that the price reaction to insider trading is gradual, therefore these studies measure abnormal returns up to 12 month after the execution of the insider's transaction to gauge the informativeness of insider trades.

Each month, I construct an equally-weighted insider purchase and sale portfolio. To construct these portfolios, I buy (sell) each month stocks of firms with net insider buying (selling) in the last month and I hold these portfolios for one, three, or six months.[21] Further, I classify the buy (sell) portfolio into election (recession) and no election (expansion) portfolios, depending on the timing of the insider trade. Thus, the election (recession) purchase (sale) portfolio includes all shares with net insider buying (selling) over the previous one to six months, if the insider trade was executed during the twelve months following a presidential election (during a recession). All other trades are pooled into the no election (expansion) purchase (sale) portfolio.[22] Further, I analyze the returns of all four portfolios with established performance-evaluation methods, e.g., CAPM, Fama-French-3-Factors, Carhart Model and Fama-French-5-Factors:

$$R_{it} - R_{ft} = \alpha_i + \beta_{1i} RMRF_t + Factors + \varepsilon_{it} \tag{2.4}$$

where R_{it} is the return on insider portfolio *i* in month *t*, R_{ft} is the risk-free return in month *t*, $RMRF_t$ is the market risk premium. I also include additional factors related to known asset-pricing anomalies: SMB_t (small minus big), HML_t (high minus low), RMW_t

[21]Jeng et al. (2003) argue that these "intensive-trading criteria are logical filter rules when assessing the "informativeness" of insider trading for future returns [...]".

[22]This trading strategy is also applicable for outside investors because 50% of insider trades in this sample are announced up to five days after the execution.

(high profitability minus low profitability), CMA_t (high investment intensity minus low investment intensity), and MOM_t (high return minus low return) are month *t* returns to zero-investment factor-mimicking portfolios.[23] These five last factors are designed to capture size, book-to-market, profitability, investment, and momentum effects, respectively. The α_i is the abnormal return of portfolio *i*.

The results of the long-term performance evaluation in Table 2.8 show that insider purchases following a presidential election exhibit also higher long-term abnormal returns. The insider purchase portfolios have positive abnormal returns. Specification 1 to 3 have a investment horizon of one month, Specification 4 to 6 of three months, and Specification 7 to 9 of six months. The election purchase portfolio shows higher abnormal returns compared to the no election purchase portfolio for all applied performance-evaluation methods and for all investment horizons. The abnormal return of 65 basis points over a holding period of six months for the no election purchase portfolio is comparable to the finding of Jeng et al. (2003) of 67 basis points per month for the CAPM model. The abnormal performance differential between the election and no election purchase portfolio ranges from 0.522% to 0.919% per month and is always statistically and economically significant.

For the recession analysis summarized in Panel C and D, I document also larger abnormal returns for insider purchases conducted during a recession compared to purchases conducted during an expansion for all trading horizons. The abnormal return difference between the expansion and recession purchase portfolio ranges from 0.397% to 1.515%. Only the Carhart-Model shows no statistically significant differences between purchases conducted during an expansion and purchases conducted during a recession. This finding is in line with the finding of Chordia and Shivakumar (2006), who document that price momentum is related to earnings momentum. If insiders are able to predict earnings in-

[23]The return data of the four portfolios is provided by the French data library.

novations, the momentum factor controls for the cyclicality of earnings. For insider sales, no abnormal return is observable, which is consistent with prior findings in the literature.

Overall, these results are in line with the findings in the previous section and document that the informational advantage of insiders is long-lived especially during times of higher macroeconomic uncertainty, resulting in larger information asymmetries between insider and outsiders. These findings also indicate that insiders might be able to earn larger abnormal returns with their trades during times of macroeconomic uncertainty.

2.3.3 Macroeconomic shocks and the cross-section of insider trading announcement returns

Mispricing and macroeconomic shocks

In this subsection, I investigate whether the market reaction towards insider trades of mispriced stocks during the first year of a presidential term and during recessions is more pronounced compared to all other years of a presidential term and expansions. Prior results of this study indicate that information asymmetries between insiders and outsiders are larger during times of macroeconomic uncertainty. Larger information asymmetries should lead to larger mispricing. Huddart and Ke (2007) show analytically by employing a Kyle (1985) model that expected mispricing should be larger for firms with larger information asymmetries. Empirical evidence indicates that insiders can exploit mispricing (e.g., Lakonishok et al. (1994); Rozeff and Zaman (1998)). Therefore, I expect stronger market reaction towards insider trades in mispriced stocks.

I include an interaction term between the *Uncertainty* variable and the proxies for mispricing into the standard regression design. I employ three proxies for mispricing. The book-to-market decile and the past stock return are standard measures of mispricing (e.g., Rozeff and Zaman (1998)). Further, I add a third measure: idiosyncratic volatility. Pontiff (2006) argues that idiosyncratic volatility increases the cost of holding a certain security, which also increases the cost of arbitrage, and therefore increases the probability and magnitude of mispricing. In all regression specifications, I control for insider trading intensity, firm size, liquidity, and asymmetric information. I also include firm fixed effects. The standard errors are clustered at the firm level.

The results are presented in Table 2.9 and show that the market reaction towards insider trades in mispriced stocks is more pronounced during times of macroeconomic uncertainty. Model 1 and 4 include the variable *L.Ret3*, which is the average return over the last three months, to identify mispricing. I argue that an insider tries to exploit mispricing if the insider trade is contrary to the previous stock (market) performance, e.g., insider purchase (sale) following negative (positive) stock return. This definition follows the standard in the insider trading literature and this trading pattern is called contrarian trading (e.g., Jenter (2005)). Model 2 and 5 employ *B/M-Dec,* which is the book-to-market decile of the insider's firm, as a proxy for mispricing. Model 3 and 6 use *SDIdiosyn,* which is the standard deviation of the market-purged and industry-purged (Fama-French 49 industry groups) stock return over the last 25 days before the insider trading announcement, as a mispricing proxy.

In general, for insider purchases the variables *L.Ret3* and *B/M-Dec* show a negative (positive) sign, supporting the notion that the market reacts stronger towards contrarian insider purchases. For insider sales the results are equivalent. In model 3 and 6, I apply the *SDIdiosyn* variable to gauge limits to arbitrage. This analysis shows that investors react also stronger towards insider trades of firms with larger idiosyncratic volatility. This finding is also in line with the presumption that idiosyncratic volatility is a proxy for limits to arbitrage supporting the idea that insiders use their firm-specific knowledge to exploit mispricing in their company's stock (e.g., Ben-David and Roulstone (2010)).

The contribution of contrarian insider trades to the stronger market reaction during recessions and the first year of a presidential term is gauged by including interactions with *First Year (Recession)* and the proxies for mispricing. The results for insider purchases show that the market reaction towards the announcement of contrarian insider purchases is more pronounced during recessions. Only the coefficient of the interaction of *Recession* with *B/M-Dec* is insignificant. During the first year of a presidential term, all interaction terms are significant. This result indicates that contrarian trades are especially informative during times of political uncertainty following an election. For contrarian insider sale announcement returns, the findings are equivalent as summarized in Model 4 to 5. For the measure of limits to arbitrage, I also document that insider purchases are associated with stronger market reactions for firms with larger idiosyncratic volatility during recessions and during the year following a presidential election.

In conclusion, contrarian insider trades are especially informative during uncertain time periods. These results lend support to idea that insiders have an advantage in timing the market if one assumes that the proxies for contrarian trading are valid indicators of mispricing. These findings are not in line with the idea of pseudo market timing of insiders (Jenter (2005)), which assumes that insiders try to time the market by applying public available information.

Sensitivity to systematic risk

I argue that insiders have an advantage in evaluating the impact of systematic shocks such as presidential elections and recessions on their firms. Outside investors are uncertain about the impact of a macroeconomic shock on their portfolio firms. This impact uncertainty should be especially large for firms which react very sensitively to macroeconomic shocks. Hence, insiders should have a larger information advantage for firms with a higher sensitivity towards systematic shocks.

To test this idea, I include three proxies for sensitivity towards systematic risk and their interactions with the *Uncertainty* variable into the standard regression design. These proxies are: the size of a firm (*Size-Decile*), the correlation of the stock return with the market return (*MarketCorr*) and price synchronicity (*Synch*). Stock prices of small firms, firms with a high correlation with the general stock market, and firms with a high price synchronicity measure react more sensitively towards systematic shocks compared to stock prices of large firms, firms with a low stock market correlation, and firms with a low price synchronicity measure (e.g., Roll (1988); Perez-Quiros and Timmermann (2000)).

The results are presented in Table 2.10. In general, insider purchases of firms with a high sensitivity towards systematic risk show higher insider purchase announcement returns. An equivalent but weaker pattern is also visible for insider sale announcement returns of firms with a high sensitivity towards systematic risk. During times of macroeconomic uncertainty, the market reacts especially strongly towards insider trades in firms with a high sensitivity towards macroeconomic shocks. This finding is robust for all proxies for sensitivity towards systematic risk.

All in all, information asymmetries between insiders and outsiders are especially large during times of macroeconomic uncertainty for firms with a high sensitivity towards macroeconomic shocks. This finding strengthens the idea that insiders have an advantage in evaluating the impact of a macroeconomic shock on their firm, allowing insiders to exploit the uncertainty of outsider investors.

Information hierarchy and macroeconomic shocks

In this subsection, I investigate the market reaction towards insider trades for different classes of insiders during times of macroeconomic uncertainty. The information-hierarchy hypothesis posits that insiders closer to the firm such as CEOs or officers possess more private information, and therefore their trades should be more informative compared to insiders with less knowledge about the day-to-day business such as directors (Seyhun (1986)). I apply the insider role within a firm to discriminate between informed and uninformed insiders. I group insiders based on their position in their company into five categories: CEO, officer other than the CEO, directors who are not an officer, chairman of the board, and other insiders who belong to neither of the aforementioned groups.

The results of the univariate analysis summarized in Panel D of Table 2.2 confirm that trades of informed insiders show higher disclosure day abnormal returns. Purchases of CEOs are accompanied by a stronger positive market reaction compared to all other groups of insiders. This finding is in line with the information-hierarchy hypothesis. For sales, there is no clear pattern. In the following analysis, I examine the market reaction towards insider trades during recessions (first year of a presidential term) compared to expansions (all other years of presidential term) for different insider classes.

The results of Table 2.11 show that insider purchases of better informed insiders show especially large announcement returns following presidential elections and during recessions. Panel A presents the results for the elections analysis and Panel B for the recession analysis.

Specification 1 and 2 show the results for insider purchases and Specification 3 and 4 for insider sales. I include dummy variables for all categories of insiders except for the CEO and interactions of these dummies with the *First Year* (*Recession*) variable into the regression. Hence, the coefficients of these dummies and interactions have to be interpreted relative to the CEO. The ordering of the information hierarchy for insider purchases during the year following a presidential election (recession) is: *CEO>Officer>Director>Chairman>Others* (*CEO>Officer>Director>Chairman>Others*). Purchases of CEOs are accompanied by the largest disclosure day CAARs compared to all other insider groups. I document that the disclosure of a CEO purchase during the first year after a presidential election (during a recession) is related to an especially strong market reaction. The CAARs associated with CEO insider purchases are 1.223% (1.268%) larger during the first year of a presidency (recession) compared to all other years of a presidency (expansion).

In conclusion, purchases of better informed insiders' exhibit larger disclosure day CAARs compared to uninformed insiders. This pattern is especially true for periods of high macroeconomic uncertainty. This finding is in line with the notion of the information-hierarchy hypothesis, that certain groups of insiders are especially informed about their company. Therefore, these insiders have more precise private information. These results also show that investors react especially sensitively towards trades of better informed insiders such as CEOs and officers following macroeconomic shocks.

2.3.4 Investment intensity and asymmetric information

In this section, I investigate whether asymmetric information has effects on the real economy. Bernanke et al. (1994) argue that asymmetric information between insiders and outsiders, as a main determinant of agency costs, are positively related to financing costs.

Firms with higher asymmetric information face higher financing costs, leading to a reduction in investment intensity. The corporate investment literature presents empirical evidence that financial constraints such as financing costs affect corporate investment (e.g., Fazzari et al. (1988)). I test whether asymmetric information has an impact on the investment intensity of firms by employing the following standard q-theory based investment regression:

$$\mathrm{Investment}_{i,t} = \alpha_i + \beta_1 \mathrm{AInfo}_{i,t-l} + \mathrm{Controls} + \mathrm{Time}_t + \varepsilon_{it} \tag{2.5}$$

where *i* indexes firms, *t* indexes calendar quarters, and $l \in \{1,2,3,4\}$ stands for the lead between the investment variable and the explanatory variables. The main dependent variable *Investment* is measured as capital expenditures scaled by lagged total assets. The variable of interest is *AInfo*, which is simply the cumulative average abnormal return of all insider purchases (sales) conducted during a firm's fiscal quarter.[24] I expect β_1 to show a negative sign if asymmetric information has negative effects on investment intensity. The regression also includes standard control variables: Tobin's Q and cash flow over assets.[25] Further, firm fixed effects, α_i, and quarter-year fixed effects, *Time,* control for unobservable heterogeneity. The regression's standard errors are adjusted for heteroscedasticity and cross-sectional correlation using clustered standard errors at the firm level.

The results of this analysis are summarized in Table 2.12. Panel A presents the results for insider purchases and Panel B for insider sales. For insider purchases, asymmetric information is negatively related to investment intensity. An increase in information asymmetry

[24] I only include firm-quarter observations with non-missing data for the asymmetric information variable. This rule reduces the number of firm-quarter observations to 72,517 for insider purchases and 121,889 for insider sales.

[25] Summary statistics are in appendix A.4.

by one standard deviation leads to a reduction in investment intensity by 1% relative to the average investment intensity of the overall sample. This effect is especially pronounced during years following a president election. The insider sales analysis does not show a robust relationship between information asymmetry and investment intensity. This result is in line with prior findings that insider sales announcement returns are not a good measure for information asymmetry between insiders and outsiders.

The results of the insider purchase analysis support the notion of Bernanke et al. (1994) that firms with higher information asymmetries show lower investment intensity levels compared to firms with lower information asymmetries. In combination with prior findings that information asymmetries are larger during macroeconomic shocks, this finding indicates that increasing asymmetric information is a potential contributor to the decrease in economic activity during macroeconomic shocks.

2.4 Conclusion

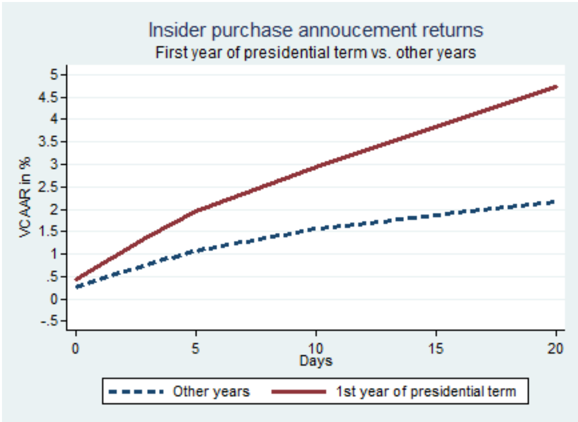
This chapter examines the impact of exogenous macroeconomic shocks on the information asymmetry between insiders and outsiders. I show that the market reacts especially strongly towards insider trades following a macroeconomic shock. Further, information asymmetry between insiders and outsiders exhibits a cyclical pattern with larger information asymmetries during recessions compared to expansions. The empirical evidence in this chapter supports the idea that insiders have an advantage in evaluating the impact of a macroeconomic shock on their firm, resulting in larger information asymmetries between insiders and outsiders.

2.5 Figures

Figure 2.1: Insider trading announcement returns over the presidential cycle

These figures display the cumulative average abnormal announcement return of insider trades over a time horizon of zero (event date) days to twenty days (after the event) conditional on the presidential election cycle. I calculate the cumulative average abnormal announcement return (y-axis) for each event window (x-axis) for the first year of a presidential term and for all other years of a presidential term. Figure a shows the results for insider purchases and Figure b for insider sales. See Appendix A.1 for a definition of all variables.

(a) Insider purchases



(b) Insider sales

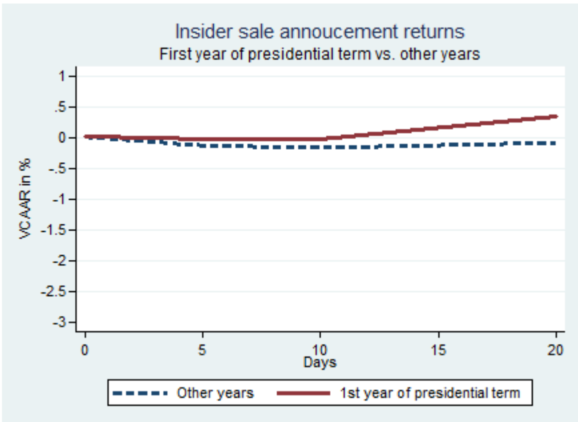
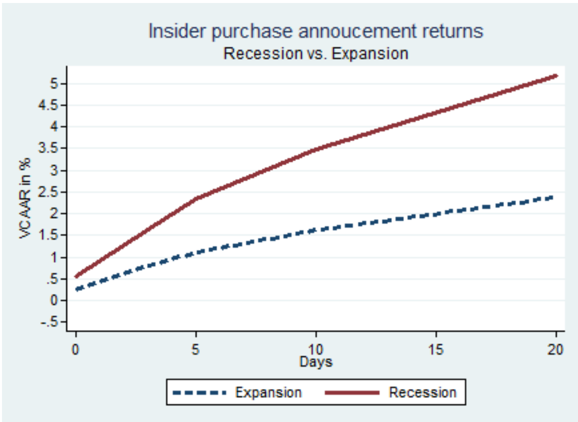


Figure 2.2: Insider trading announcement returns over the business cycle

These figures display the cumulative average abnormal announcement return of insider trades over a time horizon of zero (event date) days to twenty days (after the event) conditional on the business cycle stage. I calculate the cumulative average abnormal announcement return (y-axis) for each event window (x-axis) for recession and expansion periods. Figure a shows the results for insider purchases and Figure b for insider sales. See Appendix A.1 for a definition of all variables.

(a) Insider purchases



(b) Insider sales

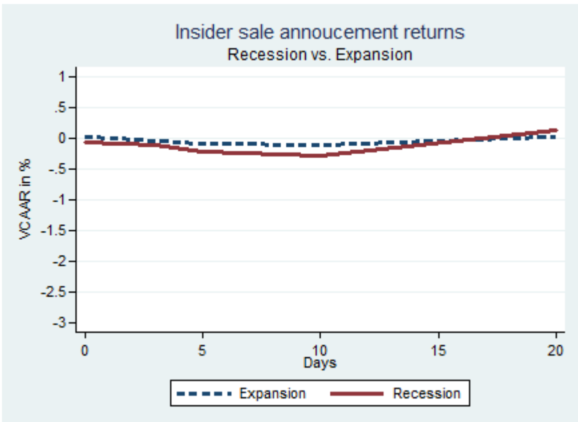
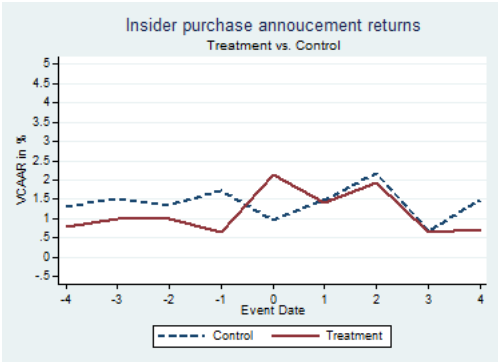


Figure 2.3: Insider trading announcement returns and gubernatorial elections

These figures display the 5-day cumulative average abnormal announcement return of insider trades for four event months before the gubernatorial election and five event months after (including) the gubernatorial election. I calculate the cumulative average abnormal announcement return (y-axis) for each event month (x-axis) for the control and treatment group. Figure a shows the results for insider purchases and Figure b for insider sales. See Appendix A.1 for a definition of all variables.

(a) Insider purchases



(b) Insider sales

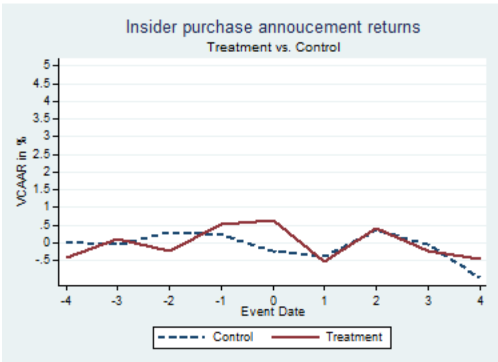
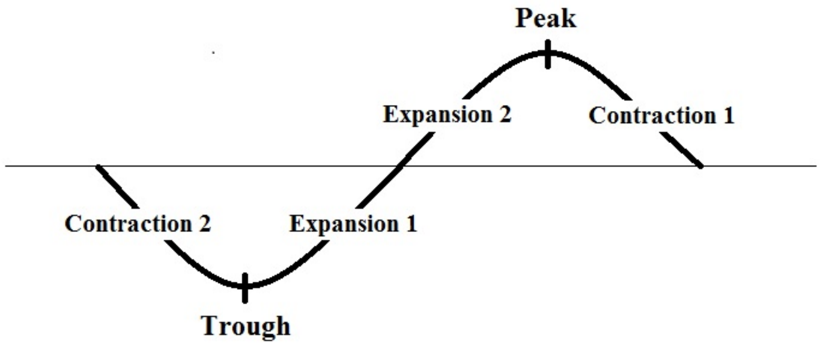


Figure 2.4: Business cycle stages

Figure 2.4 displays the different business cycle stages. Expansion 1 (Contraction 1) is the first half of an expansion (recession) and Expansion 2 (Contraction 2) is the second half of an expansion (recession).



2.6 Tables

Table 2.1: Sample construction

The table summarizes the sample construction from raw Thomson Reuter Insider Filing database (IFDF) to the final sample. I include all open market and private transactions in the IFDF database between January 1, 1986 and December 31, 2013 in my inital dataset.

	Insiders	Firms	Observations	%
Insider data	226,824	23,014	4,642,594	100
Observations after:				
1. Data after cleansing process:			4,611,617	99.33
No CUSIP			16,051	
No or negative transaction price			14,194	
Transaction date after SEC filing date or no SEC date			732	
Aggregate all transactions of the same stock by the same insider on the same SEC filing date into one transaction	224,259	22,488	1,472,841	31.72
Missing fundamental or stock price data in CRSP and Compustat	155,447	12,781	1,015,266	21.87

Table 2.2: Summary statistics

The table reports the sample mean, standard deviation, and the differences in means of main variables used in this study. Insider trading data is taken from IFDF, accounting data from Compustat, market data from CRSP, and macroeconomic data from FRED database. See Appendix A.1 for a definition of all variables. Panel A shows the summary statistics conditional on the direction of an insider trade (sale/purchase). Panel B and C show the summary statistics conditional on the timing of an insider trade (recession/expansion and 1st year of presidency/other years of presidency). Panel D presents results for OLS regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) or equally-weighted (ECAR) index. The event window range is five days and starts at the disclosure date of the insider trade. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Insider purchase vs. sale

		Purchase			Sale		Mean
	N	Mean	S.D.	N	Mean	S.D.	Diff
No. Insiders	304.236	1.024	0.498	711.030	1.047	0.472	−0.023***
Trade Size	304.236	0.181	1.313	711.030	−0.291	2.005	0.472***
B/M	304.236	1.003	1.597	711.030	0.483	1.099	0.519***
Size	304.236	105.221	1.874	711.030	106.857	1.907	−1.636***
dRD	304.236	0.308	0.462	711.030	0.509	0.500	−0.201***
L.Ret3	299.963	−0.084	0.449	701.704	0.100	0.393	−0.184***
IdiosynSD	303.743	3.168	2.448	710.523	2.393	1.854	0.775***
Bid/Ask	267.000	−0.025	0.033	656.915	−0.009	0.016	−0.016***
Synch	304.122	−1.980	1.606	710.961	−1.353	1.497	−0.627***
MarketCorr	303.880	0.309	0.226	710.575	0.401	0.232	−0.091***

Panel B: 1st year of presidency vs. all other years of presidency

	N	1st Year Mean	S.D.	N	Other Year Mean	S.D.	Mean Diff
No. Insiders	264.915	1.049	0.482	750.351	1.037	0.479	−0.012***
Trade Size	264.915	−0.161	1.959	750.351	−0.145	1.794	0.015***
B/M	264.915	0.713	1.695	750.351	0.613	1.113	−0.100***
Size	264.915	106.392	2.046	750.351	106.358	2.038	−0.034***
dRD	264.915	0.445	0.497	750.351	0.450	0.497	0.005***
L.Ret3	261.375	0.042	0.429	740.292	0.046	0.415	0.004***
IdiosynSD	264.735	2.682	2.258	749.531	2.605	2.014	−0.077***
Bid/Ask	243.686	−0.014	0.025	680.229	−0.013	0.023	0.001***
Synch	264.878	−1.564	1.559	750.205	−1.532	1.556	0.031***
MarketCorr	264.763	0.369	0.233	749.692	0.375	0.235	0.006***

Panel C: Expansion vs. recession

	N	Recession Mean	S.D.	N	Expansion Mean	S.D.	Mean Diff
No. Insiders	105.638	1.028	0.488	909.628	1.041	0.479	0.014***
Trade Size	105.638	−0.060	1.145	909.628	−0.160	1.902	−0.100***
B/M	105.638	1.085	2.900	909.628	0.587	0.927	−0.498***
Size	105.638	106.112	2.121	909.628	106.397	2.029	0.285***
dRD	105.638	0.420	0.494	909.628	0.452	0.498	0.032***
L.Ret3	104.256	0.023	0.517	897.411	0.048	0.406	0.024***
IdiosynSD	105.522	3.517	2.615	908.744	2.521	1.984	−0.996***
Bid/Ask	94.159	−0.016	0.031	829.756	−0.013	0.023	0.003***
Synch	105.623	−1.218	1.581	909.460	−1.578	1.550	−0.359***
MarketCorr	105.520	0.421	0.246	908.935	0.368	0.232	−0.053***

Panel D: Annoucement returns

	Purchase		Sale	
	ECAR5	VCAR5	ECAR5	VCAR5
All	1.119***	1.287***	−0.305***	−0.096***
	(69.85)	(79.45)	(−38.98)	(−12.22)
CEO	1.970***	2.112***	−0.286***	−0.116***
	(32.63)	(34.49)	(−11.60)	(−4.69)
Officer	1.183***	1.361***	−0.315***	−0.104***
	(37.53)	(42.60)	(−30.80)	(−10.14)
Director	0.877***	1.046***	−0.301***	−0.089***
	(40.83)	(48.20)	(−18.49)	(−5.44)
Chairman	0.993***	1.177***	−0.211***	0.043
	(10.78)	(12.66)	(−4.62)	(0.93)
Other	1.252***	1.416***	−0.307***	−0.090***
	(26.41)	(29.53)	(−10.65)	(−3.12)
Recession	2.086***	2.341***	−0.525***	−0.213***
	(35.45)	(39.26)	(−15.41)	(−6.29)
Expansion	0.953***	1.107***	−0.285***	−0.085***
	(60.32)	(69.31)	(−35.84)	(−10.67)
First Year	1.539***	1.964***	−0.409***	−0.016
	(39.48)	(49.63)	(−27.22)	(−1.04)
All other years	0.985***	1.072***	−0.267***	−0.125***
	(57.68)	(62.22)	(−29.17)	(−13.59)

Table 2.3: Presidential elections and abnormal disclosure day returns

The table presents results for OLS regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) index. The 5-day event window starts at the disclosure date of the insider trade. See Appendix A.1 for a definition of all variables. This table shows the results for the presidential election analysis, that compares the first year of presidency with all other years of the presidential term. Panel A summarizes the regression results for insider purchases and Panel B for insider sales. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Presidential elections - Insider purchases

	(1)	(2)	(3)	(4)	(5)	(6)
First Year	0.892***	0.829***	0.202**	0.343***	0.420***	0.388***
	(11.81)	(9.75)	(2.49)	(3.71)	(4.60)	(3.46)
New President			0.529***	0.470***	0.367***	0.363***
			(9.22)	(7.41)	(5.55)	(4.38)
Frist Year x New President			1.290***	1.111***	0.601***	0.439**
			(8.78)	(6.95)	(3.91)	(2.39)
Second Year		0.020	0.023	0.128*	0.149*	0.076
		(0.28)	(0.33)	(1.65)	(1.90)	(0.81)
Third Year		−0.255***	−0.277***	−0.200***	−0.178**	−0.199**
		(−3.67)	(−4.01)	(−2.60)	(−2.27)	(−2.01)
No. Insiders				0.386***	0.818***	0.799***
				(3.47)	(8.19)	(6.84)
Trade Size				0.066*	0.081*	−0.012
				(1.95)	(1.87)	(−0.33)
Size				−0.265***	−0.739***	−0.570***
				(−12.68)	(−11.80)	(−11.83)
L.Ret3				−0.792***	−0.722***	−0.779***
				(−5.96)	(−5.40)	(−4.72)
Bid/Ask				2.210	−1.001	−2.934
				(1.41)	(−0.49)	(−1.18)
dRD				0.815***	0.441	0.220
				(10.38)	(1.45)	(1.47)
Constant	1.072***	1.141***	0.907***	28.151***	77.690***	60.004***
	(33.47)	(22.57)	(15.33)	(12.72)	(11.78)	(11.83)
Observations	302,282	302,282	302,282	261,469	261,469	261,469
R^2	0.002	0.002	0.005	0.011	0.134	0.356
Controls	No	No	No	Yes	Yes	Yes
Firm FE	No	No	No	No	Yes	No
Insider FE	No	No	No	No	No	Yes

Panel B: Presidential elections - Insider sales

	(1)	(2)	(3)	(4)	(5)	(6)
First Year	0.109***	0.315***	0.446***	0.478***	0.360***	0.302***
	(3.67)	(7.88)	(8.93)	(9.11)	(7.18)	(5.34)
New President			0.232***	0.227***	0.107***	0.107***
			(6.68)	(6.23)	(3.07)	(2.69)
Frist Year x New President			−0.243***	−0.314***	−0.272***	−0.214***
			(−3.60)	(−4.24)	(−3.75)	(−2.63)
Second Year		0.453***	0.465***	0.470***	0.366***	0.334***
		(10.41)	(10.56)	(10.11)	(8.45)	(6.81)
Third Year		0.182***	0.204***	0.206***	0.100**	0.084*
		(4.42)	(4.83)	(4.70)	(2.38)	(1.79)
No. Insiders				−0.130***	−0.125**	−0.120**
				(−2.60)	(−2.34)	(−2.07)
Trade Size				0.018	0.034	0.043
				(1.39)	(0.97)	(0.79)
Size				0.058***	−0.292***	−0.167***
				(5.49)	(−9.34)	(−5.42)
L.Ret3				−0.159	−0.263***	−0.408***
				(−1.64)	(−2.94)	(−4.02)
Bid/Ask				−13.149***	−14.659***	−20.484***
				(−6.96)	(−5.65)	(−6.15)
dRD				−0.041	0.020	0.020
				(−1.40)	(0.15)	(0.20)
Constant	−0.125***	−0.335***	−0.463***	−6.548***	30.894***	17.495***
	(−7.27)	(−10.41)	(−10.70)	(−5.84)	(9.24)	(5.32)
Observations	704,149	704,149	704,149	641,442	641,442	641,442
R^2	0.000	0.001	0.001	0.002	0.071	0.225
Controls	No	No	No	Yes	Yes	Yes
Firm FE	No	No	No	No	Yes	No
Insider FE	No	No	No	No	No	Yes

Table 2.4: Abnormal disclosure day returns and gubernatorial elections

The table presents results for OLS difference-in-differnce regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) index. The 5-day event window starts at the disclosure date of the insider trade. The PostEvent dummy is zero during the five months period before the 10th of November and one during the five months period following November the 10th. The Treated dummy is one if an insider of a firm with an economic focus on a state with an upcoming election is trading. This variable is zero for insider trades of firms with a special focus on a state with no upcoming election. See Appendix A.1 for a definition of all variables. Specification 1 to 3 summarize the regression results for insider purchases and specification 4 to 6 for insider sales. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. The included control variables are: No. Insider, Trade Size, Size, Bid/Ask, L.Ret3 and dRD. Some specifications include year, state, or firm fixed effects. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
PostEvent x Treated	0.706***	0.893***	0.963***	0.466**	0.419**	0.290
	(2.96)	(3.62)	(3.76)	(2.41)	(2.09)	(1.64)
PostEvent	−0.197*	−0.264**	−0.254**	−0.342***	−0.287***	−0.248***
	(−1.81)	(−2.39)	(−2.30)	(−4.49)	(−3.71)	(−3.11)
Treated	−0.475***	−0.627***	−0.768***	−0.338***	−0.318**	−0.325**
	(−3.02)	(−3.86)	(−4.42)	(−2.61)	(−2.40)	(−2.56)
Observations	92,042	87,085	87,085	174,329	167,709	167,709
R^2	0.010	0.018	0.176	0.002	0.004	0.115
Controls	No	Yes	Yes	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	No	Yes	No	No	Yes	No
Firm FE	No	No	Yes	No	No	Yes

Table 2.5: Recessions and abnormal disclosure day returns

The table presents results for OLS regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) index. The 5-day event window starts at the disclosure date of the insider trade. See Appendix A.1 for a definition of all variables. The table shows the results for the recession analysis, that compares recessions with expansions. Panel A summarizes the regression results for insider purchases and Panel B for insider sales. In Model 5, I decompose the business cycle into six stages: peak, trough, first half of the expansions, second half of the expansion, first half of the recession, and second half of the recession. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Recessions - Insider purchases

	(1)	(2)	(3)	(4)	(5)
Recession	1.234***	1.239***	0.696***	0.549***	
	(11.33)	(10.40)	(6.20)	(4.06)	
Peak					0.166
					(0.67)
Trough					1.121***
					(2.89)
Contr1					0.250*
					(1.76)
Contr2					1.387***
					(7.62)
Expans1					0.272***
					(4.62)
No. Insiders		0.404***	0.828***	0.801***	0.833***
		(3.86)	(8.24)	(6.83)	(8.30)
Trade Size		0.060*	0.079*	−0.014	0.081*
		(1.84)	(1.83)	(−0.39)	(1.88)
Size		−0.267***	−0.805***	−0.605***	−0.747***
		(−12.72)	(−12.56)	(−12.28)	(−11.97)
L.Ret3		−0.767***	−0.697***	−0.767***	−0.707***
		(−5.72)	(−5.16)	(−4.63)	(−5.30)
Bid/Ask		1.265	−1.322	−3.688	−0.566
		(0.82)	(−0.65)	(−1.49)	(−0.28)
dRD		0.831***	0.479	0.234	0.438
		(10.65)	(1.61)	(1.55)	(1.47)
Constant	1.107***	28.588***	84.819***	63.881***	78.641***
	(36.22)	(12.85)	(12.59)	(12.33)	(11.96)
Observations	302,282	261,469	261,469	261,469	261,469
R^2	0.002	0.009	0.132	0.355	0.133
Controls	No	Yes	Yes	Yes	Yes
Firm FE	No	No	Yes	No	Yes
Insider FE	No	No	No	Yes	No

Panel B: Recessions - Insider sales

	(1)	(2)	(3)	(4)	(5)
Recession	−0.128**	−0.099	−0.194***	−0.196***	
	(−2.29)	(−1.63)	(−3.20)	(−2.85)	
Peak					−0.285
					(−1.40)
Trough					0.105
					(0.56)
Contr1					−0.252***
					(−3.17)
Contr2					−0.073
					(−0.76)
Expans1					0.023
					(0.78)
No. Insiders		−0.148***	−0.142***	−0.133**	−0.140***
		(−2.92)	(−2.65)	(−2.28)	(−2.63)
Trade Size		0.018	0.034	0.043	0.034
		(1.43)	(0.97)	(0.80)	(0.97)
Size		0.055***	−0.300***	−0.177***	−0.295***
		(5.19)	(−9.48)	(−5.67)	(−9.29)
L.Ret3		−0.178*	−0.266***	−0.409***	−0.266***
		(−1.83)	(−2.96)	(−4.02)	(−2.97)
Bid/Ask		−12.705***	−14.245***	−20.173***	−14.250***
		(−6.76)	(−5.49)	(−6.05)	(−5.49)
dRD		−0.039	0.035	0.027	0.035
		(−1.33)	(0.27)	(0.27)	(0.27)
Constant	−0.085***	−5.850***	32.054***	18.842***	31.456***
	(−5.78)	(−5.18)	(9.45)	(5.64)	(9.25)
Observations	704,149	641,442	641,442	641,442	641,442
R^2	0.000	0.001	0.070	0.225	0.070
Controls	No	Yes	Yes	Yes	Yes
Firm FE	No	No	Yes	No	Yes
Insider FE	No	No	No	Yes	No

Table 2.6: Robustness tests - Elections

The table presents results for OLS regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) index for Model 2 to 5. The 5-day event window starts at the disclosure date of the insider trade. Model 1 uses an alternative reference index, the CRSP equally-weighted index, to calculate abnormal returns (ECAR). Model 2 compares the abnormal disclosure day returns of insider trades conducted up to five months before a presidential election with insider trades conducted up to five months after a presidential election. Model 3 compares the abnormal disclosure day returns of insider trades conducted up to five months after a presidential election with insider trades conducted outside this 5 months period. Model 4 uses an alternative measure of political uncertainty, the Economic Policy Uncertainty index by Baker et al. (2013). See Appendix A.1 for a definition of all variables. Panel A summarizes the regression results for insider purchases and Panel B for insider sales. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. The included control variables are: No. Insider, Trade Size, Size, Bid/Ask, L.Ret3 and dRD. Some specifications include month, year, or firm fixed effects. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Insider purchases

	ECAR5	Pre vs. Post	1 Quarter	EPU
First Year	0.349***			
	(4.72)			
PrevsPost		0.466***		
		(3.07)		
President_1Q			0.283**	
			(2.23)	
EPU				0.870***
				(8.31)
Constant	79.785***	124.215***	113.622***	77.704***
	(12.10)	(6.82)	(15.70)	(11.56)
Observations	261,469	59,540	261,469	261,469
R^2	0.132	0.286	0.140	0.133
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	No	Yes	Yes
Year FE	No	No	Yes	No

Panel B: Insider sales

	ECAR5	Pre vs. Post	1 Quarter	EPU
First Year	-0.152^{***}			
	(-4.88)			
PrevsPost		0.107		
		(1.54)		
President_1Q			0.054	
			(1.00)	
EPU				-0.154^{***}
				(-3.25)
Constant	26.168^{***}	9.017	41.701^{***}	33.017^{***}
	(7.71)	(1.12)	(10.27)	(9.73)
Observations	641,442	132,710	641,442	641,442
R^2	0.070	0.177	0.073	0.071
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Month FE	Yes	No	Yes	Yes
Year FE	No	No	Yes	No

Table 2.7: Robustness tests - Recessions

The table presents results for OLS regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) index for Model 2 to 4. The 5-day event window starts at the disclosure date of the insider trade. Model 1 uses an alternative reference index, the CRSP equally-weighted index, to calculate abnormal returns (ECAR). Model 2 and 3 employ an alternative recession defintion based on historic GDP realizations. See Appendix A.1 for a definition of all variables. Panel A summarizes the regression results for insider purchases and Panel B for insider sales. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. The included control variables are: No. Insider, Trade Size, Size, Bid/Ask, L.Ret3 and dRD. Some specifications include month, year, or firm fixed effects. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Insider purchases

	ECAR5	GDP Rec	Rec Prob
Recession	0.566***		
	(5.07)		
Recession_GDP		0.708***	
		(6.91)	
RecessionProb_GDP			0.005**
			(1.99)
Constant	79.227***	85.117***	113.399***
	(12.06)	(12.65)	(15.77)
Observations	261,469	261,469	261,469
R^2	0.132	0.133	0.140
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Year FE	No	No	Yes

Panel B: Insider sales

	ECAR5	GDP Rec	Rec Prob
Recession	-0.285^{***}		
	(-4.58)		
Recession_GDP		0.007	
		(0.13)	
RecessionProb_GDP			-0.004^{***}
			(-2.84)
Constant	26.159^{***}	32.552^{***}	42.336^{***}
	(7.71)	(9.57)	(10.45)
Observations	641,442	641,442	641,442
R^2	0.070	0.071	0.073
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Year FE	No	No	Yes

Table 2.8: Long-term abnormal returns

The table presents results for OLS regressions with monthly portfolio returns as dependent variable. Each month I construct an equally-weighted insider purchase and sale portfolio. To construct these portfolios I buy (sell) each month stocks of firms with net insider buying (selling) in the last month and I hold these portfolios for one, three, or six months. I classify the buy (sell) portfolio into election (recession) and no election (expansion) portfolios, depending on the timing of the insider trade. Thus, the election (recession) purchase (sale) portfolio includes all shares with net insider buying (selling) over the previous one to six months if the insider trade was executed during the 12 months following a presidential election (during a recession). All other trades are pooled into the no election (expansion) purchase (sale) portfolio. I analyze the returns of all four portfolios with established performance-evaluation methods, e.g., CAPM, Fama-French-3-Factors, Carhart Model and Fama-French-5-Factors. See Appendix A.1 for a definition of all variables. Specification 1 to 3 present the results for an one month holding period, Specification 4 to 6 for a three months holding period and Specification 7 to 9 for a six months holding period. Panel A and B summarizes the regression results for the election analysis and Panel C and D for the recession analysis. The table displays the alpha estimate for each performance-evaluation method and the alpha difference between the election and no election portfolio. t-statistics are shown in parenthese. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Insider purchases - Elections

	(1) No Election	(2) Election	(3) Diff	(4) No Election	(5) Election	(6) Diff	(7) No Election	(8) Election	(9) Diff
CAPM-Alpha	1.180***	2.069***	0.889**	0.792***	1.711***	0.919**	0.652***	1.370***	0.718*
	(5.87)	(4.23)	(1.97)	(4.15)	(3.88)	(2.21)	(3.48)	(3.52)	(1.86)
FF3-Alpha	1.078***	1.744***	0.667*	0.696***	1.327***	0.631*	0.547***	1.069***	0.522*
	(6.86)	(4.46)	(1.86)	(4.72)	(3.78)	(1.93)	(3.99)	(3.41)	(1.77)
Carhart-Alpha	1.357***	2.126***	0.769***	0.997***	1.648***	0.651**	0.762***	1.318***	0.557**
	(10.50)	(6.60)	(2.61)	(8.28)	(5.79)	(2.45)	(6.75)	(5.02)	(2.27)
FF5-Alpha	1.152***	1.974***	0.821**	0.791***	1.561***	0.770**	0.629***	1.315***	0.685**
	(6.98)	(4.91)	(2.21)	(5.09)	(4.41)	(2.29)	(4.40)	(4.13)	(2.26)

Panel B: Insider sales - Elections

	(1) No Election	(2) Election	(3) Diff	(4) No Election	(5) Election	(6) Diff	(7) No Election	(8) Election	(9) Diff
CAPM-Alpha	−0.059	−0.008	0.051	−0.094	0.301	0.395	0.025	0.281	0.256
	(−0.35)	(−0.03)	(0.16)	(−0.66)	(1.27)	(1.42)	(0.17)	(1.23)	(0.96)
FF3-Alpha	−0.059	−0.182*	−0.123	−0.101*	0.038	0.139	0.005	0.045	0.040
	(−0.81)	(−1.75)	(−0.87)	(−1.72)	(0.38)	(1.19)	(0.07)	(0.39)	(0.31)
Carhart-Alpha	−0.032	−0.117	−0.084	−0.049	0.103	0.153	0.097*	0.129	0.032
	(−0.44)	(−1.19)	(−0.59)	(−0.86)	(1.11)	(1.36)	(1.67)	(1.26)	(0.29)
FF5-Alpha	0.007	−0.110	−0.117	−0.061	0.111	0.172	0.055	0.136	0.080
	(0.09)	(−1.04)	(−0.80)	(−0.99)	(1.09)	(1.44)	(0.80)	(1.14)	(0.60)

Panel C: Insider purchases - Recessions

	(1) Expansion	(2) Recession	(3) Diff	(4) Expansion	(5) Recession	(6) Diff	(7) Expansion	(8) Recession	(9) Diff
CAPM-Alpha	1.271***	2.747***	1.477**	0.803***	2.318***	1.515***	0.537***	1.833***	1.296***
	(6.71)	(4.21)	(2.45)	(4.60)	(4.18)	(2.91)	(3.20)	(3.56)	(2.76)
FF3-Alpha	1.128***	2.224***	1.097**	0.680***	1.714***	1.034**	0.421***	1.250***	0.830**
	(7.40)	(3.84)	(2.20)	(5.19)	(3.52)	(2.54)	(3.57)	(2.95)	(2.42)
Carhart-Alpha	1.439***	1.836***	0.397	0.960***	1.434***	0.474	0.685***	1.139***	0.454
	(11.09)	(3.60)	(0.93)	(8.82)	(3.32)	(1.39)	(6.97)	(3.02)	(1.58)
FF5-Alpha	1.190***	2.641***	1.451***	0.757***	2.004***	1.247***	0.489***	1.730***	1.242***
	(7.55)	(4.10)	(2.61)	(5.60)	(3.69)	(2.80)	(4.01)	(3.56)	(3.17)

Panel D: Insider sales - Recessions

	(1) Expansion	(2) Recession	(3) Diff	(4) Expansion	(5) Recession	(6) Diff	(7) Expansion	(8) Recession	(9) Diff
CAPM-Alpha	-0.175	0.572	0.747	-0.131	0.733*	0.864**	-0.046	0.581	0.628*
	(-1.16)	(1.47)	(1.60)	(-0.96)	(2.02)	(2.18)	(-0.34)	(1.52)	(1.66)
FF3-Alpha	-0.123**	0.034	0.157	-0.100*	0.145	0.245	-0.040	-0.003	0.038
	(-2.00)	(0.16)	(0.79)	(-1.91)	(0.82)	(1.53)	(-0.68)	(-0.01)	(0.22)
Carhart-Alpha	-0.099	-0.002	0.097	-0.048	0.124	0.172	0.063	-0.026	-0.089
	(-1.58)	(-0.01)	(0.48)	(-0.93)	(0.68)	(1.08)	(1.16)	(-0.13)	(-0.56)
FF5-Alpha	-0.082	-0.085	-0.003	-0.063	0.103	0.166	0.002	-0.039	-0.041
	(-1.30)	(-0.36)	(-0.01)	(-1.17)	(0.52)	(0.95)	(0.04)	(-0.16)	(-0.21)

Table 2.9: Mispricing and macroeconomic events

The table presents results for OLS regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) index. The 5-day event window starts at the disclosure date of the insider trade. See Appendix A.1 for a definition of all variables. I employ different proxies for mispricing: the average stock return over the last three months and the book-to-market decile of the insider's firm. Moreover, I employ a measure for limits to arbitrage, the idiosyncratic volitility of the stock over the last 25 trading days before the insider trading announcement. Panel A exhibts the results for the election analysis and Panel B for the recession analysis. Model 1 to 3 present the results for insider purchases and Model 4 to 6 for insider sales. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. The included control variables are: No. Insider, Trade Size, Size, Bid/Ask, L.Ret3 and dRD. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Presidential elections

	(1) Purchase	(2) Purchase	(3) Purchase	(4) Sale	(5) Sale	(6) Sale
First Year	0.619***	0.325*	−0.234*	0.155***	−0.048	−0.132
	(7.90)	(1.78)	(−1.83)	(4.38)	(−0.78)	(−1.63)
L.Ret3 x First Year	−1.047**			−0.626***		
	(−2.53)			(−3.44)		
B/M-Dec x First Year		0.052*			0.024**	
		(1.67)			(1.96)	
SDIdiosyn x First Year			0.252***			0.100**
			(5.30)			(2.56)
L.Ret3	−0.347***			−0.107		
	(−2.90)			(−0.99)		
B/M-Decile		0.140***			0.075***	
		(6.85)			(6.89)	
IdiosynSD			0.173***			−0.123***
			(4.89)			(−3.79)
Constant	84.449***	75.522***	78.059***	32.273***	23.300***	37.622***
	(12.51)	(10.04)	(11.99)	(9.51)	(6.75)	(10.85)
Observations	261,469	246,049	265,005	641,442	603,791	650,152
R^2	0.133	0.134	0.133	0.070	0.071	0.071
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Recessions

	(1) Purchase	(2) Purchase	(3) Purchase	(4) Sale	(5) Sale	(6) Sale
Recession	0.609***	0.727**	−0.422*	−0.128*	−0.373***	0.105
	(5.32)	(2.40)	(−1.81)	(−1.80)	(−3.18)	(0.67)
L.Ret3 x Recession	−0.888**			−0.514*		
	(−2.13)			(−1.90)		
B/M-Dec x Recession		−0.018			0.025	
		(−0.41)			(1.08)	
SDIdiosyn x Recession			0.268***			−0.052
			(4.28)			(−0.87)
L.Ret3	−0.473***			−0.207**		
	(−4.16)			(−2.19)		
B/M-Decile		0.145***			0.082***	
		(7.42)			(7.96)	
IdiosynSD			0.392***			−0.099***
			(12.59)			(−3.14)
Constant	83.713***	76.606***	16.290***	31.790***	23.099***	−2.432*
	(12.45)	(10.11)	(7.85)	(9.40)	(6.69)	(−1.75)
Observations	261,469	246,049	265,005	641,442	603,791	650,152
R^2	0.133	0.133	0.018	0.070	0.071	0.002
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.10: Sensitivity to systematic risk and macroeconomic events

The table presents results for OLS regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) index. The 5-day event window starts at the disclosure date of the insider trade. See Appendix A.1 for a definition of all variables. Panel A shows the results for the election analysis, which compares the first year of presidency with all other years of the presidential term. Panel B shows the results for the recession analysis, which compares recessions with expansions. Model 1 to 3 summarize the regression results for insider purchases and Model 4 to 6 for insider sales. I employ three proxies for the sensitivity of a stock to systematic risk: firm size, correlation of a stock with the market, and price synchronicity. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. The included control variables are: No. Insider, Trade Size, Size, Bid/Ask, L.Ret3 and dRD. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Election analysis

	(1) Purchase	(2) Purchase	(3) Purchase	(4) Sale	(5) Sale	(6) Sale
First Year	1.151***	0.649***	1.068***	0.287***	0.151**	0.065*
	(8.99)	(4.82)	(8.17)	(4.48)	(2.37)	(1.68)
Size-Dec x First Year	−0.096***			−0.037***		
	(−3.94)			(−3.62)		
MktCorr x First Year		0.669*			−0.108	
		(1.87)			(−0.84)	
Synch x First Year			0.102**			−0.031
			(2.04)			(−1.49)
Size-Dec	−0.095***			0.087***		
	(−8.05)			(13.69)		
MarketCorr		1.104***			−0.095	
		(6.69)			(−1.22)	
Synch			0.119***			−0.028**
			(5.33)			(−2.12)
Constant	0.619***	35.363***	35.104***	−0.406***	−6.374***	−7.115***
	(5.33)	(14.73)	(14.58)	(−6.52)	(−5.51)	(−5.92)
Observations	261,469	261,469	261,469	641,442	641,440	641,441
R^2	0.008	0.010	0.009	0.002	0.001	0.001
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Recessions

	(1) Purchase	(2) Purchase	(3) Purchase	(4) Sale	(5) Sale	(6) Sale
Recession	1.087***	0.729***	1.426***	−0.216*	0.094	−0.128*
	(5.98)	(3.47)	(9.07)	(−1.71)	(0.70)	(−1.93)
Size Dec x Recession	0.067			0.024		
	(1.51)			(1.20)		
MktCorr x Recession		1.152**			−0.394	
		(2.49)			(−1.64)	
Synch x Recession			0.153**			−0.052
			(2.12)			(−1.27)
Size-Dec	−0.118***			0.076***		
	(−10.63)			(13.16)		
MarketCorr		0.812***			−0.083	
		(5.29)			(−1.14)	
Synch			0.085***			−0.032***
			(4.05)			(−2.58)
Constant	0.688***	33.265***	32.870***	−0.313***	−6.289***	−7.073***
	(6.25)	(14.07)	(13.83)	(−5.12)	(−5.43)	(−5.87)
Observations	261,469	261,469	261,469	641,442	641,440	641,441
R^2	0.008	0.010	0.010	0.002	0.001	0.001
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 2.11: Insider identity and macroeconomic events

The table presents results for OLS regressions with abnormal disclosure day returns as dependent variable. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted (VCAR) index. The 5-day event window starts at the disclosure date of the insider trade. See Appendix A.1 for a definition of all variables. Panel A summarizes the regression results for the presidential election analysis and Panel B for the recession analysis. Model 1 and 2 present the results for insider purchases and Model 3 and 4 for insider sales. I categorize insiders based on their employment status into: CEO, officer, director, chairman or others. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. The included control variables are: No. Insider, Trade Size, Size, Bid/Ask, L.Ret3 and dRD. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Presidential election

	Purchase	Purchase	Sale	Sale
CEO x First Year	1.223***	1.044***	0.095	0.090
	(6.46)	(5.68)	(1.58)	(1.50)
Other x First Year	−0.239	−0.576**	−0.077	−0.103
	(−0.87)	(−2.16)	(−0.65)	(−0.92)
Officer x First Year	−0.063	−0.010	0.039	0.035
	(−0.32)	(−0.05)	(0.64)	(0.58)
Chairman x First Year	−0.626*	−0.567*	−0.063	−0.069
	(−1.78)	(−1.70)	(−0.46)	(−0.52)
Director x First Year	−0.601***	−0.568***	0.017	0.023
	(−3.14)	(−3.02)	(0.24)	(0.33)
Other	−0.563***	−0.480***	0.018	0.080
	(−4.57)	(−3.56)	(0.28)	(1.30)
Officer	−0.587***	−0.340***	−0.027	−0.029
	(−6.85)	(−3.99)	(−0.77)	(−0.87)
Chairman	−0.489***	−0.349**	0.097	0.053
	(−3.09)	(−2.11)	(1.37)	(0.79)
Director	−0.625***	−0.258***	−0.030	0.000
	(−7.47)	(−3.07)	(−0.76)	(0.01)
CEO	28.590***	84.770***	−5.898***	31.757***
	(12.68)	(12.57)	(−5.26)	(9.44)
Observations	261,469	261,469	641,442	641,442
R^2	0.010	0.133	0.001	0.070
Controls	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes

Panel B: Recessions

	Purchase	Purchase	Sale	Sale
CEO x Recession	1.268***	0.676***	−0.031	−0.177
	(5.24)	(2.82)	(−0.27)	(−1.57)
Other x Recession	−0.007	−0.219	−0.329	−0.216
	(−0.02)	(−0.63)	(−1.56)	(−1.05)
Officer x Recession	0.359	0.331	−0.054	−0.017
	(1.34)	(1.25)	(−0.47)	(−0.16)
Chairman x Recession	−0.167	−0.225	0.089	0.099
	(−0.33)	(−0.46)	(0.30)	(0.33)
Director x Recession	−0.269	−0.063	−0.017	0.045
	(−1.05)	(−0.25)	(−0.12)	(0.33)
Other	−0.676***	−0.618***	0.028	0.073
	(−5.86)	(−4.76)	(0.51)	(1.39)
Officer	−0.628***	−0.400***	−0.013	−0.019
	(−7.71)	(−4.94)	(−0.43)	(−0.67)
Chairman	−0.590***	−0.482***	0.073	0.025
	(−4.11)	(−3.27)	(1.15)	(0.41)
Director	−0.718***	−0.392***	−0.025	0.003
	(−8.87)	(−4.91)	(−0.71)	(0.09)
CEO	27.836***	84.804***	−5.850***	31.911***
	(12.48)	(12.60)	(−5.22)	(9.48)
Observations	261,469	261,469	641,442	641,442
R^2	0.010	0.133	0.001	0.070
Controls	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes

Table 2.12: Investment intensity and information asymmetry

The table presents results for panel regressions with investement intensity as dependent variable. Investment intensity is defined by Capex over assets. The main variable of interest is the average abnormal return on an insider trading day for a firm during a fiscal quarter. The abnormal return is the difference between the return of a specific stock and the CRSP value-weighted index. The 5-day event window starts at the disclosure date of the insider trade. The average abnormal return is calculated for insider purchases (PCAAR5) and insider sales (SCAAR5), separately. See Appendix A.1 for a definition of all variables. Panel A shows the results for the election analysis, which compares the first year of presidency with all other years of the presidential term. Panel B shows the results for the recession analysis, which compares recessions with expansions. Model 1 to 3 summarize the regression results for insider purchases and Model 4 to 6 for insider sales. I employ two control variables Tobin's Q and cashflow over total assets. The regression also includes firm fixed and time fixed effects. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Insider purchases

	Full Sample		Recession		Expansion		Election		No Election	
	Lag 1	Lag 2	Lag 1	Lag 2	Lag 1	Lag 2	Lag 1	Lag 2	Lag 1	Lag2
PCAAR5	-0.16^{*}	-0.16^{*}	-0.29	-0.29	-0.13	-0.14	-0.43^{**}	-0.38^{**}	-0.08	-0.16
	(-1.86)	(-1.91)	(-1.37)	(-1.47)	(-1.35)	(-1.44)	(-2.36)	(-2.17)	(-0.78)	(-1.56)
Tobin_Q	0.20^{***}	0.18^{***}	0.20^{***}	0.16^{***}	0.21^{***}	0.18^{***}	0.25^{***}	0.22^{***}	0.19^{***}	0.16^{***}
	(16.79)	(16.03)	(5.19)	(4.68)	(16.37)	(15.50)	(9.86)	(10.76)	(15.53)	(13.91)
Cash Flow	2.62^{***}	3.34^{***}	2.02^{***}	2.05^{***}	2.58^{***}	3.40^{***}	2.38^{***}	3.25^{***}	2.60^{***}	3.30^{***}
	(10.76)	(12.60)	(3.08)	(2.81)	(9.65)	(11.99)	(5.49)	(6.48)	(8.81)	(10.66)
Constant	1.15^{***}	1.11^{***}	0.71^{***}	0.50^{***}	1.13^{***}	1.09^{***}	0.68^{***}	0.70^{***}	1.18^{***}	1.15^{***}
	(21.40)	(21.45)	(3.85)	(4.22)	(20.77)	(20.80)	(6.73)	(8.77)	(21.85)	(21.69)
Observations	72,517	71,140	8,543	8,449	63,974	62,691	17,943	17,368	54,574	53,772
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Insider sales

	Full Sample		Recession		Expansion		Election		No Election	
	Lag 1	Lag 2	Lag 1	Lag 2	Lag 1	Lag 2	Lag 1	Lag 2	Lag 1	Lag2
SCAAR5	-0.16^{*}	0.09	-0.31	0.18	-0.12	0.10	-0.36^{*}	-0.08	-0.14	0.14
	(-1.74)	(0.94)	(-1.09)	(0.64)	(-1.22)	(0.94)	(-1.81)	(-0.40)	(-1.38)	(1.21)
Tobin_Q	0.15^{***}	0.13^{***}	0.16^{***}	0.15^{***}	0.15^{***}	0.13^{***}	0.18^{***}	0.16^{***}	0.14^{***}	0.13^{***}
	(20.97)	(19.81)	(6.69)	(6.98)	(20.74)	(19.26)	(13.16)	(12.16)	(17.96)	(17.43)
Cash Flow	3.00^{***}	3.57^{***}	2.86^{***}	5.07^{***}	3.03^{***}	3.54^{***}	2.66^{***}	3.97^{***}	3.20^{***}	3.57^{***}
	(13.44)	(15.34)	(3.87)	(6.53)	(13.12)	(14.62)	(6.86)	(9.73)	(12.51)	(13.86)
Constant	1.13^{***}	1.20^{***}	0.61^{***}	0.48^{***}	1.12^{***}	1.19^{***}	0.74^{***}	0.76^{***}	1.17^{***}	1.23^{***}
	(21.16)	(22.87)	(7.43)	(6.92)	(20.91)	(22.70)	(14.63)	(15.10)	(21.42)	(22.94)
Observations	121,889	119,074	10,884	10,768	111,005	108,306	32,123	30,458	89,766	88,616
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2.7 Appendix

Table A.1: Variable definitions

The table describes the construction of all variables used in this analysis. Insider trading data is taken from IFDF, accounting data from Compustat, market data from CRSP.

Variable	Description	Source
B/M	is the book-to-market ratio. The market value is the product of the shares outstanding and market price at the insider trading announcement day. The book value is of year t-1. It is calculated as follows: Total Assets [data6]-Total Liabilities [data181]-Preferred Stock [data10]+Deferred Taxes [data35]+Convertible Debt [data79]. If Preferred Stock [data10] is missing, I replace it with Redemption Value of Preferred Stock [data56].	Compustat, CRSP
B/M-Dec	is the book-to-market ratio decile. The market value is the product of the shares outstanding and market price at the insider trading announcement day. The book value is of year t-1. It is calculated as follows: Total Assets [data6]-Total Liabilities [data181]-Preferred Stock [data10]+Deferred Taxes [data35]+Convertible Debt [data79]. If Preferred Stock [data10] is missing, I replace it with Redemption Value of Preferred Stock [data56]. The deciles are based on NYSE breakpoints. These breakpoints are obtained from Professor Kenneth French's website: http://mba.tuck.dartmouth.edu/pages/faculty /ken.french/index.html.	Compustat, CRSP
Bid-Ask Spread	is the average bid-ask spread over the 25 trading days before the insider's trade.	CRSP

Variable Definitions continued

Variable	Description	Source
Cash Flow	is operating cash flow (income before extraordinary items + depreciation and amortization) over lagged total assets.	Compustat Quarterly Data
CEO	is 1 if the CEO of a firm conducted a specific insider trade and 0 otherwise.	IFDF
Chairman	is 1 if the chairman of the board conducted a specific insider trade and 0 otherwise.	IFDF
Contr1	is 1 if the insider trade is announced during the first half of an economic contraction and 0 otherwise.	FRED database
Contr2	is 1 if the insider trade is announced during the second half of an economic contraction and 0 otherwise.	FRED database
Director	is 1 if a director other than the chairman of the board conducted a specific insider trade and 0 otherwise.	IFDF
dRD	is 1 for an insider trade of a firm with positive R&D expenditures during last fiscal year and 0 otherwise.	Compustat
ECAR	is the cumulative abnormal return over a 1 to 10-day event window starting at the disclosure day of the insider's trade. The abnormal return is the difference between the daily stock return and the corresponding daily equally-weighted CRSP index return.	CRSP
EPU	is the natural logarithm of the EPU index, which measures the political uncertainty based on three underlying components: newspaper coverage of policy-related economic uncertainty, the number of federal tax code provisions set to expire in future years, and the disagreement among economic forecasters as a proxy for policy uncertainty.	Baker, Bloom, and Davis (2013)

Variable Definitions continued

Variable	Description	Source
Expans1	is 1 if the insider trade is announced during the first half of an economic expansion and 0 otherwise.	FRED database
Expans2	is 1 if the insider trade is announced during the second half of an economic expansion and 0 otherwise.	FRED database
First Year	is 1 for one year following a presidential election and 0 otherwise.	Hand-collected
IndioSD	is the logarithm of the market-purged and industry-purged stock return standard deviation over the last 25 trading days.	CRSP
Investment	is capital expenditures over lagged total assets.	Compustat Quarterly Data
L.Ret3	is the average daily stock return over the last three month before the insider's trade in %.	CRSP
MarketCorr	is the stock correlation with the CRSP value-weighted market return over the last 25 trading days in %.	CRSP
New President	is 1 during the first term of presidency and 0 otherwise.	Hand-collected
No. Insiders	is the number of all insiders disclosing their trades at a specific SEC disclosure date.	IFDF
Officer	is 1 if an offcier other than the CEO conducted a specific insider trade and 0 otherwise.	IFDF
Other	is 1 if an insider other than the CEO, officer, chairman, or director conducted a specific insider trade and 0 otherwise.	IFDF
Peak	is 1 if the insider trade is announced at the peak of the business cycle and 0 otherwise.	FRED database
PostEvent	is 0 during the five months prior to the 10th of November and 1 during the five months following the 10th of November.	Hand-collected

Variable Definitions continued

Variable	Description	Source
PCAAR5	is the cumulative average abnormal return over a 5-day event window, starting at the disclosure day of all insider purchases of a firm disclosed during a fiscal quarter. The abnormal return is the difference between the daily stock return and the corresponding daily value-weighted CRSP index return.	CRSP
Presidential_1Q	is 1 during the five months after a presidential election and 0 otherwise.	Hand-collected
PrevsPost	is 1 during the five months after the presidential election and 0 during five months leading up to the presidential election.	Hand-collected
Recession	is 1 if the insider trade is announced during a recession and 0 otherwise.	FRED Database
Recession_GDP	is 1 if the insider trade is announced during a recession and 0 otherwise. A recession is defined following the methodology outlined in Chauvet and Hamilton (2006), who employ historical GDP figures to make a prediction about the current state of the economy.	FRED Database
RecessionProb_GDP	equals the recession probability when a specific insider trade is announced. This recession probability is derived following the methodology outlined in Chauvet and Hamilton (2006), who employ historical GDP figures to make a prediction about the current state of the economy.	FRED Database
SCAAR5	is the cumulative average abnormal return over 5-day event window, starting at the disclosure day of all insider sales of a firm disclosed during a fiscal quarter. The abnormal return is the difference between the daily stock return and the corresponding daily value-weighted CRSP index return.	CRSP

Variable Definitions continued

Variable	Description	Source
Second Year	is 1 for one year following an mid-term election and 0 otherwise.	Hand-collected
Size	is the natural logarithm of market capitalization of a firm.	CRSP
Size-Decile	The size deciles are based on the market capitalization of each firm. I use the NYSE size decile breakpoints to classify a firm into a decile. These breakpoints are obtained from Professor Kenneth French's website: http://mba.tuck.dartmouth.edu/pages/faculty /ken.french/index.html.	CRSP
Synch	is a price synchonicity measure following the procedure of Roll (1988).	CRSP
Third Year	is 1 for the third year of the presidential cycle and 0 otherwise.	Hand-collected
Tobin's Q	is market value of total assets (product of the shares outstanding and market price + book value of total assets - book value of equity - deferred taxes and investment tax credit (if available)) over the lagged book value of total asset.	Compustat Quarterly Data
Trade Size	is the total number of traded shares disclosed at a specific SEC disclosure date by all insiders of a firm, normalized by the total number of shares outstanding.	CRSP, IFDF
Treated	is 1 if an insider of a firm with an economic focus on a state with an upcoming gubernatorial election is trading and 0 for insider trades of firms with a special economic focus on a state with no upcoming gubernatorial election.	Hand-collected
Trough	is 1 if the insider trade is announced at the trough of the business cycle and 0 otherwise.	FRED database

Variable Definitions continued

Variable	Description	Source
VCAR	is the cumulative abnormal return over a 1 to 10-day event window starting at the disclosure day of the insider's trade. The abnormal return is the difference between the daily stock return and the corresponding daily value-weighted CRSP index return.	CRSP

Table A.2: Federal elections

The table displays an overview of all presidential and Congress elections between 1986 and 2012. Panel A summarizes the electoral outcome and the winning margin of all presidential elections. Panel B presents the electoral outcome of all congressional elections.

Panel A: Presidential elections

Election Date	Incumbant	Winner	Popular Vote		Electoral Vote		Change	Margin (%)	Margin (%)
			Winner (%)	2nd (%)	Winner (%)	2nd (%)		Popular Vote	Electoral Vote
11/06/2012	Dem	Dem	51.01	47.15	61.70	38.30	0	3.86	23.40
11/04/2008	Rep	Dem	52.86	45.60	67.80	32.20	1	7.26	35.60
11/02/2004	Rep	Rep	50.73	48.26	53.20	46.70	0	2.47	6.50
12/12/2000	Dem	Rep	47.87	48.38	50.40	49.40	1	-0.51	1.00
11/05/1996	Dem	Dem	49.23	40.72	70.40	29.60	0	8.51	40.80
11/03/1992	Rep	Dem	43.01	37.45	68.80	31.20	1	5.56	37.60
11/08/1988	Rep	Rep	53.37	45.65	79.20	20.60	0	7.72	58.60

Panel B: Congress elections

Election Date	Seats Dem House	Seats Rep House	Seats Dem Senate	Seats Rep Senate	Dem - Rep House	Dem - Rep Senate	Change House	Change Senate
11/06/2012	201	234	53	45	-33	8	0	0
11/02/2010	193	242	51	47	-49	4	1	0
11/04/2008	257	178	57	41	79	16	0	1
11/07/2006	233	202	49	49	31	0	1	0
11/02/2004	202	232	44	55	-30	-11	0	0
11/05/2002	205	229	48	51	-24	-3	0	0
12/12/2000	212	221	50	50	-9	0	0	0
11/03/1998	211	223	45	55	-12	-10	0	0
11/05/1996	206	227	45	55	-21	-10	0	0
11/08/1994	204	230	48	52	-26	-4	1	1
11/03/1992	258	176	57	43	82	14	0	0
11/06/1990	267	167	56	44	100	12	0	0
11/08/1988	260	175	55	45	85	10	0	0
11/04/1986	258	177	55	45	81	10	0	0

Table A.3: Gubernatorial election summary

The table displays an overview of all gubernatorial elections between 1994 and 2014. It summarizes the number of elections in a certain state, number of firms with a geographic focus on a certain state, the number of changes in political power in a certain state, the average winning margin in a certain state, and the average disclosure day cumulative abnormal return for insider sales and purchase of firms with a geographic focus on a certain state. To gauge the geographic focus of a firm, I use the data provided by Smajlbegovic (2014). Smajlbegovic (2014) employs the methodology of Bernile et al. (2015) by counting the number of times a firm mentions various U.S. states in its 10-K annual reports. I classify a firm as being geographically focused on one specific state if this state is mentioned more than 50% of times in its 10-K annual report.

State	No Firms	No Election	No Change Power	Margin (%)	Purchase (VCAR5)	Sale (VCAR5)
Alabama	2,976	5	3	9.66	1.05	0.86
Alaska	883	5	2	15.28	1.20	0.21
Arizona	2,142	5	1	14.88	2.13	-0.48
Arkansas	1,368	5	1	18.50	0.85	0.027
California	79,918	6	2	13.10	2.12	-0.24
Colorado	3,976	5	3	15.42	0.71	-0.48
Connecticut	3,589	5	2	14.32	1.01	-0.87
Delaware	23,901	5	1	27.96	1.28	-0.073
Florida	10,297	5	2	6.66	1.77	-0.13
Georgia	7,316	5	3	9.04	1.29	-0.44
Hawaii	1,103	5	3	11.20	0.66	0.09
Idaho	199	5	2	19.28	-1.16	0.42
Illinois	6,623	5	2	10.22	1.59	-0.60
Indiana	5,622	5	2	9.59	0.84	-0.30
Iowa	1,598	5	2	9.66	0.23	0.10
Kansas	823	5	3	27.06	0.85	0.09
Kentucky	2,942	5	3	17.69	0.28	0.04
Louisiana	1,704	5	3	29.63	1.64	0.27
Maine	1,097	5	3	11.30	0.40	-0.20
Maryland	3,838	5	3	6.90	1.53	-0.38
Massachusetts	19,901	5	2	15.48	1.65	-0.32
Michigan	6,401	5	2	16.72	1.00	0.00
Minnesota	7,825	5	3	8.26	1.77	-0.10
Mississippi	1,028	5	2	11.48	0.21	0.25
Missouri	2,724	5	3	10.31	0.73	-0.34
Montana	631	5	2	20.25	0.47	0.02

Gubernatorial election summary continued

State	No Firms	No Election	No Change Power	Margin (%)	Purchase (VCAR5)	Sale (VCAR5)
Nebraska	582	5	1	38.86	-0.56	-1.01
Nevada	2,971	5	2	16.62	2.38	-0.06
New Hampshire	558	10	3	23.18	-0.28	0.69
New Jersey	6,930	5	3	10.38	0.76	-0.01
New Mexico	121	5	3	16.14	0.54	0.13
New York	30,453	5	3	21.50	1.31	-0.15
North Carolina	6,427	5	2	9.31	0.97	-0.35
North Dakota	15	5	1	33.20	4.35	
Ohio	9,274	5	3	19.58	1.02	-0.02
Oklahoma	1,715	5	3	17.64	1.08	-0.04
Oregon	4,941	5	3	11.02	1.87	-0.20
Pennsylvania	12,092	5	3	14.14	0.79	-0.10
Rhode Island	351	5	3	5.38	0.99	-1.05
South Carolina	2,105	5	4	6.18	0.50	-0.48
South Dakota	307	5	3	21.90	-1.06	-0.52
Tennessee	2,391	5	3	24.52	0.95	-0.19
Texas	19,031	5	1	16.88	1.56	0.08
Utah	2,128	6	0	35.35	1.29	0.36
Vermont	885	10	2	20.96	1.13	0.09
Virginia	7,227	5	5	8.79	0.79	-0.10
Washington	7,681	5	2	8.90	1.49	-0.47
West Virginia	0	6	3	14.90		
Wisconsin	4,472	6	2	13.50	0.84	-0.07
Wyoming	119	5	3	24.42	0.87	-0.69

Table A.4: Summary statistics investment

The table reports the sample mean, standard deviation, median, and the smallest and largest observation of main variables used in the investment analysis. The sample period starts in 1986 and ends in 2013. Insider trading data is taken from IFDF, accounting data from Compustat Quarterly Filings, market data from CRSP, and macroeconomic data from FRED database. See Appendix A.1 for a definition of all variables.

	N	Mean	Median	SD
CAPEX	447.544	1.558	0.851	2.204
Tobin' Q	447.544	2.363	1.489	2.818
Cash Flow	447.544	0.003	0.025	0.097
PCAAR5	74.190	0.013	0.006	0.080
SCAAR5	125.079	−0.002	−0.002	0.060

Chapter 3

The Presidential Puzzle revisited

3.1 Introduction

The impact of politics on the economy is an especially hot discussed topic before major elections.[1] One prominent question is: Which political party is better for the economy? Several studies present evidence that the U.S. economy and the stock market perform better under Democratic presidents compared to Republican presidents (e.g., Alesina et al. (1997); Santa-Clara and Valkanov (2003); Blinder and Watson (2016)). Santa-Clara and Valkanov (2003) document a large and significant excess market return difference between Democratic and Republican presidencies. When Democrats are in charge, value-weighted excess stock market returns are 9% higher, while equally-weighted excess stock market returns are 16% higher. The authors present evidence that this return difference is neither explainable by risk nor by fluctuations in the business cycle, and therefore constitutes a puzzle.[2]

[1]This Chapter is joint with Martin Lenz from the University of Mannheim. We are grateful for helpful comments and suggestions from Erik Theissen, Ernst Maug, and seminar participants at the University of Mannheim.

[2]Santa-Clara and Valkanov (2003) also find no evidence that the constitution of the Congress has any influence on the presidential puzzle result.

Santa-Clara and Valkanov (2003) conclude that this return difference is a result of unexpected shocks. We identify recessions as the shocks that drive the underperformance of the stock market under Republicans. We show that this return difference is a result of the uneven distribution of recessions between Democratic and Republican presidents. Once we control for recession months as defined by the National Bureau of Economic Research (NBER), the return difference between Republicans and Democrats is statistically insignificant and the economic magnitude of the presidential puzzle is reduced by almost 80%.

The recession analysis in this study is motivated by two facts: First, the phenomenon that the economy exhibits a stronger growth under Democratic compared to Republican presidencies is well known in the political economy literature. Several studies document that GDP growth is stronger under Democrats (e.g., Alesina et al. (1997); Faust and Irons (1999); Blinder and Watson (2016)). Second, empirical evidence supports the notion that stock markets exhibit two distinct return states, which are correlated with the business cycle (e.g., Hamilton and Lin (1996b); Whitelaw (2000); DeStefano (2004)). One state is correlated with expansions and shows low expected returns and low volatility and the other state is correlated with recessions and shows high expected returns and high volatility. We therefore specifically control for recessions in order to consider the different return states during recessions and expansions and to conduct a fair comparison of returns over different time periods.

We analyze U.S. stock market returns from 1927 to 2014 conditional on the political party of the U.S. president. We employ excess returns, which is either an inflation adjusted return or a return in excess of the risk-free rate, as the main measure to account for different monetary policies. The presidential puzzle documented by Santa-Clara and Valkanov (2003) is also present for our extended time period with an excess return differential of 11.16% p.a.

This difference is originated in the heavy underperformance of the stock market under Republicans. The excess returns under Republicans are insignificantly different from zero.

We start the study with a simple analysis of the distribution of recessions over different presidencies. A clear pattern emerges as Republican presidents witness three times more recession months compared to Democratic presidents (Figure 4.2). In a next step, we directly control for recessions within the baseline regression and find that the presidential puzzle and related return patterns documented by Santa-Clara and Valkanov (2003) disappear. The occurrence of recessions is the main driver of the underperformance of Republicans. After controlling for recessions, the excess return under Republican presidents is positive and statistically significant with 8.52% p.a. Moreover, conditional on the business cycle stage, the return difference between Democrats and Republicans is insignificant. Although, Republicans exhibit especially low returns during recessions. These findings indicate that the uneven distribution of recessions between Democratic and Republican presidencies is the main contributor to the presidential puzzle.

Hensel and Ziemba (1995) and Santa-Clara and Valkanov (2003) document that the presidential puzzle effect is especially pronounced for small stocks with a return differential of 22% p.a. for the smallest size decile. This finding also supports the idea that business cycle fluctuations are a main driver of the presidential puzzle as small stocks react especially sensitive to changes in the business cycle (Perez-Quiros and Timmermann (2000)). Therefore, we conduct a size analysis as well and also find especially large returns under Democratic presidents for small stocks during the time period until 1980. However, this effect vanishes and even reverses such that large stocks earn higher returns from 1981 to 2014. Again, after controlling for recessions, the return difference between Democrats and Republicans is insignificant and the economic magnitude is reduced by almost 50% for most of our size decile portfolios. The size anomaly related to the political environment also disappears after controlling for recessions.

We now turn to the question whether the return difference between Democrats and Republicans is expected by the market. We perform two sets of tests to investigate the source of the presidential puzzle in more detail and to check whether the findings of Santa-Clara and Valkanov (2003) are robust to alternative return prediction models. In a first set of tests, we investigate the source of the return difference between Democrats and Republicans by decomposing returns into expected returns and unexpected returns. Santa-Clara and Valkanov (2003) employ established macro variables related to the business cycle (see Chen et al. (1986); Fama and French (1988, 1989)) to model expected market returns and to decompose realized returns into expected and unexpected returns.[3] The results of their return decomposition suggest that return differences cannot be explained by different expected returns but are rather a result of different unexpected returns. We extend the analysis of Santa-Clara and Valkanov (2003) by applying the return decomposition framework outlined in Campbell (1991) to be able to further split up unexpected returns into cash-flow news and discount-rate news. We also document that the unexpected news component drives the presidential puzzle and that Republicans witness on average negative cash-flow news and positive discount-rate news, leading to lower realized returns. This finding supports the idea that recessions are the source of lower excess returns under Republican presidencies because recessions are also characterized by lower profitability and higher expected returns (DeStefano (2004)). Consequently, after controlling for recessions, the unexpected return difference between Democrats and Republicans turns insignificant.

[3] They use the dividend-price ratio, the default-spread, and the term-spread as well as the relative interest rate as their business cycle control variables.

Hence, our results indicate that recessions are the shock documented by Santa-Clara and Valkanov (2003), generating the presidential puzzle.

In a second set of tests, we investigate whether the return difference between Democrats and Republicans is really unexpected by the market. Recent studies (e.g., Dangl and Halling (2012); Henkel et al. (2011)) indicate that market return prediction models show an asymmetric performance as those models perform especially well during recessions in contrast to expansions. A possible solution is to introduce time-varying coefficients into the return prediction model. In our test, we allow the coefficients to vary in response to business cycle fluctuations and find that the return difference between Democrats and Republicans is largely expected by the market. Hence, the finding of Santa-Clara and Valkanov (2003) that the presidential puzzle seems to be unexpected by the market depends on the underlying return prediction model.

Eventually, we examine whether the political party is a robust predictor for future stock market returns. This question is directly related to the literature that investigates the link between the presidential party and the U.S. economy. We do not find evidence, supporting the view of Nordhaus (1975) that incumbent presidents engage in business cycle planning to increase their chance of reelection. We also do not find evidence in favor of Hibbs (1977) and Alesina (1987; 1988), who argue that left-wing governments follow a more expansionary economic policy, resulting in stronger economic growth to cater their electorate. In contrast, the results indicate that Republicans simply had bad luck during their presidencies. First, Republicans seized power following a Democratic president more frequently at the end of an economic expansion. We argue that the economic environment inherited by these Republican presidents, Nixon (1969) and G.W. Bush (2001), from their Democratic predecessors is exogenous to them, and therefore bad luck since the end of an expansion and the beginning of a recession empirically show the lowest excess returns. Second, Republicans witnessed more frequently recessions that were induced by exogenous shocks to the oil supply specifically the recessions of 1975, 1980, 1981, and 1991 (e.g., Nordhaus (2007); Hamilton (2011)). Finally, Republicans were also in power during the deepest global recessions in history: the Great Depression of 1929 and the Great Recession of 2007. The presidential puzzle effect is insignificant and reduced by almost 80% after controlling for these potential exogenous events. Furthermore, we show that controlling only for the beginning of the Nixon (1969) and G.W. Bush (2001) presidency and the Great Depression of 1929 and the Great Recession of 2007 is sufficient to reduce the economic magnitude of the presidential puzzle effect by almost 50%. We additionally perform a U.S. presidential puzzle analysis for international stock markets. We document a positive Democratic premium even for most of our international stock markets. This finding supports the view that there is a coincidental correlation of the global business cycle and the U.S. presidential cycle. Again, after controlling for our exogenous shocks, the Democratic premium is not present anymore.[4] All in all, the evidence of this study indicates that the presidential puzzle effect is driven by a few one-off events. Therefore, the political party is not a robust predictor for future stock market returns.

The contribution of this paper is twofold. First, to the best of our knowledge, there are no papers about the presidential puzzle that adequately control for overall market conditions[5] and identify recessions as the source of the presidential puzzle. We are able to link all return characteristics of the presidential puzzle anomaly to the occurrence of recessions. We thereby combine the literature on macroeconomic effects on the stock market (Chen

[4]Most of our exogenous shocks are also global shocks as identified by the International Monetary Fund. See Table 3.12.

[5]Santa-Clara and Valkanov (2003) try to control for business cycles variables but do not account for different return distributions under different economic cycles.

et al. (1986); Fama and French (1988, 1989); Hamilton and Lin (1996b); Perez-Quiros and Timmermann (2001)) and the presidential puzzle literature (Herbst and Slinkman (1984); Huang (1985); Hensel and Ziemba (1995); Santa-Clara and Valkanov (2003)).

Second, we add to the discussion about the source of the stronger economic performance under Democratic presidents (e.g., Nordhaus (1975); Alesina et al. (1997); Drazen (2000); Blinder and Watson (2016)) by presenting evidence in favor of the view that Republicans simply had bad luck during their presidencies, resulting in lower excess stock market returns. We show that only four one-off events drive the presidential puzzle effect. This finding is in line with the study of Blinder and Watson (2016), who show evidence that the stronger growth in GDP under Democratic presidents is also a result of adverse oil price, global growth shocks, and shocks to total factor productivity during Republican presidencies.

3.2 Literature review

This study contributes to the finance literature about return anomalies related to the political environment. Already in 1985, Huang (1985) documents higher stock market returns under presidencies of Democrats but with limited statistical significance in his dataset. Santa-Clara and Valkanov (2003) are the first who systematically examine the presidential puzzle. They try to find the origin of the return difference between Democrats and Republicans by testing two potential explanations. First, the authors check whether differences in risk drive the presidential puzzle. They use stock market volatility as a market risk measure and find that under Republicans the stock market was more risky, speaking against a political risk premium. Further, they check whether return differences are concentrated around election dates. Since uncertainty about the future presidency is resolved around election dates, returns should mainly differ at these points of time if there is a political risk premium. They find no evidence for a concentration of return differences before, during or directly after election dates. Even for the most contested presidential elections, they find no evidence for large return differences around the resolution of voting uncertainty. Second, Santa-Clara and Valkanov (2003) employ established macroeconomic variables related to the business cycle to analyze whether the return gap is expected by the market as a result of business cycle fluctuations. The author cannot confirm that the return gap is expected. Therefore, they conclude that yet unspecified unexpected shocks are the source of the presidential puzzle. Moreover, they perform several robustness checks such as bootstrap experiments to correct for small-sample inference problems and quantile regressions to control for outliers to ensure that their results are not spurious. The finding of the presidential puzzle is further confirmed by Herbst and Slinkman (1984), Hensel and Ziemba (1995), Siegel (1998), Chittenden et al. (1999), and Novy-Marx (2014).

The robust finding of an outperformance of stock markets under Democratic presidents compared to Republican presidents raises two questions. The first question is: What drives the presidential puzzle? Several studies unsuccessfully try to answer this question (e.g., Powell et al. (2007); Sy and Al Zaman (2011)). Powell et al. (2007) argue that the presidential puzzle is not present in the pre-1926 period, and therefore question the overall puzzle. However, before 1926 it was not possible to clearly distinguish the different ideologies of Democratic and Republican parties. Consequently, the post-1926 period is not comparable to the period before 1926. They additionally argue that the significant return difference under the different presidencies could be a spurious result due to the strong persistence of the Democratic dummy variable. However, this reasoning would not be an explanation for the economically large difference in returns, it would only reduce the statistical significance. Additionally, in regressions on the market factor, Santa-Clara and Valkanov

(2003) present results that show no high (and positive) auto-correlation in the error term. Sy and Al Zaman (2011) argue that the presidential puzzle effect is caused by higher risk of small stocks. However, they do not present theoretically convincing arguments why small stocks should be more risky under Democratic presidencies.

We employ two established facts to identify the driver of the presidential puzzle. First, a difference in the performance of the real economy under Democratic and Republican presidencies is also present and documented by multiple studies (e.g., Alesina et al. (1997); Faust and Irons (1999); Blinder and Watson (2016)). Second, the stock market exhibits two distinct return states that are correlated with the business cycle. One state is correlated with expansions and shows low expected returns and low volatility and the other state is correlated with recessions and shows high expected returns and high volatility. DeStefano (2004) documents that realized stock returns vary with the business cycle and are generally higher in expansions compared to recessions. Hamilton and Lin (1996b) show that stock returns are best characterized by two different return distributions where stock volatility is high in recessions and moderate in non-recession periods. Perez-Quiros and Timmermann (2001) propose a two-state model for the probability distribution and higher order moments of stock returns. Guidolin and Timmermann (2008) highlight the importance of accounting for regime switches when evaluating stock returns. Whitelaw (2000) uses a two-stage regime switching model and argues that the relation between stock returns and stock volatility should be modeled state-dependent.

The fact that GDP growth is stronger under Democratic presidents and the observation that expansions and recessions are characterized by distinct stock return distributions motivated us to examine the impact of business cycle fluctuations on market returns. We therefore specifically control for recessions in order to consider the different return states during recessions and expansions and to conduct a fair comparison of returns over different time periods.

The second question that naturally arises is whether political variables such as the presidential party can predict excess stock market returns. This question is directly related to the political economy literature that addresses the question whether the outperformance of the U.S. economy is a result of superior economic policy under Democratic presidents or pure luck. The first explanation rests on the assumption that political parties initiate business cycles. This notion is formalized within political business cycle models. Two kinds of political business cycle models are established in the political economy literature: partisan political business cycle models and opportunistic business cycle models.[6] Opportunistic political business cycles are first modeled by Nordhaus (1975), who argues that incumbent politicians induce a business cycle that coincides with the presidential cycle to increase the likelihood of reelection. Still, empirical support for the Nordhaus (1975) model is weak. Several studies do not document a clear pattern in GDP growth, inflation rate, and unemployment rate as predicted by the Nordhaus model (Alesina et al. (1992, 1997)).

Partisan political business cycle models are developed by Hibbs (1977) and Alesina (1987; 1988) and built on the presumption that political parties follow a specific economic doctrine. Left wing parties have a stronger focus on high economic growth compared to right wing parties, which are more concerned about keeping inflation under control. The fact that GDP growth is higher under Democrats compared to Republicans is documented by several studies (e.g., Alesina et al. (1997); Faust and Irons (1999); Blinder and Watson (2016)) and supports the partisan political business cycle models. Still, evidence in favor of political business cycles is mixed because other findings concerning differences in inflation rates

[6] A literature overview on political business cycle theory is provided by Drazen (2000) and Alesina et al. (1997).

between Democrats and Republicans do not back the predictions of the partisan political business cycle models (Drazen (2000)). Further evidence in the finance literature indicates that a significant difference in market returns is unlikely to be caused by different presidential parties. Bohl and Gottschalk (2006) look at 15 countries outside the U.S. and do not find evidence for such a partisan effect.

The second explanation forwarded by a recent empirical study of Blinder and Watson (2016) is that exogenous shocks such as oil price shocks, shocks to total factor productivity, and international growth shocks are the cause for the outperformance of the U.S. economy under Democratic presidents. Blinder and Watson (2016) argue that these shocks are unlikely a result of superior Democratic policies but most likely pure luck. We explore these two different explanations in the context of stock market returns and the occurrence of recessions to examine whether the political party of the president is a robust predictor for excess stock market returns.

3.3 Data

The sample period is from January 1927 to December 2014. This choice is motivated by the study of Santa-Clara and Valkanov (2003). We closely follow their setup in order to ensure comparability while we slightly extend the sample period including the years after 1998. Observations are at the monthly frequency. The dataset contains 1,055 monthly observations including 23 presidencies (over four years each). 11 out of these 23 presidential terms were Republican presidencies while the remaining 12 presidential periods were Democratic presidencies. Consistent with these 23 presidential terms, we have 23 election dates. During the 11 Republican presidencies, there were eight different presidents in charge while the Democrats had seven different presidents during their 12 presidential terms. In our robustness tests, we divide the sample period in two equal subsamples to check whether the results hold for both periods. The first subsample spans the period from 1950 to 1980 while the second subsample contains the period from 1981 to 2014. We exclude the years before 1950 to show that the presidential puzzle is not only a result of the Great Depression and the Second World War. Eight presidencies lie in the first sample whereas the second sample features nine presidencies. In our setup, the presidential term starts and ends with the election month. The results remain unchanged if we also use the same definition as Santa-Clara and Valkanov (2003), who use January 1st after the election as their start and end date of a presidential term.

We use the value-weighted and the equally-weighted CRSP index as proxies for the overall market return. We use returns from three-month treasury bills as our risk-free rate and the monthly inflation rate, both from CRSP. We further employ monthly return data from ten size decile portfolios directly from Kenneth French's homepage. In the statistical analyses, we look at excess index returns (over the risk-free rate) and real index returns (over the inflation rate). As further financial variables, we use the term-spread which we calculate as the difference between the yield to maturity of a 10-year treasury note and the three-month treasury bill, the default-spread which is equal to the difference between AAA- and BAA-rated bonds, the monthly return from three-month treasury bills, and the price-dividend ratio. While data for the term-spread and default-spread are from the FRED database, the price-dividend ratio is obtained directly from Robert J. Shiller from Yale University. We additionally use the cyclically adjusted price-earnings ratio (CAPE) provided by Robert J. Shiller from Yale University. Throughout the analysis, we use the logarithm of returns for all our financial variables and all financial variables are scaled by a factor 100.

As the measure of the business cycle condition, we use the U.S. recession indicator series provided by the National Bureau of Economic Research (NBER). Additionally, we also employ two recession probability measures and the year-on-year growth in quarterly GDP, which are provided by the FRED database.

Summary statistics can be found in Table 3.1. We observe an average excess market return of 6% p.a. Further, we document that recessions are rare events that we can only observe in 19% of the overall sample. In Table 3.2, we document returns conditional on the business cycle stage and confirm the findings of DeStefano (2004) that returns behave quite differently during expansions and recessions. Expansions show excess returns of 11.16% p.a. and recessions show excess returns of -16.32% p.a. We further subdivide expansions and recessions based on the length in months as illustrated in Figure 3.1. The heavy underperformance during recessions is concentrated during peaks and the first half of a contraction with -20.64% p.a. and -30% p.a., respectively. In unreported results we also confirm that the stock volatility is high in recessions but moderate in non-recession periods. These results are consistent with the idea of state-dependent return distributions as forwarded by Hamilton and Lin (1996b).

In Figure 3.2 and 3.3, we present frequencies of the different business cycle conditions for Democratic and Republican presidencies, separately. Figure 3.2 shows that out of the 196 recession months, 144 occurred during Republican presidencies while only 52 occurred when Democrats were in charge. The picture is complemented by Figure 3.3 revealing that out of 860 expansion months, only 358 fell in periods of Republican presidencies compared to 502 falling in periods of Democratic presidencies. These findings are confirmed in Table 3.3 where we show correlations between the variables of interest. It can be seen that for both recession measures, the correlation with the Democrat dummy is negative. One can further observe that GDP is higher during Democratic presidencies while the recession probability is lower when a Democratic president is in charge. These results are in line with the findings of Alesina et al. (1997), Faust and Irons (1999), and Blinder and Watson (2016) who document that quarterly GDP growth is higher during Democratic presidents. We describe the construction of all variables in detail in Table B.1 in the Appendix.

3.4 Results

In the first part of this section, we investigate the source of the presidential puzzle. The second part is concerned with the question whether the political party of the president is a robust predictor for excess stock market returns.

3.4.1 What is the source of the presidential puzzle?

In this subsection, we show that economic downturns are the main contributor to the presidential puzzle. As depicted in Figure 3.2, there exists an uneven distribution of recessions between Democratic presidents and Republican presidents.

We employ the following regression design for most of our analyses in this subsection:

$$r_{t+1} = \alpha + \pi_t + \rho_{t+1} + u_{t+1}, \tag{3.1}$$

where r_{t+1} is the excess return which is defined as the value-weighted (equally-weighted) CRSP return in excess of either the risk-free rate measured by returns of T-bills with a three-month maturity or the one-month inflation rate. π_t is a political dummy variable which takes the value of one for Democratic presidencies and zero for Republican presidencies. A presidential term starts and ends always with the election month. A change in this convention to year end dates, as applied by Santa-Clara and Valkanov (2003), does not alter the results. $\rho_{t+1}$is a dummy variable which equals one for a recession month and zero otherwise. The start and end date of a recession are hard to predict. Therefore, recessions constitute an unexpected shock for the average investor. First of all there exists no clear definition of a recession. For example the National Bureau of Economic Research (NBER) defines a recession in very broad terms as "a significant decline in economic activity spread across the economy, lasting more than a few months"[7]. Second, NBER only provides exact business cycle turning point dates several months after the recession already occurred. Finally, there exist multiple recession prediction models which in general deliver noisy results (Filardo (1999); Stock and W Watson (2003)). In conclusion, recessions are hard to predict events for professional forecasters and economists. Therefore, the dummy recession variable ρ_{t+1} is contemporaneous with the excess return variable because it captures the unexpected shock in form of a recession. For all regressions, we employ Newey and West (1987a) standard errors to control for serial correlation and heteroscedasticity in standard errors.

The results presented in Table 3.4 Panel A confirm that excess market returns are higher during Democratic presidencies. The return differential ranges from 6.48% p.a. to 16.44% p.a. depending on the time period and the excess return measure. The return differential is especially pronounced for the equally-weighted excess returns because small stocks earn larger excess returns. Further, Republican presidents witness on average a 0% excess return. Hence, the heavy underperformance of the stock market during Republican presidencies is the main contributor to the presidential puzzle. These findings are in line with the results documented in Santa-Clara and Valkanov (2003) and affirm that the presidential puzzle still exists.

In Panel B, we include a recession dummy that equals one during a recession period

[7]Website of NBER: https://www.nber.org/cycles/cyclesmain.html.

and zero otherwise. After including this control the excess return difference between Democrats and Republicans is statistically insignificant. The return gap between Democrats and Republicans also decreases substantially in economic terms by almost 50%, resulting in a statistically insignificant return difference of 6% p.a. After including the recession control, Republicans also show a statistically significant excess return of 8.52% p.a. A return difference of 10.08% at the 10% significance level is only present for the excess return measure with equally-weighted CRSP returns over the risk-free rate. This difference is driven by two factors: first, small stocks show especially strong performance under Democrats. This finding is also documented by Santa-Clara and Valkanov (2003). Second, the risk-free rate is especially low during Democratic presidencies. Therefore, after employing the inflation rate instead of the risk free rate to construct excess market returns, the return difference is insignificant for the value-weighted and equally-weighted CRSP market return with 3.27% p.a. and 7.31% p.a., as inflation is higher under Democrats compared to Republicans. In conclusion, the return difference is explained by the occurrence of recessions because the presidential puzzle is not robust to the inclusion of recession controls.

We established that recessions are the source of the presidential puzzle. Now, we examine the stock market performance under Democrats and Republicans conditional on the current state of the business cycle. Table 3.5 presents the results for different time periods and different excess return measures. We find an insignificant return difference between Democrats and Republicans conditional on the business cycle stage. Hence, the presidential puzzle does not exist within expansions (recessions). The stock market performs almost equally well under Democrats and Republicans during expansions (recessions). This finding is in line with the idea that the uneven distribution of recessions between Democrats and Republicans is the main driver of the excess return differential.

The equally-weighted excess returns are especially large for Democrats compared to Republicans. Santa-Clara and Valkanov (2003) show that small firms do especially well under Democrats compared to Republicans. This finding is also in line with the idea that recessions are the origin of the presidential puzzle because small firms react very sensitively towards economic downturns (Perez-Quiros and Timmermann (2000); Vassalou and Xing (2004); Zakamulin (2013)). Therefore, we examine the excess return difference between Democrats and Republicans for size deciles and control for recessions.

Table 3.6 summarizes the findings of the size decile analysis. We compute the excess return differential between Democrats and Republicans for all size deciles. Again, we do this analysis for different time periods and we do this analysis with and without a control for recessions. The presidential puzzle is not present after controlling for recessions for almost all size deciles except for decile one and two. This pattern is especially pronounced during the beginning of the sample period. After 1980, this effect is not present anymore. Further, after 1980 the presidential puzzle effect is more pronounced for large stocks compared to small stocks. This finding also contradicts the assumption of Sy and Al Zaman (2011) that small stocks are more risky under Democrats, and therefore drive the presidential puzzle. The economic magnitude of the return difference between Democrats and Republicans decreases sharply after controlling for recessions. For most size deciles there is almost a 50% reduction in the return difference between Democrats and Republicans. We also repeat this analysis with a different excess return measure by using the inflation rate to construct excess size decile returns. In line with the finding in Table 3.4, the return difference is even smaller after adjusting for inflation. A significant return difference is only present for the smallest size decile during the time period of 1950 to 1980. In conclusion, the uneven distribution of recessions also explains the presidential puzzle in the cross-section of size-sorted portfolios returns.

All in all, we show that the return difference between Democratic and Republican presidents is statistically insignificant after controlling for recessions. The economic magnitude also decreases drastically if one takes recessions into account. The return differential of 11.16% p.a. between Democratic presidents and Republican presidents decrease by almost 50% to 6% p.a. The occurrence of recessions also explains the presidential size effect, that small stocks seem to outperform large stocks during Democratic presidencies.

3.4.2 Unexpected returns and the business cycle

Santa-Clara and Valkanov (2003) show that the return difference between Democrats and Republicans is largely unexpected by the market. Therefore, they argue that unexpected shocks are the source of the presidential puzzle. The goal of this subsection is to relate the unexpected shock documented by Santa-Clara and Valkanov (2003) to the occurrence of recessions. Further, we investigate whether the finding of Santa-Clara and Valkanov (2003) is robust to alternative return prediction models.

In a first simple test we investigate which stage of a recession drives the finding. We therefore employ the categorization of business cycle stages following the procedure of DeStefano (2004). The beginning of a recession is especially hard to predict. Therefore, these time periods more closely constitute an unexpected shock, which is the source of the presidential puzzle as argued by Santa-Clara and Valkanov (2003). As depicted in Figure 3.2, Republicans witness peaks and the first half of a recession more frequently than Democrats. Those parts of the business cycle are also related to the lowest excess returns (see Table 3.2). In Table 3.7, we control only for the beginning of a recession. Now, ρ_{t+1} equals one for the peak and the first half of a recession and zero otherwise. The results of Table 3.4 still hold. The return gap between Democrats and Republicans, as depicted by the $Democrat$ dummy, is statistically insignificant and the economic magnitude of the return gap decreases sharply. This finding is robust to changes in the excess return measure and for different time periods. So, the beginning of the recession is the main driver of the return difference between Democrats and Republicans. This result is a first indication that recessions are the unexpected shock identified by Santa-Clara and Valkanov (2003) as the course of the presidential puzzle.

Return decomposition framework following Campbell (1991)

Santa-Clara and Valkanov (2003) employ state variables such as price-dividend ratio, term-spread, and default-spread to model expected market excess returns and show that the outperformance of the stock market under Democratic presidents is unexpected. Now, we further analyze the unexpected return difference by employing a return decomposition in the spirit of Campbell (1991) to separate discount-rate news and cash-flow news. In a second step we examine whether the recession indicator can account for this unexpected return difference. We find that the unexpected return difference is indeed explained by the occurrence of recessions.

Campbell (1991) extends the log-linear present-value relation developed by Campbell and Shiller (1988) to disaggregate realized returns into three components: expected return, cash flow news, and discount rate news.

$$r_{t+1} - E_t r_{t+1} = (E_{t+1} - E_t) \sum_{j=0}^{\infty} \rho^j \triangle d_{t+1+j} - (E_{t+1} - E_t) \sum_{j=1}^{\infty} \rho^j r_{t+1+j} \tag{3.2}$$

$$= N_{CF,t+1} - N_{DR,t+1} \tag{3.3}$$

$N_{CF,t+1}$ is news about future cash flows (dividends) and $N_{DR,t+1}$ is news about future discount rates (expected return innovations). As this relation is derived from a present-value relation, which is a simple accounting identity, an increase in future cash flows leads to higher returns today and a decrease in future expected returns leads to higher returns today. We employ the vector auto regression (VAR) approach outlined in Campbell (1991) to estimate the three components: $E_t r_{t+1}$(expected return), $N_{CF,t+1}$(cash-flow news), and $N_{DR,t+1}$(discount-rate news). We only have to estimate the expected returns and discount-rate news to be able to back out the cash-flow rate news, applying Formula 3.2. We assume that the data is generated by a first-order VAR-model of the following form:

$$z_{t+1} = a + \Gamma z_t + u_{t+1} \tag{3.4}$$

where z_{t+1} is a m-by-1 state vector with r_{t+1} as its first element, a and Γ are a m-by-1 vector and a m-by-m matrix of constant parameters, and u_{t+1} is a 1-by-m vector of i.i.d. shocks. $N_{DR,t+1}$ and $N_{CF,t+1}$ are linear functions of the t+1 shock vector, assuming Formula 3.3 constitutes the return generating process:

$$N_{CF,t+1} = (e1' + e1'\lambda)\, u_{t+1} \tag{3.5}$$

$$N_{DR,t+1} = e1'\lambda u_{t+1} \tag{3.6}$$

where $\lambda \equiv \rho\Gamma\,(I - \rho\Gamma)^{-1}$, which maps the VAR shocks to news. The long-run significance of each VAR shock to discount-rate expectations is captured by $e1'\lambda$. The weight of variables in the discount-rate news formula is increasing in absolute size of the coefficients of the variable in the return prediction equation. Further, more persistent variables also receive a larger weight, which is captured by$(I - \rho\Gamma)^{-1}$. Following Campbell and Vuolteenaho (2004), we set $\rho = 0.95$, which corresponds to an average dividend-price or consumption-wealth ratio of 5.2%.

We use five state variables to estimate the VAR model: excess log returns on the market, term-spread, default-spread, monthly return of a three-month Treasury bill, and price-dividend ratio. These variables are established in the return prediction literature (see Chen et al. (1986), Fama and French (1988) and Fama and French (1989)). Summary statistics and correlations are presented in Panel A and C of Table 3.8.[8] Panel B of Table 3.8 presents the results of the VAR regression. In line with prior findings, the coefficients of the term-spread, default-spread, and excess market return show a positive and the T-bill return and price-dividend ratio a negative sign in the return prediction regression.

Panel D summarizes the findings for the return decomposition. There is no significant difference in expected returns between Democrats and Republicans. Further, in line with the findings of Santa-Clara and Valkanov (2003) Republicans show lower unexpected returns. The stock market experiences lower cash-flow news and higher discount-rate news under Republican presidencies, leading to lower unexpected realized returns. This pattern is also in accordance with the idea that the occurrence of recessions is the driver of the return difference. Recessions are characterized by decreasing profitability and high expected returns. We include a recession dummy in Panel E. The return difference in unexpected returns between Republicans and Democrats is insignificant after including a recession control. There is no significant difference in cash-flow news and discount-rate news. In summary, recessions are the source of the unexpected return difference between Democrats and Republicans and constitute the unexpected shock named as the source of the presidential puzzle by Santa-Clara and Valkanov (2003).

[8]Table B.2 employs the price-earnings ratio instead of the price-dividend ratio as a robustness check. The results remain unchanged.

Expected returns and time-varying coefficients

In this subsection, we examine whether the lower returns under Republicans are really unexpected as claimed by Santa-Clara and Valkanov (2003). Recent studies (e.g. Henkel et al. (2011); Dangl and Halling (2012)) conclude that coefficients in a return prediction regression should be time-varying because prediction models perform especially badly during expansions. Therefore, we allow the coefficients of the return prediction model to vary with the business cycle. Because the recession definitions by NBER are only available after a recession occurred, we employ three different measures which use data available at the time of the return prediction. The first two measures are based on recession prediction models, which estimate the probability of being in a recession. The first model of Chauvet (1998) is a dynamic-factor Markov-switching model, which uses macroeconomic data such as industrial production, non-farm payroll, real personal income excluding transfer payments, and real manufacturing and trade sales to estimate the recession probability. The second model of Chauvet and Potter (2005) employs the history of quarterly GDP growth figures to derive a recession probability. Both models have the drawback that the researchers use historic recession data to calibrate the models, which introduces a look ahead bias. Therefore, we employ as a third measure a simple dummy variable which equals one if the last quarter showed a negative quarterly GDP growth and zero otherwise. We run the following regression:

$$r_{t+1} = \alpha + \beta X_t + \delta D_t + \gamma X_t * D_t + u_{t+1} \tag{3.7}$$

where X_t is a vector of state variables. Following the literature on return predictability, we use the price-earnings ratio (price-dividend ratio), term-spread, default-spread, and monthly returns on a three-month T-bill as state variables. D_t is one of the three measures for the state of the economy. The interaction term captures the time-variation in coefficients of the state variables. We run this regression and employ the estimated coefficients to model expected returns:

$$E_t(r_{t+1}) = a + bX_t + cD_t + dX_t * D_t \tag{3.8}$$

In a second step we calculate the unexpected return as the difference of the realized return and the derived expected return. Finally, we test whether the presidential puzzle is still present for the unexpected return component as in Santa-Clara and Valkanov (2003).

Panel A of Table 3.9 summarizes the results of the return prediction regression. In line with prior research, the coefficients on the state variables show the expected signs. Further, for most of the regression specifications, only the coefficients of the interaction terms are statistically significant, which also support the finding that return prediction regressions perform poorly during economic expansions.

Panel B compares the expected and unexpected returns during Democratic and Republican presidencies. The return difference between Democrats and Republicans is largely explained by the expected return part. The predicted return difference in relation to the unexpected return difference is especially large for the return prediction models employing the recession probabilities. 42% and 62% of the overall return difference between Democrats and Republicans is expected for return prediction models employing recession probabilities based on macroeconomic data and based on GDP realizations, respectively. Whereas the unexpected return difference is statistically insignificant. For the third model using a dummy variable, which is one if GDP growth was negative in the last quarter and zero otherwise, only 18% of the return difference is expected. Still, the unexpected return difference for this very simple prediction model is insignificant in contrast to the expected return difference, which is significant at the 5% level. Hence, from the point of view of an investor who employs the outlined prediction models the return difference between Democrats and Republicans is not surprising but a function of the macroeconomic environment.[9] In contrast to the claim of Santa-Clara and Valkanov (2003), the market is not necessarily systematically positively surprised by Democratic policies.

In conclusion, we are able to link the unexpected return shock documented by Santa-Clara and Valkanov (2003) to recessions and show that the return difference is not necessarily unexpected if one considers alternative return prediction models with time-varying coefficients as advocated by recent studies (Henkel et al. (2011); Dangl and Halling (2012)).

3.4.3 Is the presidential party a robust predictor for excess stock market returns?

In the previous section, we show that the uneven distribution of recessions is a main driver of the presidential puzzle. Now, we address the question whether in light of this finding the presidential party is a robust predictor for excess stock market returns. This question is directly related to studies examining the link between the presidential party and the macroeconomic performance (e.g., Blinder and Watson (2016)).

The presidential cycle and business cycle

In this subsection, we examine whether business cycles are result of opportunistic political business cycle planning as proclaimed by Nordhaus (1975). In line with his claim a second return anomaly related to the U.S. presidency is documented in the finance litera-

[9] Table B.3 employs the price-earnings ratio instead of the price-dividend ratio as a robustness check. The results remain unchanged.

ture. The realized returns during the first two years of a presidential term are lower than during the last two years of a presidential term. This anomaly is called the presidential cycle (see Allvine and O'Neill (1980); Huang (1985)). Nordhaus (1975) also documents a presidential cycle effect for unemployment data during the time period of 1947 to 1972. He motivates his opportunistic political business cycle model with this finding. He dubs the first Nixon administration a textbook example for political business cycle planning because Nixon witness a recession at the start of his presidency and an expansion at the end of his first presidential term. Following the argument of Nordhaus (1975), the presidential cycle anomaly is a result of political business cycle planning by the incumbent to increase the probability of re-election.

We show that the presidential cycle anomaly is related to the uneven distribution of recessions over a presidential term. As depicted in Figure 3.4, recessions occurred especially often during the second year of a presidential term. This pattern is especially pronounced during the time period until 1980. To investigate the link between the presidential cycle anomaly and recessions, we conduct the following analysis:

$$r_t = a + \pi_t + \rho_t + u_t \tag{3.9}$$

where the political dummy variable π_t takes the value of one for the first two years of a presidential term and zero for the last two years of a presidential term and ρ_t is a dummy variable which equals one for a recession month and zero otherwise. We employ Newey and West (1987a) standard errors to control for serial correlation and heteroscedasticity in standard errors.

Table 3.10 summarizes the results for different time periods and different excess return measures. Panel A documents that the realized excess returns are lower during the first two years of a presidential term. This result is robust for different excess return measures and is especially pronounced between 1950 and 1980. Panel B includes a recession dummy. The return difference decreases for all specifications and only stays significant for the time period from 1950 to 1980. Hence, this anomaly is only present during a short time period. For all other sample periods the presidential cycle effect vanishes after controlling for recessions and is reduced by almost 40% for the overall sample period. So, the uneven distribution of recessions over different presidencies is a contributor to two anomalies: the presidential puzzle and the presidential cycle anomaly.

In conclusion, the presidential cycle anomaly is only present during a short time period. This result does not support the claim of Nordhaus (1975) that incumbents in general engage in business cycle planning to increase their probability of re-election.

Bad luck

In this subsection, we test whether Republicans had bad luck during their presidencies, resulting in lower excess returns. The first possibility is that Republicans were elected at the wrong time. Therefore, we have a closer look at elections, resulting in a change in power either from Democrats to Republicans or vice versa. We examine only changes in power because the newly elected president is not responsible for politics of his predecessor, and therefore the economic condition at the time of his election are exogenous to him. In a first step, we test whether Republicans were more often elected at the end of an expansion compared to Democrats. Empirically, the business cycle stages related to the lowest excess returns are the peak and the first half of a recession (Table 3.2). We use again the prior definition to identify different business cycle stages. Only Republican presidents had bad luck when taking over the presidency. In total, only two presidents were elected at the end of an expansion: Nixon (1969) and G. W. Bush (2001). These two expansions are also the longest in the U.S. history after 1928 (see Table 3.12). As a result, both presidents witnessed recessions at the beginning of their presidencies. Furthermore, Democrats were more lucky because they were three times elected at the end of a recession. These times are related to the largest excess returns. As a further analysis, we employ industrial production as a coincident indicator of macroeconomic performance to test whether Republicans were indeed elected on average during the end of an expansion. We look at the magnitude of growth and at the change in growth of industrial production during the election year. The terminal stage of an expansion is in general marked by high growth rates and negative changes in growth rates (DeStefano (2004)). Figure 3.6 summarizes the results and confirms the previous finding that Republicans were more often elected at the end of an expansion. Growth rates are higher during the election year of Republicans and the changes in growth are negative, indicating a slowdown in growth.

To gauge the impact of this election effect on the presidential puzzle anomaly, we look at excess returns only during the first term of a president and control for the Nixon and Bush presidency. The results are presented in Table 3.11. We can confirm that the presidential puzzle effect is also present considering only the first term of each presidency. In Specification 2 to 5, we control for the Nixon and Bush presidency and for the recessions occurring during their presidencies. Again, the presidential puzzle effect vanishes. The first two years of the Nixon and Bush presidency are characterized by especially low excess returns. This finding is in line with the finding that the end of an expansion and the beginning of a recession show the lowest excess returns. Moreover, in Specification 5 we only control for the specific recession event during the Nixon and Bush presidency and the presidential puzzle effect decreases sharply. We also employ alternative excess return measures. The results are presented in Table B.4 in the Appendix. Again the results are robust to different return measures.

After we presented evidence that the presidential puzzle effect, at least during the first term of a presidency, is related to bad luck of Republicans, we have a closer look at the second term of all presidencies. Now, the economic environment inherited during the second term is more likely a result of the policy choices of the president and his administration. However, exogenous shocks might still be a valid explanation for differences in economic performance between Democrats and Republicans during the second term of presidency. We therefore analyze the causes of all recessions in our sample. In the literature, two potential exogenous causes for recessions are named: oil price shocks and global shocks (e.g., Nordhaus (2007); Hamilton (2011); Blinder and Watson (2016)). We categorize recessions based on these explanations into three categories: oil price induced recessions, global recessions as defined by the IMF, and potential political recessions.[10] Table 3.12 provides an overview of all recessions naming its cause and categorization. Overall, only 6 out of 14 recessions fall into the first two categories. Republican presidents witnessed five of these six potentially exogenous recessions. There are four recessions related to oil shocks. These oil shocks are rooted in international conflicts such as the Yom Kippur War, Iranian Revolution, Iran–Iraq War, and the Iraqi invasion of Kuwait. These conflicts resulted in a decrease in output. The IMF names four global recessions since 1960: the recession of 1975, 1982, 1991, and the Great Recession of 2008 because these events had a significant negative effect on global GDP growth. We also include the Great Depression of 1929 as a global recession. As expected there is a large overlap between oil shock related recessions and global recessions because oil is the most important source of energy. Disruptions in the supply of oil will therefore affect all developed oil dependent nations.

Table 3.13 summarizes the results of the exogenous shock analysis. We include a dummy

[10] Bordo and Haubrich (2017) provide a good overview of all U.S. recessions and potential causes.

for oil price shocks, for the Great Depression, and for the Great Recession. Again, we can confirm that the presidential puzzle effect is also present considering only the second term of a presidency. After controlling for these six potential exogenous recessions, the presidential puzzle effect disappears completely. The Great Depression of 1929 and the Great Recession of 2008 are the main drivers of the presidential puzzle effect considering only the second term of a presidency. The results are also robust to different excess return measures. The results of the robustness test are summarized in Table B.5 in the Appendix.

We also conduct an analysis for the full sample to see the effect on the overall presidential puzzle effect. These results are summarized in Table 3.14. We control for the beginning of the presidency of Nixon and G. W. Bush and for our exogenous shocks. The presidential puzzle effect is also not present after controlling for these events. The economic magnitude of the effect is reduced by 77%. Hence, only a small number of rare events is driving the presidential puzzle effect. Moreover, in Specification 5 we only control for the first year of the Nixon and G. W. Bush presidency and for the occurrence of the Great Depression and Great Recession. The presidential puzzle effect is not present anymore even if we only consider these four events. The economic magnitude is reduced by 50%. These results are also robust to different excess return measures as summarized in Table B.6.

All in all, the evidence presented in this subsection is in line with the notion that Republicans had bad luck during their presidencies. They were elected at the end of long expansionary periods and they witnessed the harshest global recessions during the last 100 years. These results are also in line with the findings of a recent study of Blinder and Watson (2016), who document that the stronger GDP growth under Democrats is most likely a result of oil price shocks and international growth shocks.

The Presidential Puzzle and international markets

In the last subsection, we presented evidence in line with the idea that the presidential puzzle is a result of bad luck for Republicans. Now, we investigate whether there is a relation between the political party in charge in the U.S. and international stock market performance. If the presidential puzzle effect in the U.S. is a result of bad luck due to a coincidental correlation of the global business cycle and presidential cycle as argued in the last subsection, one would expect a correlation between the political party in charge in the U.S. and the stock market of countries outside of the direct control of the U.S. president. To examine the relation between the U.S. presidential party and international stock market returns, we modify the analysis of Bohl and Gottschalk (2006). Bohl and Gottschalk (2006) conduct an excess return analysis in spirit of Santa-Clara and Valkanov (2003) for 14 international markets outside the U.S. They do not find a significant market return differences related to the political party in charge outside the U.S. This evidence contradicts the partisan political business cycle forwarded by Alesina (1987) that left wing governments witness stronger economic growth compared to right wing governments.

In this analysis of international financial markets, we rely on Bohl and Gottschalk (2006) who employ 14 democratic countries outside the U.S. For each country, we calculate excess stock market returns, the return of the local market index from Datastream minus the yield of a 3-month treasury bill (whenever necessary, we sometimes have to use 6-month treasuries).

Table 3.15 shows results of regressions that test for a U.S. political party effect in stock markets outside the U.S. In comparison to the study of Bohl and Gottschalk (2006), we find positive and significant excess returns during Democratic presidencies for 9 out of the 14 countries in their study, whereas for 13 countries we document a positive premium during

Democratic presidencies.[11] In summary, the U.S. presidential puzzle effect is also present in many international stock markets, even in countries without a domestic presidential puzzle effect (Bohl and Gottschalk (2006)). This result suggests that Democrats experience a more favorable global macroeconomic environment, and therefore the stock market performed better under Democrats than under Republicans. Still, we cannot fully rule out the possibility that the political parties directly influence the macroeconomic environment. However, the results speak against it.

3.5 Conclusion

We link the presidential puzzle and all related return characteristics documented by Santa-Clara and Valkanov (2003) directly to the occurrence of recessions. After controlling for recessions, we find no significant return differences related to presidential parties. These results suggest that Republican presidents witnessed a considerably higher number of recessions depressing overall stock market returns and leading to lower realized returns compared to Democratic presidencies. Consequently, these results suggest that the significant return difference can be attributed to the distribution of recessions that simply occur more often when Republicans are in charge.

Santa-Clara and Valkanov (2003) already admit that it is unlikely that the political parties can affect the stock market directly with their policies without influencing the state of the economy. In line with this argument, we show that the unexpected returns, which drive the presidential puzzle are originated in the occurrence of recessions. Further, we document that the return difference between Democrats and Republicans is largely ex-

[11]In unreported tests, we extend the sample to 34 countries and document for 21 out of 34 countries a positive return premium during Democratic presidencies.

pected after augmenting the excess market return prediction model with time-varying coefficients, which vary with respect to the economic environment. We therefore suppose that the macroeconomic environment is the decisive factor in explaining the presidential puzzle.

We also examining the link between the occurrence of recession and the political party in charge. We find evidence in favor of the view that Republicans had bad luck during their presidencies. We identify four potential exogenous events, which drive the presidential puzzle. These results do not support the claim of Nordhaus (1975) and Alesina (1987) that business cycles are a result of political planning. The finding of this study is in line with a recent study of Blinder and Watson (2016), who document that the favorable economic environment during Democratic presidents is largely due to external factors out of the control of the U.S. president, supporting the idea that differences in economic growth between Democrats and Republicans are exogenous. Still, accounting for potential endogeneity problems deserves further research to shed more light on the link between politics and the economy in general.

3.6 Figures

Figure 3.1: Business cycle stages

Figure 3.1 displays the different business cycle stages. Expansion 1 (Contraction 1) is the first half of an expansion (recession) and Expansion 2 (Contraction 2) is the second half of an expansion (recession).

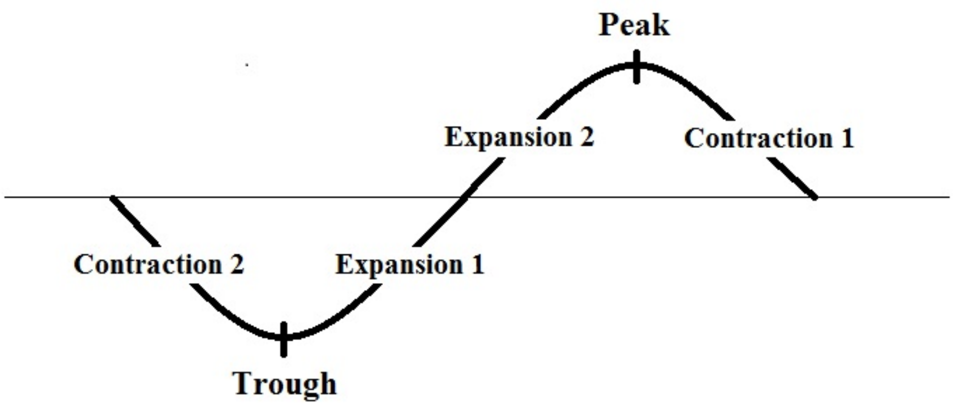


Figure 3.2: U.S. Presidents and recessions

Figure 3.2 displays the frequency of recessions and different stages of a recession such as the peak, the first half of the recession (Contraction 1), and the second half of the recession (Contraction 2) for Democratic and Republican presidents from 1927 to 2014.

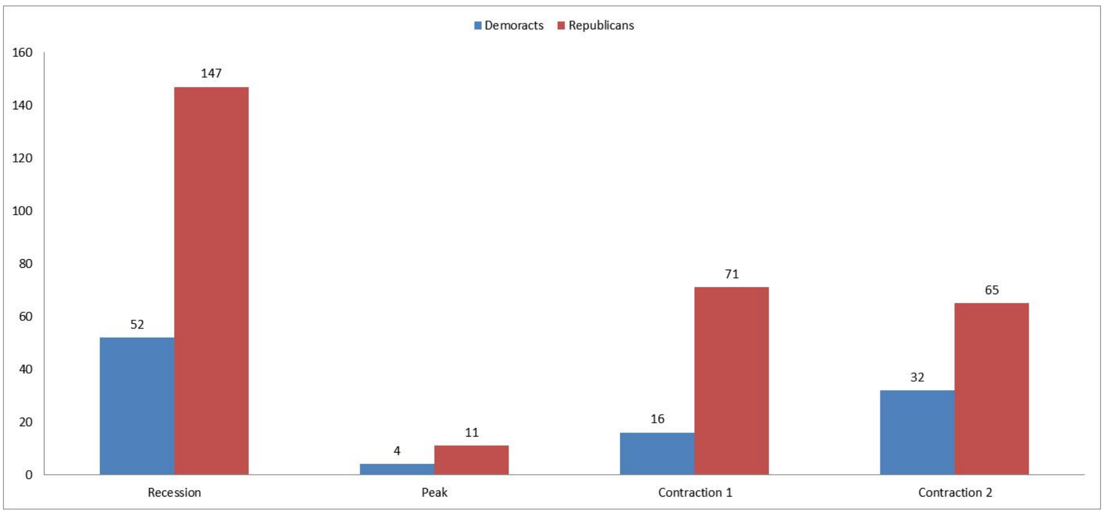


Figure 3.3: U.S. Presidents and expansions

Figure 3.3 displays the frequency of expansions and different stages of an expansion such as the through, the first half of the expansion (Expansion 1), and the second half of the expansion (Expansion 2) for Democratic and Republican presidents from 1927 to 2014.

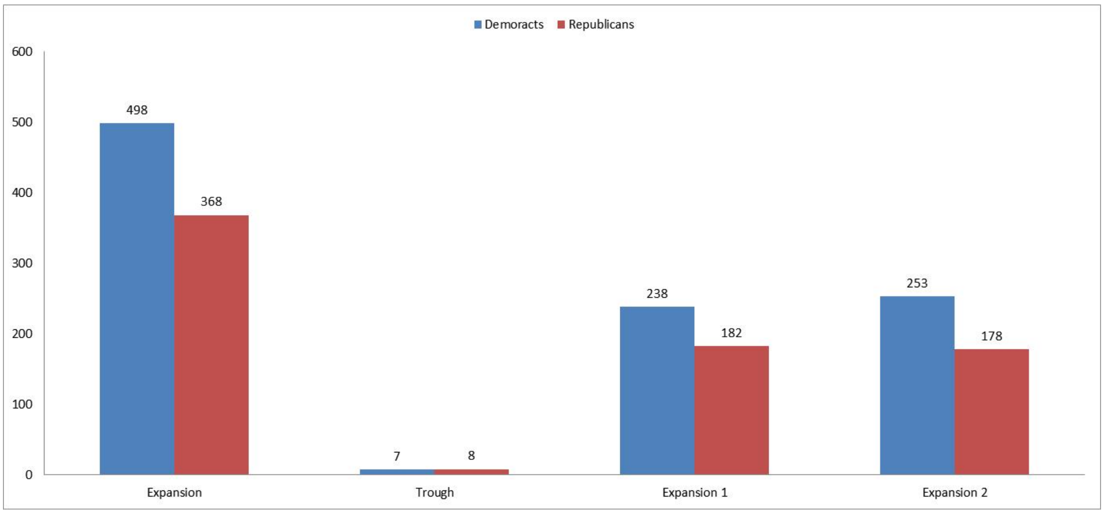


Figure 3.4: Presidential term and recessions

Figure 3.4 displays the frequency of recessions and different stages of a recession such as the peak, first half of the recession (Contraction 1), and the second half of the recession (Contraction 2) for the first half and second half of a presidential term from 1927 to 2014.

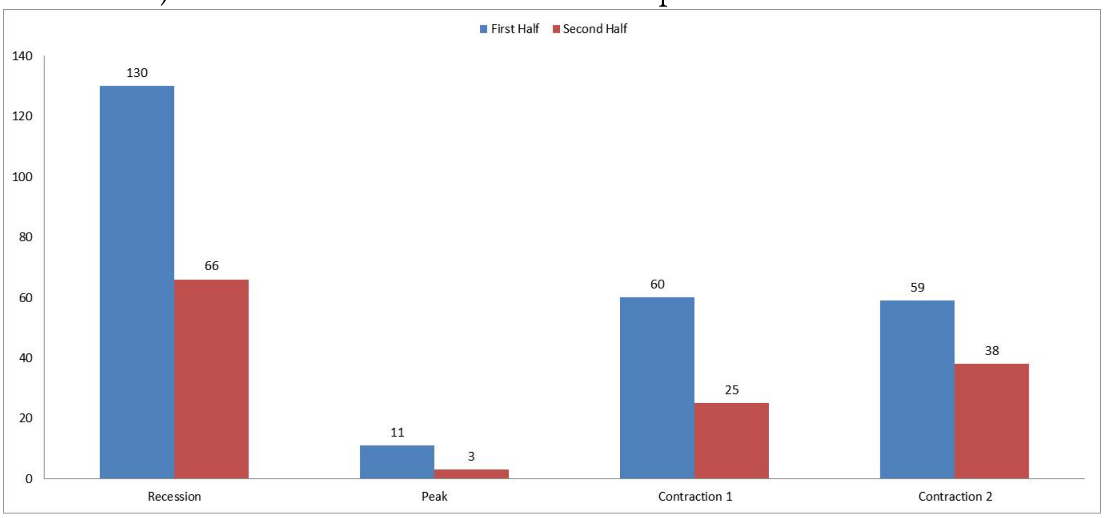


Figure 3.5: Presidential term and expansions

Figure 3.5 displays the frequency of expansions and different stages of an expansion such as the through, the first half of the expansion (Expansion 1), and the second half of the expansion (Expansion 2) for the first half and second half of a presidential term from 1927 to 2014.

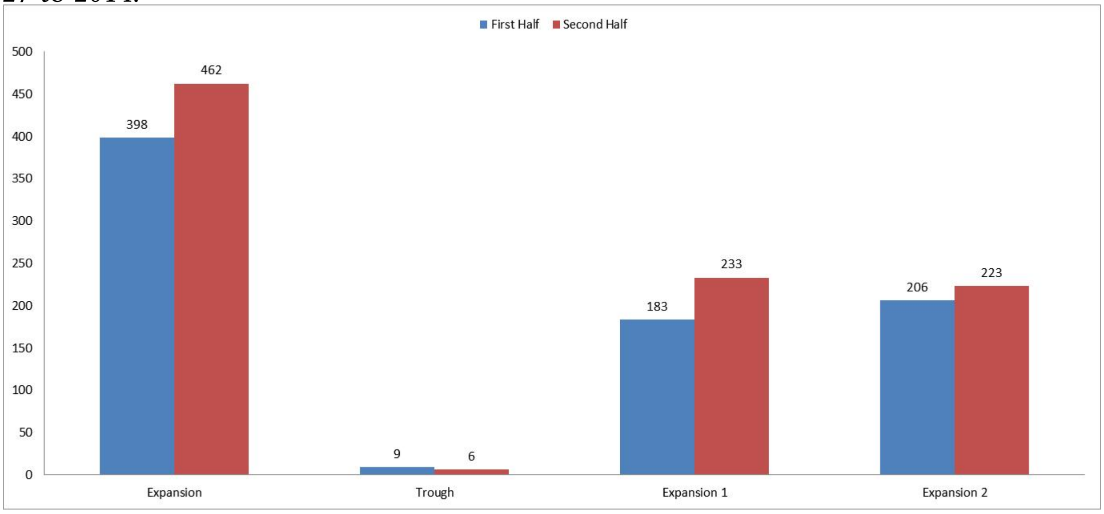
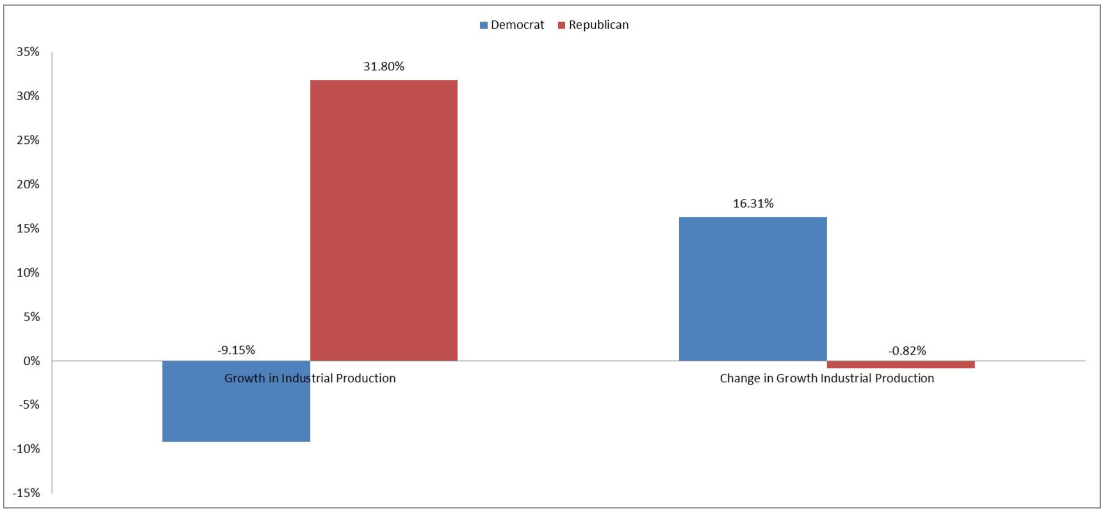


Figure 3.6: Election years and industrial production

Figure 3.6 displays the growth in industrial production and the change in growth in industrial production during the year before a presidential election, which resulted in a change in power conditional on the winning party.



3.7 Tables

Table 3.1: Summary statistics

The table reports the number of observations, sample mean, sample median, standard deviation, smallest observation, and largest observation of main variables used in this study. See Appendix B.1 for a definition of all variables.

	N	Mean	Median	SD	Min	Max
VW-TBL	1,056	0.50	1.01	5.42	-34.43	32.82
EW-TBL	1,056	0.72	1.14	7.05	-37.54	51.01
VW-INFL	1,056	0.53	1.10	5.43	-33.83	33.23
EW-INFL	1,056	0.76	1.21	7.05	-36.84	51.78
Dec1-TBL	1,056	0.72	0.82	9.03	-41.80	80.08
Dec2-TBL	1,056	0.63	1.04	8.35	-40.50	65.74
Dec3-TBL	1,056	0.67	1.30	7.73	-37.31	56.60
Dec4-TBL	1,056	0.67	1.30	7.26	-37.86	51.62
Dec5-TBL	1,056	0.65	1.36	7.01	-36.34	44.82
Dec6-TBL	1,056	0.68	1.20	6.71	-39.26	46.66
Dec7-TBL	1,056	0.62	1.16	6.43	-35.76	41.87
Dec8-TBL	1,056	0.60	1.17	6.13	-37.22	42.63
Dec9-TBL	1,056	0.56	1.15	5.83	-39.13	38.33
Dec10-TBL	1,056	0.46	0.79	5.11	-32.88	30.04
D_Recession	1,056	0.19	0.00	0.39	0.00	1.00
Democrat	1,056	0.52	1.00	0.50	0.00	1.00
Tbill_3m	1,056	0.28	0.25	0.25	-0.06	1.34
Term	741	24.45	13.58	33.76	-20.15	127.20
Default	1,056	16.59	13.08	10.76	5.43	63.49
P/D	1,056	146.58	146.36	10.42	109.12	170.52
CAPE	1,056	285.99	288.21	36.94	188.18	381.11

Table 3.2: Summary statistics - Returns over the business cycle

The table reports the average realized excess market returns for different business cycles stages. The header of each column reports the dependent variable. The time period is 1927 to 2014. We use robust standard errors. See Appendix B.1 for a definition of all variables.

	VW-TBL	VW-TBL	VW-TBL	VW-TBL	VW-TBL	VW-TBL	VW-TBL
D_Recession	-2.29^{***}						
	(-3.79)						
Peak		-2.25					
		(-1.44)					
Contraction_1st			-3.26^{***}				
			(-4.63)				
Contraction_2nd				-0.91			
				(-0.91)			
Trough					4.62^{***}		
					(3.78)		
Expansion_1st						0.80^{**}	
						(2.47)	
Expansion_2nd							0.37
							(1.18)
Constant	0.93^{***}	0.53^{***}	0.76^{***}	0.59^{***}	0.44^{***}	0.19	0.35
	(6.10)	(3.17)	(4.53)	(3.79)	(2.61)	(0.81)	(1.43)
Observations	1056	1056	1056	1056	1056	1056	1056

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.3: Correlation table - Recession measures

The table reports the correlation matrix for different recession measures, year-on-year growth in quarterly GDP, and Democrat dummy. The time period is 1927 to 2014. See Appendix B.1 for a definition of all variables.

	Democrat	D_Recession	GDP	Rec_Prob	Rec_Prob_GDP
Democrat	1				
D_Recession	−0.248	1			
GDP	0.0370	−0.524	1		
Rec_Prob	−0.168	0.859	−0.586	1	
Rec_Prob_GDP	−0.244	0.783	−0.649	0.781	1

Table 3.4: Presidential Puzzle and recessions

The table reports the average realized excess market returns under Democratic and Republican presidents and the return difference between Republicans and Democrats for different time periods. The Democrat dummy captures the return difference between Democratic and Republican presidencies. Panel A shows results without controlling for recessions and Panel B includes a recession control. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

Panel A: Presidential Puzzle

	1927-2014			1950-1980			1981-2014		
	Dem	Rep	Full Sample	Dem	Rep	Full Sample	Dem	Rep	Full Sample
Democrat[t-1]			0.93***			0.57			0.96**
			(2.64)			(1.30)			(2.10)
VW-TBL	0.95***	0.01	0.01	0.85***	0.28	0.28	1.08***	0.12	0.12
	(4.37)	(0.05)	(0.05)	(2.95)	(0.86)	(0.86)	(3.36)	(0.36)	(0.36)
Democrat[t-1]			1.36***			1.37**			0.79
			(2.89)			(2.35)			(1.34)
EW-TBL	1.37***	0.01	0.01	1.54***	0.17	0.17	1.02**	0.24	0.24
	(4.38)	(0.02)	(0.02)	(4.02)	(0.38)	(0.38)	(2.48)	(0.58)	(0.58)
Democrat[t-1]			0.66*			0.54			0.79*
			(1.86)			(1.23)			(1.72)
VW-INFL	0.85***	0.19	0.19	0.84***	0.29	0.29	1.08***	0.29	0.29
	(3.85)	(0.67)	(0.67)	(2.90)	(0.89)	(0.89)	(3.37)	(0.88)	(0.88)
Democrat[t-1]			1.10**			1.34**			0.65
			(2.32)			(2.27)			(1.11)
EW-INFL	1.28***	0.18	0.18	1.52***	0.18	0.18	1.07***	0.42	0.42
	(4.08)	(0.52)	(0.52)	(3.96)	(0.40)	(0.40)	(2.61)	(1.01)	(1.01)
Observations	553	502	1055	179	193	372	169	239	408

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: Presidential Puzzle controlling for recession

	1927-2014			1950-1980			1981-2014		
	Dem	Rep	Full Sample	Dem	Rep	Full Sample	Dem	Rep	Full Sample
D_Recession	−1.53	−2.39***	−2.13***	0.81	−1.54*	−1.15	−0.09	−2.26**	−1.96*
	(−1.43)	(−3.03)	(−3.34)	(0.35)	(−1.76)	(−1.38)	(−0.02)	(−2.13)	(−1.86)
Democrat[t-1]			0.50			0.30			0.67
			(1.55)			(0.69)			(1.44)
VW-TBL	1.08***	0.71***	0.63***	0.82***	0.71**	0.60*	1.08***	0.53*	0.48
	(5.04)	(3.29)	(2.77)	(2.89)	(2.28)	(1.89)	(3.55)	(1.74)	(1.51)
D_Recession	−2.07	−2.82***	−2.60***	0.17	−1.90	−1.56	3.75	−3.02**	−2.08
	(−1.50)	(−2.84)	(−3.21)	(0.05)	(−1.64)	(−1.42)	(0.84)	(−2.35)	(−1.56)
Democrat[t-1]			0.84*			1.01*			0.48
			(1.92)			(1.71)			(0.78)
EW-TBL	1.55***	0.83***	0.76**	1.53***	0.69	0.60	0.89**	0.80**	0.62
	(4.90)	(2.95)	(2.57)	(4.12)	(1.60)	(1.36)	(2.29)	(2.03)	(1.52)
Observations	553	502	1055	179	193	372	169	239	408

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

continued: Panel B: Presidential Puzzle controlling for recession

	1927-2014			1950-1980			1981-2014		
	Dem	Rep	Full Sample	Dem	Rep	Full Sample	Dem	Rep	Full Sample
D_Recession	−1.23	−2.24***	−1.93***	0.65	−1.62*	−1.24	0.29	−2.26**	−1.91*
	(−1.15)	(−2.84)	(−3.03)	(0.28)	(−1.83)	(−1.47)	(0.08)	(−2.12)	(−1.79)
Democrat[t-1]			0.27			0.26			0.51
			(0.82)			(0.58)			(1.08)
VW-INFL	0.96***	0.84***	0.75***	0.81***	0.74**	0.64**	1.07***	0.71**	0.64**
	(4.37)	(3.85)	(3.26)	(2.87)	(2.37)	(1.99)	(3.54)	(2.29)	(2.01)
D_Recession	−1.87	−2.63***	−2.40***	−0.02	−1.97*	−1.64	3.60	−2.94**	−2.03
	(−1.37)	(−2.66)	(−2.98)	(−0.01)	(−1.68)	(−1.49)	(0.81)	(−2.31)	(−1.54)
Democrat[t-1]			0.61			0.96			0.35
			(1.39)			(1.61)			(0.57)
EW-INFL	1.45***	0.95***	0.88***	1.52***	0.72	0.63	0.94**	0.96**	0.79*
	(4.53)	(3.35)	(2.96)	(4.08)	(1.65)	(1.43)	(2.43)	(2.43)	(1.93)
Observations	553	502	1055	179	193	372	169	239	408

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.5: Market performance conditional on business cycle

The table reports the average realized excess market returns under Democratic and Republican presidents and the return difference between Republicans and Democrats for different time periods conditional on the business cylce stage. The Democrat dummy captures the return difference between Democratic and Republican presidencies. Panel A shows results for recession. Panel B shows results for expansions. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

Panel A: Market performance during recessions

	1927-2014			1950-1980			1981-2014		
	Dem	Rep	Full Sample	Dem	Rep	Full Sample	Dem	Rep	Full Sample
Democrat[t-1]			1.24			2.46			2.72
			(0.96)			(1.00)			(0.69)
VW-TBL	−0.44	−1.68**	−1.68**	1.62	−0.84	−0.84	0.99	−1.72	−1.72
	(−0.42)	(−2.21)	(−2.20)	(0.67)	(−1.01)	(−1.00)	(0.25)	(−1.67)	(−1.66)
Democrat[t-1]			1.48			2.91			6.87
			(0.89)			(0.88)			(1.47)
EW-TBL	−0.52	−1.99**	−1.99**	1.70	−1.21	−1.21	4.64	−2.23*	−2.23*
	(−0.38)	(−2.08)	(−2.08)	(0.52)	(−1.11)	(−1.11)	(0.96)	(−1.78)	(−1.76)
Democrat[t-1]			1.12			2.34			2.92
			(0.87)			(0.94)			(0.72)
VW-INFL	−0.28	−1.40*	−1.40*	1.46	−0.88	−0.88	1.36	−1.56	−1.56
	(−0.26)	(−1.84)	(−1.84)	(0.59)	(−1.05)	(−1.04)	(0.33)	(−1.50)	(−1.49)
Democrat[t-1]			1.26			2.74			6.52
			(0.77)			(0.83)			(1.39)
EW-INFL	−0.42	−1.68*	−1.68*	1.50	−1.25	−1.25	4.54	−1.98	−1.98
	(−0.32)	(−1.76)	(−1.76)	(0.45)	(−1.14)	(−1.13)	(0.94)	(−1.61)	(−1.59)
Observations	49	146	195	8	53	61	6	44	50

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: Market performance during expansions

	1927-2014			1950-1980			1981-2014		
	Dem	Rep	Full Sample	Dem	Rep	Full Sample	Dem	Rep	Full Sample
Democrat[t-1]			0.37			0.11			0.55
			(1.23)			(0.26)			(1.28)
VW-TBL	1.08***	0.71***	0.71***	0.82***	0.71**	0.71**	1.08***	0.53*	0.53*
	(5.05)	(3.29)	(3.29)	(2.90)	(2.29)	(2.29)	(3.56)	(1.74)	(1.74)
Democrat[t-1]			0.73*			0.84			0.10
			(1.72)			(1.48)			(0.17)
EW-TBL	1.55***	0.83***	0.83***	1.53***	0.69	0.69	0.89**	0.80**	0.80**
	(4.90)	(2.95)	(2.95)	(4.13)	(1.60)	(1.60)	(2.29)	(2.03)	(2.03)
Democrat[t-1]			0.12			0.07			0.36
			(0.39)			(0.16)			(0.84)
VW-INFL	0.96***	0.84***	0.84***	0.81***	0.74**	0.74**	1.07***	0.71**	0.71**
	(4.37)	(3.85)	(3.85)	(2.88)	(2.38)	(2.38)	(3.55)	(2.29)	(2.29)
Democrat[t-1]			0.50			0.80			−0.02
			(1.17)			(1.40)			(−0.04)
EW-INFL	1.45***	0.95***	0.95***	1.52***	0.72	0.72*	0.94**	0.96**	0.96**
	(4.53)	(3.35)	(3.35)	(4.09)	(1.65)	(1.66)	(2.44)	(2.44)	(2.44)
Observations	504	356	860	171	140	311	163	195	358

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.6: Size deciles

The table reports the average realized excess return difference of size decile portfolios between Republicans and Democrats for different time periods. The header of each column reports whether a recession control is included in the analysis. Panel A employs the monthly return on a 3-month Treasury bill and Panel B the monthly inflation rate to construct an excess return measure. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

Panel A: Size decile - Risk-free return

	1927-2014		1950-1980		1981-2014	
	No Control	Control	No Control	Control	No Control	Control
Dec1-TBL	1.62***	0.95*	1.83***	1.33*	0.84	0.48
	(2.69)	(1.71)	(2.69)	(1.91)	(1.24)	(0.69)
Dec2-TBL	1.58***	0.93*	1.38**	0.93	0.87	0.55
	(2.89)	(1.83)	(2.20)	(1.45)	(1.29)	(0.81)
Dec3-TBL	1.37***	0.76	1.39**	0.97	0.67	0.35
	(2.65)	(1.61)	(2.29)	(1.58)	(1.07)	(0.56)
Dec4-TBL	1.24***	0.70	1.19**	0.77	0.60	0.33
	(2.58)	(1.56)	(2.02)	(1.29)	(1.01)	(0.54)
Dec5-TBL	1.23***	0.68	1.12**	0.73	0.71	0.41
	(2.68)	(1.58)	(2.03)	(1.28)	(1.20)	(0.68)
Dec6-TBL	1.08**	0.56	0.86	0.53	0.61	0.34
	(2.43)	(1.38)	(1.60)	(0.97)	(1.11)	(0.61)
Dec7-TBL	1.07**	0.55	0.83	0.49	0.85	0.55
	(2.55)	(1.41)	(1.59)	(0.91)	(1.58)	(1.03)
Dec8-TBL	1.02**	0.58	0.64	0.40	0.92*	0.60
	(2.55)	(1.60)	(1.31)	(0.81)	(1.75)	(1.16)
Dec9-TBL	0.94**	0.48	0.58	0.36	0.88*	0.56
	(2.47)	(1.39)	(1.30)	(0.80)	(1.83)	(1.16)
Dec10-TBL	0.83**	0.44	0.36	0.11	1.05**	0.77*
	(2.53)	(1.45)	(0.87)	(0.28)	(2.45)	(1.77)
Observations	1055	1055	372	372	408	408

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

Panel B: Size decile - Inflation

	1925-2014		1950-1980		1981-2014	
	No Control	Control	No Control	Control	No Control	Control
Dec1-INFL	1.35**	0.72	1.80***	1.28*	0.70	0.35
	(2.25)	(1.30)	(2.63)	(1.82)	(1.04)	(0.50)
Dec2-INFL	1.32**	0.70	1.35**	0.88	0.73	0.42
	(2.40)	(1.37)	(2.13)	(1.36)	(1.09)	(0.61)
Dec3-INFL	1.10**	0.53	1.36**	0.92	0.54	0.22
	(2.13)	(1.12)	(2.21)	(1.48)	(0.85)	(0.35)
Dec4-INFL	0.97**	0.47	1.16*	0.72	0.47	0.20
	(2.02)	(1.05)	(1.95)	(1.19)	(0.78)	(0.33)
Dec5-INFL	0.96**	0.45	1.09*	0.67	0.57	0.28
	(2.10)	(1.04)	(1.95)	(1.17)	(0.97)	(0.46)
Dec6-INFL	0.81*	0.33	0.83	0.48	0.47	0.21
	(1.82)	(0.82)	(1.53)	(0.86)	(0.86)	(0.37)
Dec7-INFL	0.81*	0.33	0.79	0.43	0.71	0.42
	(1.92)	(0.83)	(1.51)	(0.80)	(1.33)	(0.79)
Dec8-INFL	0.76*	0.35	0.60	0.35	0.78	0.47
	(1.88)	(0.96)	(1.23)	(0.70)	(1.49)	(0.91)
Dec9-INFL	0.67*	0.25	0.55	0.31	0.74	0.43
	(1.77)	(0.72)	(1.21)	(0.68)	(1.54)	(0.89)
Dec10-INFL	0.57*	0.21	0.32	0.06	0.91**	0.64
	(1.71)	(0.69)	(0.77)	(0.14)	(2.11)	(1.46)
Observations	1055	1055	372	372	408	408

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.7: Presidential Puzzle and recession start

The table reports the average realized excess market return difference between Republicans and Democrats for different time periods. The Democrat dummy captures the return difference between Democratic and Republican presidencies. All regressions control for the start of a recession. The header of each column reports the dependent variable. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

Panel A: Presidential Puzzle controlling for peak and 1st part of contraction (1927-2014)

	VW-TBL	EW-TBL	VW-INFL	EW-INFL
Democrat[t-1]	0.57	0.89*	0.31	0.64
	(1.61)	(1.89)	(0.87)	(1.35)
Peak	−2.37	−3.96**	−2.31	−3.96**
	(−1.52)	(−2.06)	(−1.49)	(−2.08)
Contraction_1st	−3.12***	−3.94***	−3.00***	−3.83***
	(−3.84)	(−3.86)	(−3.68)	(−3.74)
Constant	0.48*	0.62*	0.64**	0.78**
	(1.69)	(1.71)	(2.24)	(2.16)
Observations	1055	1055	1055	1055

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: Presidential Puzzle controlling for peak and 1st part of contraction (1950-1980)

	VW-TBL	EW-TBL	VW-INFL	EW-INFL
Democrat[t-1]	0.19	0.88	0.15	0.84
	(0.43)	(1.48)	(0.34)	(1.40)
Peak	−3.33	−4.89	−3.37	−4.97
	(−1.35)	(−1.36)	(−1.39)	(−1.40)
Contraction_1st	−2.89***	−3.63**	−2.98***	−3.71**
	(−2.67)	(−2.36)	(−2.70)	(−2.40)
Constant	0.71**	0.73	0.74**	0.75*
	(2.15)	(1.64)	(2.21)	(1.67)
Observations	372	372	372	372

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel C: Presidential Puzzle controlling for peak and 1st part of contraction (1981-2014)

	VW-TBL	EW-TBL	VW-INFL	EW-INFL
Democrat[t-1]	0.68	0.45	0.50	0.29
	(1.47)	(0.75)	(1.07)	(0.50)
Peak	−3.37**	−4.55***	−3.24**	−4.50***
	(−2.46)	(−3.52)	(−2.23)	(−3.43)
Contraction_1st	−2.52**	−3.00**	−2.65**	−3.16**
	(−2.09)	(−2.07)	(−2.19)	(−2.16)
Constant	0.39	0.58	0.58*	0.77*
	(1.17)	(1.34)	(1.69)	(1.79)
Observations	408	408	408	408

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.8: VAR model - P/D ratio

The table reports the results of the return decomposition following Campbell (1991). Panel A shows a correlation martrix of all variables employed to conduct the return decomposition. Panel B summarizes the regression result of the vector auto regression. The header of each column reports the dependent variable of the regression. Panel C shows the summary statistics of all variables derived from the return decomposition. Panel D reports the average expected returns, cash-flow news, discount-rate news under Democratic and Republican presidents, and the return differences between Republicans and Democrats. The Democrat dummy captures the return difference between Democratic and Republican presidencies. Panel E repeats the analysis of Panel D with regression controls. We use robust standard errors. See Appendix B.1 for a definition of all variables.

Panel A: Correlation matrix

	VW-TBL	CAPE	P/D	Term	Default	Tbill_3m
VW-TBL	1					
CAPE	−0.00284	1				
P/D	0.0214	0.859	1			
Term	0.0929	0.217	0.364	1		
Default	−0.0160	−0.318	−0.496	0.521	1	
Tbill_3m	−0.0601	−0.152	0.0712	−0.689	−0.532	1

Panel B: First stage

	VW-TBL	P/D	Term	Default	Tbill
VW-TBL [t-1]	0.08**	0.00***	−0.00	−0.00***	−0.00
	(2.12)	(18.05)	(−0.99)	(−6.28)	(−0.79)
P/D [t-1]	−6.14***	0.99***	0.03	−0.00	−0.05
	(−2.87)	(301.47)	(1.63)	(−0.60)	(−1.60)
Term [t-1]	0.86	0.00	0.99***	0.00	−0.03***
	(1.22)	(0.34)	(155.74)	(0.03)	(−2.61)
Default [t-1]	0.99	0.01*	0.28***	0.97***	−0.16***
	(0.24)	(1.94)	(7.46)	(84.75)	(−2.84)
Tbill_3m [t-1]	−1.28	0.00	0.03***	−0.00	0.93***
	(−1.37)	(0.13)	(3.37)	(−0.12)	(71.49)
Constant	9.86***	0.01	−0.09***	0.01	0.12**
	(2.81)	(1.40)	(−2.76)	(0.99)	(2.56)
Observations	740	740	740	740	740

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

Panel C: Summary statistics

	1953-2014					
	N	Mean	Median	SD	Min	Max
DR News	740	-0.00	-0.03	1.31	-3.80	12.43
CF News	740	-0.00	0.13	3.89	-23.80	16.81
ExpectR	741	0.50	0.51	0.72	-2.07	2.61

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

Panel D: Presidential Puzzle - Decomposition

	Dem	Rep	Full Sample
Democrat[t-1]			0.08
			(1.47)
ExpectedR	0.54***	0.47***	0.47***
	(13.03)	(13.75)	(13.41)
Democrat[t-1]			0.45
			(1.57)
CF News	0.26	−0.19	−0.19
	(1.25)	(−0.99)	(−1.02)
Democrat[t-1]			−0.16*
			(−1.67)
DR News	−0.09	0.07	0.07
	(−1.46)	(1.00)	(1.09)
Observations	314	426	740

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel E: Presidential Puzzle and recessions - Decomposition

	Dem	Rep	Full Sample
RecessionNBER3	0.45**	−0.10	−0.01
	(2.39)	(−1.23)	(−0.08)
Democrat[t-1]			0.08
			(1.41)
ExpectedR	0.52***	0.49***	0.47***
	(12.25)	(12.71)	(12.08)
RecessionNBER3	0.28	−0.67	−0.51
	(0.29)	(−1.43)	(−1.23)
Democrat[t-1]			0.37
			(1.23)
CF News	0.25	−0.04	−0.08
	(1.15)	(−0.20)	(−0.38)
RecessionNBER3	0.67**	1.07***	1.00***
	(2.31)	(6.84)	(7.53)
Democrat[t-1]			0.01
			(0.11)
DR News	−0.13*	−0.17**	−0.16**
	(−1.95)	(−2.30)	(−2.29)
Observations	314	426	740

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.9: Time-varying coefficient - Return prediction [P/D ratio]

The table reports the results of the return prediction regression with time-varying coefficients. The header of each column reports the time-varying variable of the regression. Panel A summarizes the regression result of the return prediction regression. Panel B reports the predicited and unpredicted return differences between Republicans and Democrats. The predicted returns are the fitted values of the regression reported in Panel A. The unpredicted returns are the residuals of the regression reported in Panel A. We use robust standard errors. See Appendix B.1 for a definition of all variables.

Panel A: First stage results

	Rec_Prob	Rec_GDP	GDP
Rec_Prob [t-1]	0.82**		
	(2.27)		
Rec_Prob_GDP [t-1]		0.86***	
		(3.39)	
Neg. GDP [t-1]			34.56
			(1.64)
RecProb*Tbill [t-1]	0.03	−0.01	3.78
	(0.44)	(−0.26)	(0.88)
RecProb*Term [t-1]	0.00***	0.00***	0.07***
	(2.70)	(3.53)	(2.97)
RecProb*P/D [t-1]	−0.01**	−0.01***	−0.25**
	(−2.53)	(−3.75)	(−1.97)
RecProb*Default [t-1]	−0.01**	−0.00**	−0.16
	(−2.01)	(−2.49)	(−1.08)
Tbill_3m [t-1]	−2.74*	−1.59	−2.04**
	(−1.76)	(−0.86)	(−2.06)
Term [t-1]	−0.01	−0.02	0.00
	(−0.80)	(−1.60)	(0.21)
P/D [t-1]	−0.03	0.01	−0.04*
	(−1.05)	(0.31)	(−1.93)
Default	0.08	0.12**	0.05
	(1.62)	(2.00)	(1.21)
Constant	6.00	−1.15	6.79**
	(1.12)	(−0.19)	(2.02)
Observations	570	566	740

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: Expected and unexpected returns

	Diff. Rec_Prob	Diff. Rec_Prob_GDP	Diff. GDP
Predict_PD	-0.41^{***}	-0.61^{***}	-0.18^{**}
	(-4.29)	(-5.81)	(-2.44)
Unexp_PD	-0.57	-0.37	-0.52
	(-1.50)	(-0.97)	(-1.63)
Observations	570	566	740

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.10: Presidential cycle and recessions

The table reports the average realized excess market returns during the first half and the second half of a presidency and the return difference between the first half and the second half of a presidency for different time periods. The 1st_Half dummy captures the return difference between the first half and the second half of a presidency. Panel A shows results without controlling for recessions and Panel B includes a recession control. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

Panel A: Presidential cycle anomaly

	1927-2014			1950-1980			1981-2014		
	1st Half	2nd Half	Full Sample	1st Half	2nd Half	Full Sample	1st Half	2nd Half	Full Sample
1st_Half			-0.66^{*}			-1.30^{***}			-0.18
			(-1.89)			(-2.95)			(-0.40)
VW-TBL	0.17	0.83^{***}	0.83^{***}	-0.12	1.19^{***}	1.19^{***}	0.43	0.61^{*}	0.61^{*}
	(0.70)	(3.43)	(3.43)	(-0.33)	(4.54)	(4.54)	(1.35)	(1.82)	(1.82)
1st_Half			-0.88^{*}			-1.63^{***}			-0.29
			(-1.87)			(-2.72)			(-0.51)
EW-TBL	0.28	1.16^{***}	1.16^{***}	-0.01	1.61^{***}	1.61^{***}	0.43	0.72	0.72
	(0.84)	(3.56)	(3.56)	(-0.03)	(4.30)	(4.30)	(1.10)	(1.63)	(1.63)
1st_Half			-0.68^{*}			-1.31^{***}			-0.13
			(-1.96)			(-2.96)			(-0.28)
EW-INFL	0.19	0.87^{***}	0.87^{***}	-0.12	1.19^{***}	1.19^{***}	0.56^{*}	0.68^{**}	0.68^{**}
	(0.76)	(3.64)	(3.64)	(-0.35)	(4.55)	(4.55)	(1.75)	(2.02)	(2.02)
1st_Half			-0.91^{*}			-1.64^{***}			-0.24
			(-1.94)			(-2.73)			(-0.41)
EW-INFL	0.31	1.21^{***}	1.21^{***}	-0.02	1.62^{***}	1.62^{***}	0.57	0.81^{*}	0.81^{*}
	(0.91)	(3.75)	(3.75)	(-0.05)	(4.29)	(4.29)	(1.50)	(1.84)	(1.84)
Observations	528	528	1056	180	192	372	214	194	408

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: Presidential cycle and recession control

	1927-2014			1950-1980			1981-2014		
	1st Half	2nd Half	Full Sample	1st Half	2nd Half	Full Sample	1st Half	2nd Half	Full Sample
D_Recession	-2.21^{***}	-2.23	-2.21^{***}	-1.08	-0.69	-0.95	-2.16^{*}	-2.23	-2.18^{**}
	(-3.27)	(-1.61)	(-3.31)	(-1.07)	(-0.48)	(-1.18)	(-1.88)	(-1.09)	(-2.09)
1st_Half			-0.39			-1.16^{***}			0.00
			(-1.06)			(-2.64)			(0.01)
VW-TBL	0.72^{***}	1.11^{***}	1.11^{***}	0.15	1.25^{***}	1.27^{***}	0.78^{***}	0.78^{**}	0.78^{**}
	(2.87)	(5.88)	(5.24)	(0.43)	(4.99)	(4.91)	(2.67)	(2.47)	(2.42)
D_Recession	-2.98^{***}	-2.38	-2.76^{***}	-1.89	-0.97	-1.59	-1.95	-2.81	-2.22^{*}
	(-3.53)	(-1.33)	(-3.22)	(-1.51)	(-0.45)	(-1.47)	(-1.33)	(-1.14)	(-1.70)
1st_Half			-0.54			-1.38^{**}			-0.10
			(-1.09)			(-2.26)			(-0.17)
EW-TBL	1.02^{***}	1.46^{***}	1.50^{***}	0.45	1.70^{***}	1.76^{***}	0.74^{**}	0.93^{**}	0.89^{**}
	(2.83)	(5.45)	(5.17)	(0.98)	(4.83)	(4.81)	(2.11)	(2.21)	(2.09)
Observations	528	528	1056	180	192	372	214	194	408

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

continued: Panel B: Presidential cycle and recession control

	1927-2014			1950-1980			1981-2014		
	1st Half	2nd Half	Full Sample	1st Half	2nd Half	Full Sample	1st Half	2nd Half	Full Sample
D_Recession	-1.94^{***}	-1.88	-1.92^{***}	-1.10	-0.85	-1.02	-1.89	-2.51	-2.09^{**}
	(-2.87)	(-1.36)	(-2.87)	(-1.08)	(-0.59)	(-1.25)	(-1.63)	(-1.20)	(-1.98)
1st_Half			-0.45			-1.16^{***}			0.05
			(-1.22)			(-2.63)			(0.12)
VW-INFL	0.67^{***}	1.11^{***}	1.11^{***}	0.15	1.27^{***}	1.28^{***}	0.86^{***}	0.88^{***}	0.84^{***}
	(2.62)	(5.89)	(5.28)	(0.43)	(5.05)	(4.94)	(2.95)	(2.78)	(2.62)
D_Recession	-2.74^{***}	-1.99	-2.47^{***}	-1.90	-1.13	-1.65	-1.78	-2.91	-2.14^{*}
	(-3.25)	(-1.12)	(-2.90)	(-1.51)	(-0.52)	(-1.52)	(-1.23)	(-1.20)	(-1.66)
1st_Half			-0.61			-1.38^{**}			-0.05
			(-1.22)			(-2.26)			(-0.09)
EW-INFL	0.98^{***}	1.46^{***}	1.52^{***}	0.44	1.72^{***}	1.76^{***}	0.87^{**}	1.04^{**}	0.98^{**}
	(2.70)	(5.49)	(5.25)	(0.96)	(4.85)	(4.81)	(2.45)	(2.45)	(2.29)
Observations	528	528	1056	180	192	372	214	194	408

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.11: Presidential Puzzle and change in power

The table reports the average realized excess market return difference between Republicans and Democrats during the first presidential term following a change in political power for the time period of 1927 to 2014. The Democrat dummy captures the return difference between Democratic and Republican presidencies. We control for different parts of the first term following a change in power of the Nixon (1969) and G. W. Bush (2001) presidency. The header of each column reports the dependent variable. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

	VW-TBL	VW-TBL	VW-TBL	VW-TBL	VW-TBL	VW-TBL
Democrat[t-1]	1.03**	0.59	0.44	0.77	0.77	0.80*
	(2.09)	(1.04)	(0.89)	(1.55)	(1.58)	(1.65)
First Term		−0.91				
		(−1.33)				
First Half			−2.55***			
			(−2.97)			
First Year				−2.38**		
				(−2.17)		
Second Year					−2.05*	
					(−1.69)	
First Term Recession						−2.30
						(−1.64)
Constant	0.16	0.60	0.77**	0.43	0.42	0.39
	(0.48)	(1.39)	(2.29)	(1.25)	(1.25)	(1.19)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.12: Recessions

The table displays an overview of all U.S. recessions between 1927 and 2014. The table also summarizes the lenght, time since previous recession, and potential cause for each recession.

Name	Start	End	Duration	Time since previous recession	Global	Oil Shock	Monetary Policy	Fiscal Policy	War	Other
Great Depression	Aug 1929	Mar 1933	3 years 7 month	1 year 9 month	x					x
1937 recession	May 1937	June 1938	1 year 1 month	4 years 2 months			x	x		x
1945 recession	Feb 1945	Oct 1945	8 months	6 years 8 month					x	
1949 recession	Nov 1948	Oct 1949	11 months	3 years 1 month					x	x
1953 recession	July 1953	May 1954	10 months	3 years 9 month			x		x	
1958 recession	Aug 1957	Apr 1958	8 months	3 years and 3 months			x	x		x
1960 recession	Apr 1960	Feb 1961	10 months	2 years			x	x		
1969 recession	Dec 1969	Nov 1970	11 months	8 years 10 months			x	x		
1973 recession	Nov 1973	Mar 1975	1 year	3 years	x	x				
1980 recession	Jan 1980	July 1980	6 months	4 years 10 months		x	x			
Early 1980s recession	July 1981	Nov 1982	1 year 4 months	1 year	x	x	x			
Early 1990s recession	July 1990	Mar 1991	8 months	7 years 8 months	x	x	x			x
Early 2000s recession	Mar 2001	Nov 2001	8 months	10 years						x
Great Recession	Dec 2007	June 2009	1 year 6 months	6 years 1 month	x		x			x

Table 3.13: Presidential Puzzle and no change in power

The table reports the average realized excess market return difference between Republicans and Democrats during the presidential term following an election, which did not result in a change in political power for the time period of 1927 to 2014. The Democrat dummy captures the return difference between Democratic and Republican presidencies. We control for different potential exogenous shocks. The header of each column reports the dependent variable. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

	VW-TBL	VW-TBL	VW-TBL	VW-TBL
Democrat[t-1]	0.84*	0.72	0.16	−0.04
	(1.75)	(1.47)	(0.42)	(−0.11)
Oil Shock		−1.55	−2.11	−2.31
		(−0.96)	(−1.33)	(−1.46)
Great Depression			−4.09*	−4.30*
			(−1.80)	(−1.89)
Great Recession				−4.61**
				(−2.15)
Constant	−0.08	0.04	0.60**	0.81***
	(−0.19)	(0.10)	(2.14)	(3.05)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.14: Presidential Puzzle and exogenous shocks

The table reports the average realized excess market return difference between Republicans and Democrats for the time period of 1927 to 2014. The Democrat dummy captures the return difference between Democratic and Republican presidencies. We control for different potential exogenous shocks and for different parts of the first term following a change in power of the Nixon (1969) and G. W. Bush (2001) presidency. The header of each column reports the dependent variable. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

	VW-TBL	VW-TBL	VW-TBL	VW-TBL	VW-TBL
Democrat[t-1]	0.21	0.36	0.35	0.37	0.49
	(0.70)	(1.16)	(1.15)	(1.20)	(1.55)
Oil Shock	−1.75*	−1.62	−1.62	−1.60	
	(−1.68)	(−1.55)	(−1.55)	(−1.54)	
Great Depression	−4.40**	−4.26**	−4.26**	−4.24**	−4.12**
	(−2.11)	(−2.05)	(−2.04)	(−2.04)	(−1.98)
Great Recession	−3.34*	−3.24	−3.24	−3.23	−3.14
	(−1.68)	(−1.63)	(−1.63)	(−1.63)	(−1.59)
First Half	−2.59***				
	(−3.17)				
First Year		−2.59**			−2.45**
		(−2.44)			(−2.31)
Second Year			−2.31*		
			(−1.94)		
First Term Recession				−2.57*	
				(−1.86)	
Constant	0.82***	0.67***	0.67***	0.65***	0.52**
	(3.88)	(3.12)	(3.17)	(3.11)	(2.34)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table 3.15: Presidential Puzzle international data

The table reports the average realized excess market return difference between Republicans and Democrats. The excess market returns are calculate for 14 countries. The Democrat dummy capture the return difference between Democratic and Republican presidencies. The title of each column reports the country of interest. The sample end date for each country is Decemmber 2014. We use Newey-West standard errors. See Appendix B.1 for a definition of all variables.

	Australia	Austria	Belgium
Democrat[t-1]	1.16**	0.01	1.71**
	(2.33)	(0.01)	(2.46)
Observations	468	313	288
Starting date	Jan. 1976	Jan. 1989	Jan. 1991
	Canada	Denmark	France
Democrat[t-1]	1.18***	1.43**	1.42**
	(2.74)	(2.48)	(2.18)
Observations	480	355	327
Starting date	Jan. 1975	June 1985	Nov. 1987
	Germany	Italy	Japan
Democrat[t-1]	0.72	1.67**	1.02
	(1.46)	(2.37)	(1.30)
Observations	372	324	230
Starting date	Jan. 1975	Jan. 1988	Nov. 1995
	Netherlands	New Zealand	Norway
Democrat[t-1]	1.76***	0.51	1.04
	(2.90)	(0.98)	(1.29)
Observations	348	323	348
Starting date	Jan. 1986	Feb. 1988	Jan. 1986
	Sweden	UK	
Democrat[t-1]	2.46***	0.88*	
	(3.06)	(1.75)	
Observations	309	360	
Starting date	April. 1989	Jan. 1985	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

3.8 Appendix

Table B.1: Variable definitions

The table describes the construction of all variables used in this analysis.

Variable	Description	Source
1st_Half	is 1 during the first two years of each presidency and 0 otherwise.	Hand-collected
CAPE	is the logarithm of the cyclically adjusted earnings-price ratio calculated for the S&P500 index scaled by a factor 100.	Robert Shiller Data Library
CF News	This variable results from a return decomposition following the procedure outlined in Campbell (1991) and corresponds to the cash flow news component of unexpected returns.	CRSP, FRED Database, Data library of Robert Shiller
Contraction_1st	is 1 during the first half of an economic contraction and 0 otherwise.	FRED database
Contraction_2nd	is 1 during the second half of an economic contraction and 0 otherwise.	FRED database
Democrat	is 1 if a Democratic president is in charge and 0 otherwise.	Hand-collected
Default	is the logarithm of the spread between a AAA- and BAA-rated corporate bond scaled by a factor 100.	FRED database
DR News	This variable results from a return decomposition following the procedure outlined in Campbell (1991) and corresponds to the discount rate news component of unexpected returns.	CRSP, FRED Database, Data library of Robert Shiller
Dec[1 to 10]-TBL	is the logarithm of the difference between the monthly return on a size decile portfolio [1 to 10] and monthly return of a 3-months Treasury Bill scaled by a factor 100.	CRSP, French Data Library

Variable Definitions continued

Variable	Description	Source
Dec[1 to 10]-INFL	is the logarithm of the difference between the monthly return on a size decile portfolio [1 to 10] and monthly inflation rate scaled by a factor 100.	CRSP, French Data Library
EW-TBL	is the logarithm of the difference between the monthly equally-weighted CRSP return and monthly return of a 3-months Treasury Bill scaled by a factor 100.	CRSP
EW-INFL	is the logarithm of the difference between the monthly equally-weighted CRSP return and monthly inflation rate scaled by a factor 100.	CRSP
Expansion_1st	is 1 during the first half of an economic expansion and 0 otherwise.	FRED database
Expansion_2nd	is 1 during the second half of an economic expansion and 0 otherwise.	FRED database
First Half	is 1 during the first two years of the Nixon (1969) and G. W. Bush (2001) presidency and 0 otherwise.	Hand-collected
First Term	is 1 during the first term of the Nixon (1969) and G. W. Bush (2001) presidency and 0 otherwise.	Hand-collected
First Term Recession	is 1 during the recession occuring during first term of the Nixon (1969) and G. W. Bush (2001) presidency and 0 otherwise.	Hand-collected
First Year	is 1 during the first year of the Nixon (1969) and G. W. Bush (2001) presidency and 0 otherwise.	Hand-collected
Great Depression	is 1 during the recession of 1929 and 0 otherwise.	Hand-collected
Great Recession	is 1 during the recession of 2007 and 0 otherwise.	Hand-collected
GDP	equals the year-on-year growth in quarterly GDP.	FRED database

Variable Definitions continued

Variable	Description	Source
Oil Shock	is 1 during recessions related to oil shocks: recession of 1975, 1980, 1982 and 1991 and 0 otherwise.	Hand-collected
P/D	is the logarithm of the price-dividend ratio calculated for the S&P500 index scaled by a factor 100.	Robert Shiller Data Library
Peak	is 1 at the peak of the business cycle and 0 otherwise.	FRED database
Recession	1 during recessions as identified by NBER and 0 otherwise.	FRED database
Rec_Prob	This recession probability is derived following Chauvet et al. (1998). They use a dynamic-factor markov-switching model that uses macroeconomic data such as industrial production, non-farm payroll, real personal income excluding transfer payments, and real manufacturing and trade sales to estimate recession probability.	FRED Database
Rec_Prob_GDP	This recession probability is derived following the methodology outlined in Chauvet and Hamilton (2005). They employ historical GDP figures to make a prediction about the current state of the economy.	FRED Database
Second Year	is 1 during the second year of the Nixon (1969) and G. W. Bush (2001) presidency and 0 otherwise.	Hand-collected
Tbill_3m	is the logarithm of the monthly return of a 3-month Treasury Bill scaled by a factor 100.	CRSP
Term	is the logarithm of the spread between a 10 year Treasury Bond and 3-month Treasury Bill scaled by a factor 100.	FRED database
Trough	is 1 at the trough of the business cycle and 0 otherwise.	FRED database

Variable Definitions continued

Variable	Description	Source
VW-TBL	is the logarithm of the difference between the monthly value-weighted CRSP return and monthly return of a 3-month Treasury Bill scaled by a factor 100.	CRSP
VW-INFL	is the logarithm of the difference between the monthly value-weighted CRSP return and monthly inflation rate scaled by a factor 100.	CRSP

Table B.2: VAR model - CAPE ratio

The table reports the results of the return decomposition following Campbell (1991). Panel A summarizes the regression results of the vector auto regression. The title of each column reports the dependent variable of the regression. Panel B shows the summary statistics of all variables derived from the return decomposition. Panel C reports the average expected returns, cash-flow news, and discount-rate news under Democratic and Republican presidents and the return differences between Republicans and Democrats. The Democrat dummy captures the return difference between Democratic and Republican presidencies. Panel D repeats the analysis of Panel D with regression controls. We use robust standard errors. See Appendix B.1 for a definition of all variables.

Panel A: First stage

	VW-TBL	CAPE	Term	Default	Tbill
VW-TBL [t-1]	0.08**	0.00***	−0.00	−0.00***	−0.00
	(2.18)	(18.18)	(−0.97)	(−6.28)	(−0.84)
CAPE [t-1]	−1.31**	0.99***	0.01***	−0.00	−0.03***
	(−2.36)	(280.34)	(2.89)	(−0.72)	(−3.53)
Term [t-1]	0.37	0.00	0.99***	−0.00	−0.03***
	(0.52)	(0.79)	(158.06)	(−0.14)	(−3.27)
Default [t-1]	0.30	0.02	0.31***	0.97***	−0.22***
	(0.07)	(0.65)	(7.86)	(81.51)	(−3.64)
Tbill_3m [t-1]	−1.84*	−0.00	0.04***	−0.00	0.90***
	(−1.70)	(−0.20)	(4.12)	(−0.34)	(60.94)
Constant	4.86**	0.01	−0.09***	0.01	0.15***
	(2.24)	(0.91)	(−4.64)	(1.34)	(4.98)
Observations	740				

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: Summary statistics

	1953-2014					
	N	Mean	Median	SD	Min	Max
DR News	740	0.00	-0.06	1.17	-3.70	10.25
CF News	740	0.00	0.19	4.11	-25.79	18.47
ExpectR	741	0.50	0.49	0.67	-2.00	2.44

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel C: Presidential Puzzle - Decomposition

	Dem	Rep	Full Sample
Democrat [t-1]			0.02
			(0.40)
ExpectedR	0.51***	0.49***	0.49***
	(12.57)	(16.05)	(15.11)
Democrat [t-1]			0.50*
			(1.65)
CF News	0.29	−0.21	−0.21
	(1.32)	(−1.04)	(−1.08)
Democrat [t-1]			−0.17*
			(−1.95)
DR News	−0.10*	0.07	0.07
	(−1.68)	(1.18)	(1.27)
Observations	314	426	740

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

Panel D: Presidential Puzzle and recessions - Decomposition

	Dem	Rep	Full Sample
RecessionNBER3	0.34*	−0.20***	−0.11
	(1.85)	(−2.74)	(−1.52)
Democrat [t-1]			0.00
			(0.03)
ExpectedR	0.49***	0.53***	0.51***
	(11.88)	(15.55)	(14.26)
RecessionNBER3	0.36	−0.70	−0.52
	(0.36)	(−1.42)	(−1.20)
Democrat [t-1]			0.41
			(1.32)
CF News	0.27	−0.06	−0.10
	(1.20)	(−0.24)	(−0.44)
RecessionNBER3	0.63**	0.94***	0.89***
	(2.41)	(6.70)	(7.39)
Democrat [t-1]			−0.02
			(−0.20)
DR News	−0.13**	−0.14**	−0.13**
	(−2.19)	(−2.07)	(−2.06)
Observations	314	426	740

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

Table B.3: Time-varying coefficient - Return prediction [CAPE ratio]

The table reports the results of the return prediction regression with time-varying coefficients. The header of each column reports the time-varying variable of the regression. Panel A summarizes the regression result of the return prediction regression. Panel B reports the predicited return and unpredicted return differences between Republicans and Democrats. The predicted returns are the fitted values of the regression reported in Panel A. The unpredicted returns are the residuals of the regression reported in Panel A. We use robust standard errors. See Appendix B.1 for a definition of all variables.

Panel A: First stage results

	Rec_Prob	Rec_GDP	GDP
Rec_Prob [t-1]	0.28*		
	(1.68)		
Rec_Prob_GDP [t-1]		0.28**	
		(2.04)	
Neg. GDP [t-1]			10.51
			(0.93)
RecProb*Tbill [t-1]	0.03	−0.00	4.41
	(0.43)	(−0.08)	(0.91)
RecProb*Term [t-1]	0.00**	0.00***	0.06***
	(2.40)	(2.93)	(2.69)
RecProb*CAPE [t-1]	−0.00**	−0.00***	−0.05
	(−2.31)	(−2.74)	(−1.64)
RecProb*Default [t-1]	−0.00*	−0.00**	−0.13
	(−1.72)	(−2.02)	(−0.85)
Tbill_3m [t-1]	−2.48	−1.67	−2.46**
	(−1.47)	(−0.86)	(−2.20)
Term [t-1]	−0.01	−0.01	−0.00
	(−0.76)	(−1.38)	(−0.30)
CAPE [t-1]	−0.01	0.00	−0.01
	(−0.76)	(0.10)	(−1.53)
Default [t-1]	0.08	0.09	0.04
	(1.46)	(1.51)	(0.95)
Constant	2.45	0.52	3.56
	(0.84)	(0.16)	(1.64)
Observations	570	566	740

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: Expected and unexpected returns

	Diff. Rec_Prob	Diff. Rec_Prob_GDP	Diff. GDP
Predict_CAPE	−0.36***	−0.53***	−0.15**
	(−4.07)	(−5.83)	(−2.13)
Unexp_CAPE	−0.62	−0.45	−0.55*
	(−1.63)	(−1.17)	(−1.72)
Observations	570	566	740

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table B.4: Presidential Puzzle and change in power [Robustness check]

The table reports the average realized excess market return difference between Republicans and Democrats during the first presidential term following a change in political power for the time period of 1927 to 2014. The Democrat dummy captures the return difference between Democratic and Republican presidencies. We control for different parts of the first term following a change in power of the Nixon (1969) and G. W. Bush (2001) presidency. We employ different excess return measures in each Panel. The header of each column reports the dependent variable. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

Panel A: VW-INFL

	VW-INFL	VW-INFL	VW-INFL	VW-INFL	VW-INFL	VW-INFL
Democrat[t-1]	0.85*	0.33	0.25	0.60	0.58	0.62
	(1.72)	(0.58)	(0.51)	(1.20)	(1.18)	(1.28)
First Term		−1.09				
		(−1.60)				
First Half			−2.60***			
			(−3.03)			
First Year				−2.37**		
				(−2.17)		
Second Year					−2.16*	
					(−1.77)	
First Term Recession						−2.30
						(−1.65)
Constant	0.31	0.84*	0.93***	0.58*	0.58*	0.54
	(0.93)	(1.96)	(2.78)	(1.68)	(1.75)	(1.64)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: EW-TBL

	EW-TBL	EW-TBL	EW-TBL	EW-TBL	EW-TBL	EW-TBL
Democrat[t-1]	1.43**	1.20	0.85	1.24*	1.11	1.16*
	(2.08)	(1.62)	(1.24)	(1.78)	(1.62)	(1.70)
First Term		−0.48				
		(−0.52)				
First Half			−2.52**			
			(−2.07)			
First Year				−1.79		
				(−1.11)		
Second Year					−2.61	
					(−1.54)	
First Term Recession						−2.82
						(−1.43)
Constant	0.38	0.61	0.98**	0.58	0.70	0.66
	(0.85)	(1.18)	(2.19)	(1.26)	(1.59)	(1.52)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel C: EW-INFL

	EW-INFL	EW-INFL	EW-INFL	EW-INFL	EW-INFL	EW-INFL
Democrat[t-1]	1.25*	0.91	0.66	1.06	0.91	0.98
	(1.82)	(1.24)	(0.95)	(1.52)	(1.33)	(1.43)
First Term		−0.72				
		(−0.79)				
First Half			−2.60**			
			(−2.13)			
First Year				−1.81		
				(−1.12)		
Second Year					−2.74	
					(−1.61)	
First Term Recession						−2.83
						(−1.43)
Constant	0.53	0.88*	1.15**	0.73	0.87*	0.80*
	(1.17)	(1.71)	(2.57)	(1.58)	(1.96)	(1.86)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table B.5: Presidential Puzzle and no change in power [Robustness check]

The table reports the average realized excess market return difference between Republicans and Democrats during the presidential term following an election, which did not result in a change in political power, for the time period of 1927 to 2014. The Democrat dummy captures the return difference between Democratic and Republican presidencies. We control for different potential exogenous shocks. We employ different excess return measures in each Panel. The header of each column reports the dependent variable. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

Panel A: VW-INFL

	VW-INFL	VW-INFL	VW-INFL	VW-INFL
Democrat[t-1]	0.50	0.35	−0.11	−0.33
	(1.03)	(0.72)	(−0.28)	(−0.87)
Oil Shock		−1.90	−2.36	−2.58
		(−1.17)	(−1.48)	(−1.63)
Great Depression			−3.38	−3.60
			(−1.48)	(−1.58)
Great Recession				−5.03**
				(−2.33)
Constant	0.11	0.26	0.72**	0.94***
	(0.27)	(0.63)	(2.51)	(3.53)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: EW-TBL

	EW-TBL	EW-TBL	EW-TBL	EW-TBL
Democrat[t-1]	1.26**	1.13*	0.61	0.38
	(2.02)	(1.80)	(1.20)	(0.76)
Oil Shock		−1.64	−2.16	−2.40
		(−0.77)	(−1.03)	(−1.14)
Great Depression			−3.82	−4.05
			(−1.31)	(−1.39)
Great Recession				−5.17**
				(−2.03)
Constant	−0.23	−0.10	0.42	0.66**
	(−0.45)	(−0.19)	(1.23)	(2.00)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel C: EW-INFL

	EW-INFL	EW-INFL	EW-INFL	EW-INFL
Democrat[t-1]	0.93	0.77	0.35	0.11
	(1.49)	(1.23)	(0.68)	(0.21)
Oil Shock		−2.00	−2.42	−2.66
		(−0.92)	(−1.14)	(−1.25)
Great Depression			−3.10	−3.35
			(−1.06)	(−1.15)
Great Recession				−5.41**
				(−2.25)
Constant	−0.03	0.13	0.55	0.79**
	(−0.06)	(0.25)	(1.59)	(2.39)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Table B.6: Presidential Puzzle and exogenous shocks [Robustness check]

The table reports the average realized excess market return difference between Republicans and Democrats for the time period of 1927 to 2014. The Democrat dummy captures the return difference between Democratic and Republican presidencies. We control for different potential exogenous shocks and for different parts of the first term following a change in power of the Nixon (1969) and G. W. Bush (2001) presidency. We employ different excess return measures in each Panel. The header of each column reports the dependent variable. We use Newey and West (1987a) standard errors. See Appendix B.1 for a definition of all variables.

Panel A: VW-INFL

	VW-INFL	VW-INFL	VW-INFL	VW-INFL	VW-INFL
Democrat[t-1]	−0.01	0.14	0.13	0.15	0.27
	(−0.02)	(0.45)	(0.41)	(0.48)	(0.86)
Oil Shock	−1.80*	−1.67	−1.67	−1.65	
	(−1.71)	(−1.59)	(−1.59)	(−1.57)	
Great Depression	−3.64*	−3.50*	−3.50*	−3.48*	−3.36
	(−1.75)	(−1.68)	(−1.68)	(−1.67)	(−1.61)
Great Recession	−3.36*	−3.26	−3.26	−3.25	−3.15
	(−1.65)	(−1.61)	(−1.61)	(−1.60)	(−1.56)
First Half	−2.60***				
	(−3.17)				
First Year		−2.54**			−2.39**
		(−2.41)			(−2.27)
Second Year			−2.37**		
			(−1.98)		
First Term Recession				−2.53*	
				(−1.84)	
Constant	0.94***	0.79***	0.79***	0.77***	0.63***
	(4.41)	(3.63)	(3.71)	(3.63)	(2.80)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Panel B: EW-TBL

	EW-TBL	EW-TBL	EW-TBL	EW-TBL	EW-TBL
Democrat[t-1]	0.64	0.79*	0.73*	0.75*	0.95**
	(1.52)	(1.88)	(1.76)	(1.81)	(2.22)
Oil Shock	−2.12	−1.98	−2.02	−2.01	
	(−1.59)	(−1.49)	(−1.52)	(−1.51)	
Great Depression	−4.52*	−4.37*	−4.42*	−4.40*	−4.20
	(−1.71)	(−1.65)	(−1.67)	(−1.66)	(−1.59)
Great Recession	−3.03	−2.92	−2.95	−2.94	−2.79
	(−1.14)	(−1.10)	(−1.11)	(−1.11)	(−1.06)
First Half	−2.36**				
	(−2.02)				
First Year		−1.83			−1.67
		(−1.17)			(−1.06)
Second Year			−2.62		
			(−1.58)		
First Term Recession				−2.86	
				(−1.47)	
Constant	0.82***	0.66**	0.72***	0.70***	0.48*
	(3.03)	(2.39)	(2.64)	(2.59)	(1.68)

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

Panel C: EW-INFL

	EW-INFL	EW-INFL	EW-INFL	EW-INFL	EW-INFL
Democrat[t-1]	0.42	0.58	0.51	0.54	0.74^{*}
	(0.99)	(1.37)	(1.23)	(1.29)	(1.72)
Oil Shock	−2.16	−2.02	−2.07	−2.05	
	(−1.61)	(−1.50)	(−1.54)	(−1.52)	
Great Depression	−3.76	−3.61	−3.66	−3.64	−3.43
	(−1.42)	(−1.36)	(−1.39)	(−1.38)	(−1.30)
Great Recession	−3.07	−2.96	−2.99	−2.98	−2.82
	(−1.19)	(−1.16)	(−1.17)	(−1.16)	(−1.11)
First Half	-2.39^{**}				
	(−2.05)				
First Year		−1.82			−1.64
		(−1.16)			(−1.05)
Second Year			−2.71		
			(−1.63)		
First Term Recession				−2.84	
				(−1.45)	
Constant	0.95^{***}	0.78^{***}	0.84^{***}	0.82^{***}	0.60^{**}
	(3.48)	(2.80)	(3.09)	(3.01)	(2.06)

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Chapter 4

Macroeconomic shocks and the cross-section of investment flexibility

4.1 Introduction

Several empirical studies document a relationship between firm characteristics and stock returns.[1] The most prominent return patterns are size, book-to-market, investment intensity, and profitability premium.[2] However, the source of these return patterns is hot debated. Mispricing and risk are two potential explanations for these empirical return patterns (e.g., Daniel and Titman (1998); Daniel et al. (2001)). This chapter empirically investigates a risk-based explanation for these return patterns forwarded in several theoretical investment-based asset-pricing studies. These studies suggest that the ability of a firm to adjust its capital stock in response to an aggregate shock is a major determinant

[1]I am grateful for helpful comments and suggestions from Ernst Maug, Erik Theissen, and seminar participants at the university of Mannheim. All errors are my own.

[2]These patterns are incorporated into the widely used Fama-French factor models. See Fama and French (2016) for a comprehensive overview.

for the riskiness of a firm's stock (e.g., Jermann (1998); Cooper (2006); Livdan et al. (2009)). In this framework, corporate investment works as a smoothing mechanism for corporate payouts, resulting in less pro-cyclical payout patterns. Firms that can easily adjust their capital stock in response to an aggregate shock are able to smooth their payouts, and therefore these firms are less risky and earn lower expected returns compared to firms that are unable to adjust their capital stock in response to an aggregate shock. In the literature, this ability of a firm to adjust its capital stock is called investment flexibility.

Recent theoretical models suggest that firm characteristics proxy for investment flexibility (Zhang (2005); Livdan et al. (2009)). These models assume that firm characteristics are related to capital adjustment costs, which are a main determinant of investment flexibility. High adjustment costs decrease the flexibility of a firm to adjust its capital stock in response to an aggregate shock. For example, Zhang (2005) argues that costly investment reversibility is binding for value firms, limiting the ability of value firms to reduce their capital stock in response to negative aggregate shocks. Therefore, value firms have idle capacity during negative aggregate shocks. Livdan et al. (2009) argue that financial frictions increase the costs of expanding a firm's capital stock. They show that small firms and low profitability firms have higher financing costs, which reduce the ability of small and unprofitable firm to expand their capital stock in response to a positive aggregate shock. As a result, value firms, small firms, and unprofitable firms are more constrained in using corporate investment as a tool to smooth their payout streams, leading to more pro-cyclical payouts compared to growth firms, large firms, and profitable firms.

To the best of my knowledge, no study has empirically examined the relation between firm characteristics and investment flexibility as a source of risk. This study fills this void by investigating whether a link exists between investment flexibility and well-known asset-pricing patterns related to size, book-to-market, profitability, and investment intensity. The main results of this study are that investment flexibility is related to these firm characteristics and that capital adjustment costs are negatively related to investment flexibility.

To test the investment flexibility hypothesis, I employ quarterly data from Compustat spanning the time period of 1986 to 2013. The data set consists of 447,544 firm-quarter observations. The proxy for investment flexibility is a firm's investment sensitivity to an aggregate shock. To measure this investment sensitivity, I use a standard q-theory-based panel regression with investment intensity as the main dependent variable and a proxy for an aggregate shock as the variable of interest. The three proxies for an aggregate shock are: recessions, a proxy for the market risk premium, and political uncertainty. All three proxies are related to higher stock market volatility and higher market risk premium (Hamilton and Lin (1996a); Pástor and Veronesi (2013)) and affect the optimal capital level of firms by altering marginal q.[3] For the overall sample, I can confirm that firms reduce their investment intensity in response to all three proxies for an aggregate shock. The panel regression also includes firm fixed effects and time fixed effects to control for unobservable heterogeneity.

In a first step, I investigate the relation between the firm characteristics of interest and investment flexibility. I focus on the four asset-pricing patterns that are incorporated into the Fama-French 5-factor model. For this purpose, I construct decile portfolios based on size, Tobin's Q, investment intensity, and profitability. I conduct a panel regression for each of the forty decile portfolios to investigate whether there are cross-sectional differences in investment flexibility.[4] For the Tobin's Q and investment intensity portfolio sorts,

[3]A change in the market risk premium impacts marginal q directly by changing the market value of the investment project and uncertainty affects the option value to delay investment, which also leads to a change in marginal q.

[4]There are four firm characteristics, and I construct ten decile portfolios for each characteristic, resulting

a strong positive relationship between these firm characteristics and investment flexibility is present. This finding is in line with the assumptions of Zhang (2005) and Cooper (2006). High q firms (high investment intensity firms) react up to three time (five times) more sensitively to the occurrence of aggregate shocks compared to low q firms (low investment intensity firms). For size, I also find a comparable but weaker pattern, especially for changes in political uncertainty and in the market risk premium. Large firms show an investment flexibility up to three times higher than small firms. This difference in investment flexibility is driven by the lower investment sensitivity of small firms towards aggregate shocks, supporting the notion that small firms face higher investment frictions such as higher costs of financing (e.g., Cabral and Mata (2003); Livdan et al. (2009)). For profitability-based portfolios, only very profitable firms show a distinct investment pattern by reacting especially sensitively to aggregate shocks. In conclusion, the empirical results are in line with the model predictions of Zhang (2005) and Livdan et al. (2009), in which firm characteristics proxy for investment flexibility.

In a next step, I identify the source of the cross-sectional heterogeneity of investment flexibility for the forty decile portfolios. I investigate whether, as proclaimed by Zhang (2005) and Livdan et al. (2009), costs of expanding (reducing) capital stock are the driver of the cross-sectional heterogeneity of investment flexibility for the decile portfolios. I base my investigation on Tobin's Q, size, investment intensity, and profitability. I employ a standard investment panel regression to measure the investment sensitivity to Tobin's Q as a proxy for capital adjustment speed (e.g., Jermann (2010); Kogan and Papanikolaou (2010)). Firms with a higher capital adjustment speed should incur lower costs when expanding their capital stock. I document that investment flexibility is positively related to capital adjustment speed for the portfolios based on size, investment intensity, and profitability. For the

in forty decile portfolios.

Tobin's Q sorted portfolios, I find lower adjustment speed for growth firms. This finding is in line with the argument by Zhang (2005). He argues that growth firms have to incur higher costs when expanding their capital stock compared to value firms because growth firms do not have idle capacity, which could be brought to use during expansions. To test for this idle capacity assumption, I study the investment behavior during expansions and the disinvestment behavior during recessions for firms sorted into Tobin's Q-based portfolios. In support of Zhang's (2005) argument, I document that value firms disinvest more during recessions and invest less during expansion compared to growth firms. This finding is in line with the idea that investment irreversibility is the main driver of the investment inflexibility of value firms. All in all, I find empirical support for the model assumptions of Zhang (2005) and Livdan et al. (2009) that capital adjustment costs are the main determinant of investment flexibility. Moreover, the results confirm that costs related to capital expansion are related to the cross-sectional heterogeneity in investment flexibility for size, profitability, and investment intensity and that costs related to capital reduction are related to the cross-section heterogeneity in investment flexibility for Tobin's Q.

Finally, I investigate whether investment flexibility is related to expected stock returns. For each firm in the sample, I employ rolling window regressions to measure the investment sensitivity towards the proxy for the market risk premium. Subsequently, I construct investment flexibility-based portfolios to test whether firms with a low investment sensitivity to the market risk premium earn higher (abnormal) returns compared to firms with a high investment sensitivity. For the value-weighted portfolio sorts, I document that firms with low investment flexibility earn higher raw and abnormal returns compared to firms with high investment flexibility. The most inflexible firms earn up to 0.587% higher abnormal returns per month compared to the most flexible firms in the sample. This pattern is mostly driven by the lower and even negative abnormal returns for firms with a very high investment flexibility. However, after controlling for the investment factor by employing the Fama-French-5-Factor model, the abnormal return difference is positive but statistically insignificant. In general, the empirical evidence for the value-weighted portfolios supports the hypothesis that investment flexibility is negatively related to stock returns, as forwarded by multiple theoretical studies (e.g., Jermann (1998); Cooper (2006); Livdan et al. (2009)). For the equally-weighted portfolios sorts, I do not observe a statistically significant difference in raw and abnormal returns between flexible and inflexible firms, indicating that the investment flexibility effect is mostly present for larger firms.

This chapter is directly related to the investment-based asset-pricing literature. The study by Cochrane (1991) builds the foundation of this literature and establishes the link between investment returns and stock returns. Cochrane also employs a measure of aggregate investment returns to price stocks in the cross-section (Cochrane (1996)). Later studies use real-option models to explain stock returns in the cross-section (e.g., Berk et al. (1999); Carlson et al. (2004); Zhang (2005); Cooper (2006)). This study is the first study I am aware of that empirically examines investment flexibility as a potential driver for the cross-sectional dispersion in stock returns. I find evidence in favor of the prediction forwarded by multiple studies (e.g., Jermann (1998, 2010)) that investment flexibility is negatively related to stock returns. Moreover, I document that the cross-sectional dispersion in investment flexibility is related to firm characteristics known to be related to asset-pricing patterns such as size, book-to-market, and investment intensity. This finding supports the notion by Zhang (2005) and Livdan et al. (2009) that investment flexibility is related to these asset-pricing patterns.

This chapter is also closely related to empirical studies that test the q-theory of investment and real-option models by investigating the impact of aggregate shocks on investment intensity (e.g., Lettau and Ludvigson (2002); Julio and Yook (2012); Gulen and Ion (2016)). Aggregate shocks related to higher market risk premium and higher uncertainty should lead to a reduction in investment intensity because the value of investment opportunities decreases and the option value to postpone investment increases. In their test of the implications of the q-theory, Lettau and Ludvigson (2002) empirically examine the relation between aggregate investment and the time variation in the market risk premium. The authors show that firms reduce their investment intensity in response to an increase in the market risk premium. Julio and Yook (2012) and Gulen and Ion (2016) examine the impact of political uncertainty on aggregate investment and document that firms stop investing during times of political uncertainty. I extend this strand of literature by investigating the cross-sectional dispersion in investment intensity in response to aggregate shocks and by relating these cross-sectional differences to capital adjustment costs.

4.2 Hypotheses development

The asset-pricing literature identifies several return patterns. The most prominent patterns are related to size, book-to-market, profitability, and investment intensity. These patterns have resulted in new asset-pricing models such as the Fama-French-5-factor model. The objective of this analysis is to examine the relation between these four return patterns and investment flexibility. Recent studies in the investment-based asset-pricing literature forward the idea that the ability of a firm to adapt its capital stock in response to an aggregate shock determines the riskiness of a firm (e.g., Jermann (1998); Cooper (2006); Livdan et al. (2009)). Intuitively, asset payoffs that are positively correlated with systematic risk are riskier than payoffs that are uncorrelated with systematic risk (e.g., Jermann (2010)). Corporate investment activity enables firms to smooth their payout streams by increasing (decreasing) investment in response to positive (negative) aggregate shocks. This adjustment in capital stock leads to a lower increase (decrease) in payout relative to an increase (decrease) in cash flow before investment activity. So, investment can act as a buffer for payout streams. Firms that can easily adapt their capital stock in response to an aggregate shock can use the buffer effect of investment and are therefore less risky compared to firms that are inflexible in their investment decisions and are unable to use the buffer effect. Hence, higher expected returns are a result of investment inflexibility.

- Hypothesis 1: *Firms with a lower investment flexibility have higher expected returns compared to firms with a higher investment flexibility.*

To measure investment flexibility, I employ three proxies to identify aggregate shocks: recessions, political uncertainty, and changes in the market risk premium. Empirically, several studies show that political uncertainty and recessions are related to higher market risk premia and higher uncertainty (e.g., Hamilton and Lin (1996a); Pástor and Veronesi (2013)). An increase in the market risk premium should trigger a decrease in investment intensity because high expected market returns decrease marginal q and therefore reduce the level of a firm's optimal capital stock. Further, higher uncertainty increases the option value to delay investment, which should also lead to lower investment intensity. For example, Gulen and Ion (2016) present evidence that firms delay investment projects in the face of political uncertainty.

- Hypothesis 2: *Recessions, an increase in political uncertainty, and an increase in the market risk premium should be related to a decrease in investment intensity.*

Recent studies directly model the dynamic investment optimization problem of firms to make predictions about the cross-section of returns (e.g., Berk et al. (1999); Kogan (2004);

Zhang (2005); Cooper (2006)). The investment flexibility concept is a key component for several real-option models to explain the cross-section of returns (e.g., Zhang (2005); Cooper (2006); Livdan et al. (2009)). These studies implement different capital adjustment cost functions, which cause cross-sectional differences in the investment flexibility of firms to generate cross-sectional variation in stock returns.[5] These studies distinguish between costs related to capital expansion and costs related to capital reduction.

Costly investment reversibility is forwarded as a source of the value premium, the observation that value firms earn higher returns compared to growth firms. To derive the value premium as a result of a firm's investment flexibility, these models implement different adjustment cost functions such as asymmetric adjustment costs (Zhang (2005)) and irreversible investment (Kogan (2004); Cooper (2006)). All these models predict that low q firms are burdened with excess capacity following a negative aggregate shock such as a recession. Optimally, low q firms should reduce their capital stock in response to a negative shock because, for low q firms, it is more likely for low q firms that marginal q drops below one following a negative aggregate shock. However, capital reduction is very costly, and therefore low q firms postpone disinvestment. This postponement results in excess capacity. This excess capacity is the source of higher systematic risk. Carlson et al. (2004) implement into their model operating leverage, which makes excess capacity expensive and leads to pro-cyclical returns. In the model by Zhang (2005) and Cooper (2006), low q firms are unable to use the buffer effect of investment to smooth the payout to equity holders in response to systematic shocks. Hence, expected returns are high because payouts to equity holders of low q firms behave more pro-cyclical.

[5]Adjustment costs are a main determinant of the time-series variation in investment and stock returns (Cochrane (1991); Jermann (1998, 2010)). Further, Liu et al. (2009) show theoretically that adjustment costs are also necessary to relate investment returns directly to firm characteristics.

- Hypothesis 3: *Value firms have a lower investment flexibility compared to growth firms due to costly investment reversibility.*

Costly investment expansion is another source for cross-sectional differences in investment flexibility and expected returns. Two recent studies directly link firm size, investment expansion costs, and stock returns. Li and Zhang (2010) and Livdan et al. (2009) assume that smaller firms face higher financing costs compared to larger firms, resulting in lower investment flexibility.[6] Fazzari et al. (1988) and Cabral and Mata (2003) also relate a more gradual investment pattern of small firms, the empirical observation of higher autocorrelation of investment for small firms, to financial frictions and therefore higher investment expansion costs. Higher investment expansion costs reduce the adjustment speed to the optimal capital level, resulting in a gradual investment pattern and lower investment flexibility (e.g., Jermann (2010); Kogan and Papanikolaou (2010)). Therefore, the size premium, the observation that small firms earn higher returns compared to large firms, should be related to investment flexibility. Small firms are less flexible in adjusting their capital stock compared to large firms due to higher financing costs for small firms.

- Hypothesis 4: *Small firms have a lower investment flexibility compared to large firms because small firms face higher capital expansion costs.*

A recent finding is that low profitability firms show lower expected returns compared to high profitability firms (e.g., Fama and French (2015)). Following the investment flexibility concept, this return anomaly should not be a result of differences in investment flexibility because high profitability firms should show a higher investment flexibility compared to

[6]The assumption of higher financial frictions for small firms is built on the literature about financial frictions and corporate investment, which employs firm size as a proxy for financial frictions (e.g., Fazzari et al. (1988); Almeida and Campello (2007)). Financial frictions such as financing costs are a prominent example of investment frictions and are a source of investment inflexibility.

low profitability firms. High profitability firms, which generate sufficient internal cash flows, should be able to react more flexibly to aggregate shocks because those firms face lower financing costs compared to low profitability firms (e.g., Livdan et al. (2009)). Hence high profitability firms should show higher investment flexibility compared to low profitability firms because high profitability firms face lower financial frictions and therefore lower capital expansion costs.

- Hypothesis 5: *Low profitability firms have a lower investment flexibility compared to high profitability firms due to higher capital expansion costs.*

Recent asset-pricing studies show that firms with high investment intensity show lower expected returns compared to firms with low investment intensity (e.g., Cooper et al. (2008)). If investment flexibility is the explanation for this anomaly, high investment intensity firms should show higher investment flexibility compared to low investment intensity firms. There are two potential sources for the higher investment flexibility of high investment intensity firms compared to low investment intensity firms. First, high investment intensity firms have lower cost of capital reduction compared to low investment intensity firms. This follows the argument by Zhang (2005) and Cooper (2006) about the source of the value premium because the investment anomaly is closely related to the value premium (e.g., Fama and French (2015)). This is also in line with investment theory, which predicts that firms with more investment opportunities should show higher investment intensities.

Second, high investment intensity firms have lower capital expansion cost compared to low investment intensity firms. Optimally, firms with high capital expansion costs should increase their capital stock gradually to reach their optimal capital levels (e.g., Jermann (2010); Kogan and Papanikolaou (2010)). Therefore, firms with higher capital expansion costs show lower investment intensities compared to firms with lower investment expansion costs.

- Hypothesis 6a: *Low investment intensity firms have a lower investment flexibility compared to high investment intensity firms due to higher capital expansion costs.*
- Hypothesis 6b: *Low investment intensity firms have a lower investment flexibility compared to high investment intensity firms due to higher capital reduction costs.*

4.3 Data and methodology

In this section, I describe the empirical design of this study and the data used. I classify the data into accounting and macroeconomic data.

4.3.1 Methodology

I employ a panel regression commonly used to test the q-theory of investment to measure investment flexibility, defined as the ability of a firm to adapt its capital stock in response to aggregate shocks such as recessions. The empirical setup is a direct result of the q-theory. As a result, the main investment regression takes the following form:

$$\mathrm{Investment}_{i,t} = \alpha_i + \beta_1 \mathrm{Inter}_{i,t-l} + \beta_2 \mathrm{Shock}_{t-l} + \beta_3 \mathrm{Firm}_{i,t-l} + \mathrm{Controls} + \mathrm{Time}_t + \varepsilon_{it} \tag{4.1}$$

where the main dependent variable *Investment* is measured as capital expenditures scaled by lagged total assets. In all specifications, *i* indexes firms, *t* indexes calendar quarters, and $l \in \{1,2,3,4\}$ stands for the lead between the investment variable and the explanatory variables. *Lamont (2000)* shows that a lag exists between investment planning and execution, demanding a lag structure within the empirical design. The α_i is firm fixed effects and *Time* represents quarter-year fixed effects. I include the firm characteristics of interest *Firm* (Tobin's Q, investment intensity, size, and profitability) and its interactions with the *Shock* variable, *Inter*, into the regression design.[7] The macroeconomic shock variable *Shock* is a market-wide shock. The interaction term, *Inter*, allows me to include a quarter-year fixed effects, *Time*, into the regression specification. As a result, the *Shock* variable, which is constant for all firms within one calendar year quarter, is captured by the time fixed effect, and therefore this coefficient is not displayed in the results section. Depending on the regression specification, I include Tobin's Q, cash flow over lagged total assets, and sales growth as *Controls*. Contrary to the prediction of the q-theory, cash flow variables have strong economic and statistical explanatory power, as confirmed in Table 4.2. Potential reasons for this finding are that financial constraints have a significant effect on investment (Fazzari et al. (1988)) or that cash flow proxies for future profitability expectations not gauged by Tobin's Q (Alti (2003); Erickson and Whited (2006)). Therefore, I include a cash flow proxy as a further main control variable. I adjust the regression's standard errors for heteroscedasticity and cross-sectional correlation using clustered standard errors at the firm level.

[7]This empirical design is motivated by studies concerned with the impact of the informational environment of firms on the investment sensitivity to Tobin's Q (e.g., Chen et al. (2007); Foucault and Frésard (2012)).

4.3.2 Accounting data

I use quarterly firm-level accounting data from Compustat. The sample spans the time period from January 1987 to December 2013. I deflate all my main variables by total assets to ensure that the results are not dominated by large firms. I exclude financials (SIC between 6000 and 6999), utilities (SIC between 4900 and 4999), and all firms with total assets, sales, or book equity smaller or equal to zero, resulting in a sample of 10,412 unique firms over 108 quarters for a total of 447,544 firm quarter observations. Finally, I winsorize all variables at the 1st and 99th percentiles to reduce the impact of data errors and outliers.[8] Table 4.1 presents summary statistics for all variables employed in this study. The summary statistics confirm that the data employed in this study are comparable to other studies that use quarterly Compustat data (e.g., Gulen and Ion (2016)). Further, Appendix C.1 describes the construction of all variables in more detail.

4.3.3 Macroeconomic data

I employ three proxies for aggregate shocks: recessions, political uncertainty, and the market risk premium. First, I identify recessions and construct business cycle related variables by employing the FRED database.[9] I use the National Bureau of Economic Research (NBER) recession indicators to mark periods of economic contraction and economic expansion. The NBER Business Cycle Dating Committee defines a recession as "a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales."[10] I include all recessions and expansions in the United States since 1986. Three

[8] The results are robust to changes in these filters.
[9] https://fred.stlouisfed.org/
[10] http://www.nber.org/cycles/general_statement.html

recessions took place during this time period with a duration of 8 to 18 months.

Second, I employ the economic policy uncertainty index (*EPU*) developed by Baker et al. (2016) to measure policy uncertainty. It is a weighted average of three components: (1) news coverage of policy-related uncertainty, (2) number of federal tax code provisions set to expire in coming years, and (3) the extent of disagreement among macroeconomic forecasters. The index is normalized to 100. The variable of interest is *EPU* and corresponds to the logarithm of the EPU index.

The third variable of interest is the market risk premium, which should change as a result of economy-wide shocks such as recessions and political uncertainty. To forecast expected market returns, I employ established macrovariables such as price-earnings ratio (*CAPE*), term spread (*TS*), output gap (*GAP*), short rate (*TB3*) and default spread (*DFS*) (e.g., Chen et al. (1986); Fama and French (1988, 1989); Cooper and Priestley (2009)).[11] I do this on a monthly basis employing rolling window regressions:

$$r_{t+1} = \alpha + \beta_1 TS_t + \beta_2 DFS_t + \beta_3 GAP_t + \beta_4 TB3_t + \beta_4 CAPE_t + u_{t+1}, \tag{4.2}$$

where r_{t+1} is the excess log returns on the market. All other variables are also logged. Each month, I run this regression over all available historical data points and use the derived coefficients to predict the expected market returns for the upcoming month. I employ this approach to circumvent a look-ahead bias because managers at this time also had only historical information at hand to make predictions about future market returns.

To match the monthly macroeconomic shock data set with the quarterly firm-level accounting data, I use simple averages of the shock variables over the last three months.[12]

[11] I also employ different macroeconomic variables such as the dividend-price ratio. The results remain robust to these alternate specifications.

[12] For the recession variable, I use the quarter-end level.

Specifically, I match the macroeconomic shock data of month m with accounting data of fiscal quarter t ending in month m of firm i. The results are also robust to different matching conventions such as taking quarter-end levels.

Panel B of Table 4.1 shows summary statistics of the macroeconomic shock variables. Additionally, Panel C presents a correlation matrix for the three shock variables. The correlations show the expected signs. All variables of interest are positively correlated. In a next step, I check whether the macroeconomic shock variables have the expected impact on investment. Table 4.2 summarizes the results and confirms that all shock variables have a significant and negative impact on investment intensity. Moreover, Tobin's Q and cash flow over lagged total assets also have a positive and significant impact on investment intensity replicating prior findings.

4.4 Results

The analysis starts in Section 4.4.1 by employing a simple proxy for investment flexibility, the investment volatility, to test whether there are differences in investment flexibility in the cross-section. In Section 4.4.2, I conduct a time-series analysis by constructing decile portfolios on the basis of firm characteristics such as size, Tobin's Q, investment intensity, and profitability. In addition, I perform a panel data analysis, which is standard in the investment literature, conditional on the decile portfolio sort to take the cross-sectional variation within each decile into account, as well. In Section 4.4.3, I investigate the source of the cross-sectional variation in investment flexibility. Finally, Section 4.4.4 summarizes the results for the return analysis, which examines whether investment flexibility is indeed related to stock returns.

4.4.1 Standard deviation of investment intensity

The investigation starts with an analysis of the standard deviation of investment intensity, measured by capital expenditures over lagged total assets, as a new measure of investment flexibility. Firms with lower investment flexibility should also show a lower volatility in investment intensity because firms with a low level of investment flexibility increase their capital stock gradually to reach their optimal capital levels (e.g., Jermann (2010); Kogan and Papanikolaou (2010)). To measure the standard deviation of investment intensity conditional on the respective firm characteristic, I construct each calendar quarter decile portfolios, ranging from one (low) to ten (high), based on the firm characteristic of interest: size, Tobin's Q, investment intensity, and profitability. For each portfolio, I calculate the standard deviation of investment intensity over the entire sample period.

The results of this analysis are summarized in Figure 4.1. Figure 4.1a shows the standard deviation of investment intensity for the decile portfolios based on Tobin's Q. The standard deviation of investment intensity is two times larger for high q firms compared to low q firms. The same pattern is also visible for high investment intensity firms and low investment intensity firms, whereas the difference in the standard deviation for the investment intensity portfolios is much more pronounced compared to Tobin's Q based portfolios. Figure 4.1c presents the results for the size-based decile portfolios. Larger firms show a higher standard deviation of investment intensity compared to small firms. However the difference is less pronounced compared to those of Tobin's Q and investment intensity based portfolios. A low standard deviation of investment intensity for small firms is the driver of this difference in the standard deviation of investment intensity. This finding is in line with the idea that firm size is a proxy for investment frictions such as financial constraints, which should be especially binding for the smallest firms. Figure 4.1d summarizes the results for the profitability based decile portfolios. Firms with higher profitability show higher standard deviation of investment intensity compared to firms with lower profitability. This pattern is much weaker compared to the other firm characteristic based portfolios. Especially, low profitability firms show high standard deviation of investment intensity, which might be a result of liquidity restrictions forcing these firms to scale their investment in response to their liquidity levels, resulting in less stable investment intensity levels.

Generally, a pattern exists that is in line with hypotheses three to six, where firm characteristics associated with lower (higher) expected returns show higher (lower) levels of investment flexibility proxied by the standard deviation of investment intensity. In the upcoming section, I investigate this issue in more detail by employing aggregate shocks within a panel regression framework to gauge the investment flexibility of firms w.r.t. these shocks.

4.4.2 Investment flexibility and firm characteristics

Firm-level analysis

I start the analysis by conducting firm-level panel regressions conditional on the portfolio decile and present the investment sensitivities to the *Shock* variable, β, in Figures 4.2 to 4.4.[13] The regression does not include the terms: *Inter* and *Firm*. Therefore, I do not include time fixed effects in these specifications since doing so would mechanically absorb all the explanatory power of the macroeconomic shock variable. Instead, I include a set of calendar-quarter dummies to control at least for seasonality. Figure 4.2 summa-

[13] $Investment_{i,t} = \alpha_i + \beta Shock_{i,t-l} + Controls + \varepsilon_{it}$, where *i* indexes firms, *t* indexes calendar quarters, and $l \in \{1,2,3,4\}$ stands for the lead between the investment variable and the explanatory variables.

rizes the results for the recession analysis. For the Tobin's Q analysis, a clear pattern is visible that low q firms react especially insensitively towards the occurrence of recessions compared to high q firms. The investment sensitivity towards recessions increases almost monotonically from decile one to decile ten and is two times stronger for high q firms compared to low q firms. This result supports the model assumptions of Zhang (2005) and Cooper (2006), who claim that costly investment reversibility results in a lower degree of investment flexibility for low q firms compared to high q firms. The same but more pronounced pattern exists for the investment intensity based portfolios. Here, high intensity firms react almost ten times as sensitively towards recessions compared to low investment intensity firms. For the size analysis, I document that small firms show lower investment sensitivities towards recessions compared to large firms for higher lags of three and four quarters. Only very small firms show especially low investment sensitivities to recessions, supporting the idea from Livdan et al. (2009) that small firms are confronted with higher investment expansion costs. Further, I find that especially large firms, summarized in decile nine and ten, have lower investment sensitivities to shocks compared to medium-sized firms in decile five to seven. This might be a result of increasing complexity of firm operations with size, decreasing the adjustment speed in face of aggregate shocks. Figure 4.2d summarizes the results for the profitability-based portfolios and shows that high profitability firms react especially sensitively to recessions. This pattern is more pronounced for higher lags. Moreover, low and moderate profitable firms have comparable investment sensitivities to recessions.

Figure 4.3 shows the results for the political uncertainty analysis. For the Tobin's Q based portfolios and the investment intensity based portfolios, I document an increase in investment sensitivity to political uncertainty with Tobin's Q and investment intensity. High q firms (high investment intensity firms) react almost three times (five times) as sensitively to political uncertainty as low q firms (low investment intensity firms). For the size-based portfolios, small firms in the two bottom decile portfolios have the lowest investment sensitivity towards political uncertainty. All other portfolios show comparable investment sensitivities to political uncertainty. Again, this supports the notion that small firms face higher investment frictions compared to large firms. The profitability-based portfolios do not show a clear pattern in investment flexibility to political uncertainty. Only for higher lags profitable firms have higher investment sensitivities to political uncertainty compared to low and moderate profitable firms.

Figure 4.4 summarizes the results for the market risk premium analysis. Here a clear pattern emerges for all portfolio sorts. Investment sensitivity towards changes in the market risk premium increases almost monotonically from the bottom decile to the top decile. Size, profitability, and investment intensity based portfolios show the most pronounced patterns. For the Tobin's Q based portfolios, a drop in investment flexibility for high q firms in the top decile portfolio is visible. Still, a strong increase in investment sensitivity to changes in the market risk premium is present for the q-based portfolios from decile one to decile nine with sensitivities three times stronger for firms in the ninth decile compared to firms in the first decile.

Subsequently, I conduct a panel regression for the overall sample to test whether the differences in investment sensitivity to macroeconomic shocks are statistically significant and robust to the inclusion of quarter-year fixed effects. The results are summarized in Table 4.3. Panel A shows the result for the recession analysis and confirms previous findings that firms in the top decile react more sensitively to recessions compared to firms in the bottom decile for all portfolio sorts. For all specifications, the interaction term shows the expected sign and is almost always statistically significant, especially for regression specifications with higher lags. This pattern might be caused by the definition of the NBER recession indicator, which marks the begin and end point of a recession. These turning points are only publicly known a long time after the recession already occurred. However, in real time the management might realize at a later point in time that a recession had already started and adapt the firm's operations correspondingly. This belated reaction by managers might result in the observed delayed response to recessions.

Panel B shows that the investment sensitivity to political uncertainty is also significantly positively related to the four firm characteristics of interest. Hence, investment sensitivity to political uncertainty is higher for firms in the top decile portfolio compared to firms in the bottom decile portfolio. Again, this pattern is especially pronounced for the investment intensity based portfolios.[14]

Panel C summarizes the findings of the market risk premium analysis and confirms prior findings that firms in the top decile portfolios show larger investment sensitivities to a change in the market risk premium compared to firms in the bottom decile portfolios. This pattern is present for all portfolio sorts, confirming that the observed patterns in Figure 4.2 to 4.4 are statistically significant. I repeat this analysis employing the raw data instead of decile portfolios as my *Firm* variable. These results are summarized in Table C.2 in the appendix and show that the findings are robust.

To grasp the economic significance of these results, a doubling of the market risk premium would translate into a decrease in investment intensity of 0.0159% for firms in the bottom decile and of 0.159% for firms in the top decile of the Tobin's Q sorted portfolios. These results correspond to a 1.02% decrease for low q-firms (decile one) and of 10.21% decrease for high q firms (decile ten) in investment intensity relative to the overall sample mean of

[14]I do not consider a dynamic panel data framework for the investment intensity analysis because T is relatively large in my sample (4 x 27 = 108), which should reduce the bias considerably.

investment intensity (1.558%). Hence, a difference of 9.18% between value and growth firms would emerge. For the investment intensity based portfolios, this difference is 28.13%, for the size-based portfolio 13.58%, and for the profitability-based portfolio 11.96% relative to the average investment intensity if the market risk premium was to double.

In conclusion, the firm characteristics show the hypothesized relation to investment flexibility. Investment intensity and Tobin's Q-based portfolios show the strongest association with investment flexibility with an almost monotonic increase in investment flexibility with investment intensity and Tobin's Q. By comparison, the results for the profitability-based portfolios are less coherent. Highly profitable firms show a higher degree of investment flexibility compared to low profitability firms although empirically very profitable firms have the highest expected returns. This finding indicates that investment flexibility is not a major contributor to the profitability return premium, assuming that investment flexibility is negatively related to expected return, which I test in a later subsection. For the size-based portfolios, I also document the expected relationship that small firms show the lowest degree of investment flexibility, which is also in line with the empirical pattern that small firms show higher expected returns compared to large firms. These findings support the hypotheses three to six. In the upcoming subsection, I employ aggregate data to test the robustness of the results.

Portfolio analysis

This analysis employs aggregate data to reduce noise. Therefore, I construct each calendar quarter decile portfolios based on the firm characteristics of interest: size, Tobin's Q, investment intensity, and profitability. As a result, I have ten portfolios per firm characteristic per month. This empirical setup is motivated by the work of Lettau and Ludvigson

(2002), who employ a comparable setup to investigate the impact of changes in the market risk premium proxied by macroeconomic variables on aggregate investment. Because I use aggregate data, I run the following simplified panel regression for each firm characteristic of interest without additional firm-specific control variables:

$$\mathrm{Investment}_{i,t} = \beta_1 \mathrm{Inter}_{i,t-l} + \beta_2 \mathrm{Shock}_{i,t-l} + \beta_3 \mathrm{Firm}_{i,t-l} + \mathrm{Time}_t + \varepsilon_{it} \quad (4.3)$$

where the main dependent variable *Investment* is measured as capital expenditures scaled by lagged total assets, as it is common in the investment literature (e.g., Foucault and Frésard (2012)). In all specifications, *i* indexes firm decile, *t* indexes calendar quarter years, and $l \in \{1,2,3,4\}$ stands for the lead between the investment variable and the explanatory variables. *Shock* is the macroeconomic shock of interest. *Firm* is the decile portfolio of the firm characteristic of interest, and therefore it captures the portfolio fixed effects. *Inter* is the interaction term of the *Shock* variable and *Firm* variable. This interaction term allows the inclusion of quarter-year fixed effect, *Time*, into the regression specification. As a result the *Shock* variable, which is constant for all decile portfolios within one calendar quarter, is captured by the time fixed effect, and therefore this coefficient is not displayed in the results section. I adjust the regression's standard errors for heteroscedasticity and cross-sectional correlation using clustered standard errors at the decile level.

In a first step, I run the regression specification for each firm characteristic based decile separately without including time fixed effects, decile fixed effects, and the terms: *Inter* and *Firm.* I examine the investment sensitivity β to the aggregate shock variable for each decile portfolio separately.[15] Figures 4.5 to 4.7 summarize the results by displaying the

[15] $\mathrm{Investment}_{i,t} = \alpha + \beta_1 \mathrm{Inter}_{i,t-l} + \beta \mathrm{Shock}_{i,t-l} + \varepsilon_{it}$, where *i* indexes firm decile, *t* indexes calen-

investment sensitivity β to the aggregate shock for each firm characteristic based decile. Figure 4.5 shows the sensitivities towards recessions. For Tobin's Q, I document that high q firms react more sensitively towards the occurrence of recessions compared to low q firms. This effect is especially pronounced for the high q portfolios nine and ten, showing a shock sensitivity that is up to 50% higher compared to portfolio one. A comparable but stronger pattern is present for the investment intensity based portfolios. High investment intensity firms have a much higher sensitivity towards the occurrence of recessions compared to low investment intensity firms showing investment sensitivities that are almost ten times stronger compared to low investment intensity firms. For the size decile analysis, no obvious pattern is visible. Large and small firms have comparable investment sensitivities towards recessions. Only for higher lags of two to four quarters, I document an increase in investment sensitivity towards recessions with size. However, very large firms, decile nine and ten, show a strong decrease in investment sensitivities towards recessions. Figure 4.5d summarizes the results for the profitability based decile portfolios. Low profitability firms show lower investment sensitivities towards recessions compared to high profitability firms. However, very profitable firms captured in decile nine and ten have also only moderate investment sensitivities towards recessions. So, a comparable pattern to the size analysis is present that shows an increase in investment sensitivity with size (profitability) until decile eight and than a decrease in sensitivity for the largest (most profitable) firms.

I conduct the same analysis for political uncertainty as a shock variable. Again, for Tobin's Q and investment intensity based portfolios, I document higher investment sensitivities towards political uncertainty for high q firms (high investment intensity firms) compared to low q firms (low investment intensity firms). The investment sensitivities towards political

dar quarter years, and $l \in \{1,2,3,4\}$ stands for the lead between the investment variable and the explanatory variables.

uncertainty almost increase monotonically with q and investment intensity. For the size-based portfolios, I find a comparable but weaker pattern with an increase in investment sensitivity towards political uncertainty with size. This pattern is especially pronounced during the first two quarters following the political uncertainty shock.[16] Furthermore, I can document that very large firms in decile nine and ten exhibit a decrease in investment sensitivity. The profitability-based portfolios in Figure 4.6d exhibit an increase in investment flexibility w.r.t. political uncertainty with increasing profitability. However, very unprofitable firms also show higher investment sensitivities towards political uncertainty compared to firms in decile portfolio four. This results in a weak U-shaped pattern for the profitability-based portfolios.

Figure 4.7 summarizes the results for the market risk premium variable. Here, a clear pattern for all decile portfolio sorts is visible. High q firms and high investment intensity firms show higher investment sensitivity towards the proxy for the market risk premium compared to low q firms and low investment intensity firms. Firms in the top decile react almost two times as sensitively as firms in the bottom decile for the Tobin's Q portfolio sorts. For the investment intensity based portfolios, high intensity firms react almost five times as sensitively as low investment intensity firms. For the size and profitability based portfolios, I document the same pattern. Small firms and low profitability firms react less sensitively towards a change in the market risk premium compared to large firms and high profitability firms. Firms in the top decile react almost 75% more sensitively towards a change in the market risk premium compared to firms in the bottom decile for both portfolio sorts. For all portfolio sorts, the investment sensitivity towards changes in the market risk premium increases monotonically from the bottom to the top decile portfolio.

[16]This is true for all decile portfolio sorts, indicating that political uncertainty shocks do not have long-lasting effects on investment.

In a next step, I employ the panel regression design and include quarter-year fixed effects and decile fixed effects. The interaction term tests whether the increase in investment sensitivity towards the shock variable from decile one to decile ten is statistically significant. The results are summarized in Table 4.4. Panel A presents the results for the recession analysis, Panel B for the political uncertainty analysis, and Panel C for the market risk premium analysis. For all three shock variables a clear pattern emerges that shows an increase in investment flexibility with Tobin's Q. Only for the shock variable based on the recession dummy, I find a statistically insignificant increase in investment flexibility for the first two lags. For higher lags the interaction term is statistically significant. The same but stronger pattern is also visible for the investment intensity based portfolios. High investment intensity firms show also higher investment sensitivities towards all three shock variable employed in this study. These results confirm that the findings presented in Figures 4.5 to 4.7 are statistically significant even after controlling for quarter-year fixed effects. For the size-based portfolios, I document that small firms exhibit a lower investment sensitivity towards all three shock variables compared to large firms. This pattern is weaker compared to the q based and investment intensity based portfolios. This is especially true for the recession analysis that only shows insignificant results. However, unreported results confirm that the differences in investment sensitivity towards recessions for the top and bottom size decile portfolios are statistically significant. The results for the profitability-based portfolios also confirm that high profitability firms show statistically significant higher investment sensitivities towards all three shock variables compared to low profitability firms.

To grasp the economic significance of these results, a doubling of the market risk premium would translate into a decrease in investment intensity of 0.0282% for firms in the bottom decile and of 0.282% for firms in the top decile of the Tobin's Q sorted portfolios. These results correspond to a 1.81% decrease for low q firms (decile one) and of 18.1% decrease for high q firms (decile ten) in investment intensity relative to the overall sample mean of investment intensity (1.558%), resulting in a difference of 16.29% between value and growth firms. For the investment intensity based portfolio, this difference is 26.63%, for the size-based portfolio 9.99%, and for the profitability-based portfolio 9.01% relative to the average investment intensity, if the market risk premium was to double.

All in all, the results confirm the hypotheses three to six and show that the findings in the last subsection are robust.

4.4.3 The source of investment inflexibility

In this subsection, I investigate the relation between investment flexibility and capital adjustment costs to identify the source of the cross-sectional differences in investment flexibility. Two sources of investment inflexibility are known in the literature: costs to expand a firm's capital stock and costs to reduce a firm's capital stock. Costs of capital reduction hinder firms to reach their optimal capital level by disinvesting their idle capacity. Hence, firms with high capital reduction costs possess a larger fraction of idle capacity that will reduce their investment sensitivity to macroeconomic shocks. Costs of capital expansion reduce the capital adjustment speed, the time it takes for a firm to reach its optimal capital level through investments, thereby reducing the investment sensitivity to macroeconomic shocks. In conclusion, both costs, capital expansion and capital reduction costs, are negatively related to investment flexibility.

I employ investment sensitivity to Tobin's Q of a firm as a measure of adjustment speed, which is negatively related to capital expansion costs (e.g., Jermann (2010); Kogan and Papanikolaou (2010)). Firms with a high investment sensitivity to Tobin's Q are able to increase their current capital level to the optimal capital level faster compared to firms with a low investment sensitivity to Tobin's Q. The following standard panel regression measures the capital expansion costs conditional on the decile portfolio based on either size, Tobin's Q, investment intensity, and profitability:

$$Investment_{i,t} = \alpha_i + \beta_{jl} Q_{i,t-l} + Time_t + \varepsilon_{it} \tag{4.4}$$

where the dependent variable *Investment* is capital expenditures over lagged total assets and the main explanatory variable is Tobin's Q. I also include firm fixed and quarter-year fixed effects. In all specification, *i* indexes firms, *j* indexes the specific decile portfolio, *t* indexes calendar quarter years, and $l \in \{1,2,3,4\}$ stands for the lead between the investment variable and the explanatory variable. The regression's standard errors are adjusted for heteroscedasticity and cross-sectional correlation, using clustered standard errors at the firm level.

The results are summarized in Figure 4.8. For all portfolio sorts except for Tobin's Q, I document an increase in adjustment speed, and therefore a decrease in capital expansion costs from the bottom decile to the top decile. Hence, profitable firms, large firms, and firms with high investment intensity show higher adjustment speed, and therefore lower capital expansion costs, compared to unprofitable firms, small firms, and firms with low investment intensity. This finding in combination with the results of the last subsection, that investment sensitivity to aggregate shocks is positively related to firm size, profitability, and investment intensity, are evidence in favor of the view that capital adjustment costs are negatively related to investment flexibility.

In contrast, Tobin's Q based portfolios show the opposite behavior. Low q firms show higher adjustment speed compared to high q firms. This result indicates that the positive relation between Tobin's Q and investment flexibility is not a result of differences in expansion costs. This finding is in line with the argument by Zhang (2005), who claims that on the one hand high q firms have to incur higher expansion costs because these firms have to invest during expansions to adjust their capital levels to the optimal capital level. On the other hand, low q firms can bring their idle capacity to use during expansions saving them capital expansion costs.

Following the argument by Zhang (2005) and Cooper (2006), idle capacity of low q firms is a result of costly investment reversibility. Because it is more likely that the marginal q of low q firms drop below one as a result of a negative aggregate shock, low q firms are more likely to be forced to reduce their capital stock in response to a negative systematic shock compared to high q firms. However, high costs associated with disinvestment will lead to lower disinvestment rates as compared to a world without costly disinvestment, resulting in idle capacity. Hence, low q firms have to invest less during good times because these firms still have idle capacity, which will be brought to use during these good times. Zhang (2005) and Cooper (2006) employ recessions to identify good and bad times. They argue that low q firms disinvest more, but not enough, in bad times compared to growth firms, and therefore growth firms invest more in good times compared to value firms.

I analyze whether low q firms and high q firms indeed show this investment pattern. I employ capital expenditures over total assets as measure of investment and asset sales over total assets as measure of disinvestment. The results are summarized in Table 4.5. Panel A shows the disinvestment behavior during recessions for decile portfolios based on Tobin's Q. As expected, low q firms disinvest more during recessions compared to high q firms. The disinvestment intensity of firms in decile eight to ten is significantly lower compared to low q firms in decile one. Panel B summarizes the findings for the investment analysis during expansions. Low q firms show lower investment intensity levels during expansions compared to high q firms. The investment intensity increases monotonically from the bottom to the top decile.[17] Although, it is impossible to observe the counterfactual, a world without costly investment reversibility, this finding supports the notion of Zhang (2005) and Cooper (2006) that investment inflexibility of low q firms is a result of costly investment reversibility.

In conclusion, the evidence of this subsection supports the idea that capital expansion costs are a main determinant of differences in investment flexibility w.r.t. aggregate shocks for size, investment intensity, and profitability based portfolios. For Tobin's Q based portfolios, the results are in line with the assumptions of Zhang (2005) and Cooper (2006) that differences in investment flexibility are a result of costly investment reversibility. In the upcoming subsection, I examine whether investment flexibility w.r.t. aggregate shocks is indeed related to stock returns.

4.4.4 Investment inflexibility and stock returns

Is investment flexibility indeed related to stock returns? I test whether firms with a high degree of investment flexibility show lower (abnormal) returns compared to firms with a low degree of investment flexibility. Each month I construct investment flexibility-based portfolios by employing a measure of investment flexibility, the investment sensitivity to changes in the market risk premium. To derive the measure of investment flexibility, I analyze the investment sensitivity to changes in the market risk premium of each firm over the

[17] In unreported tests, I also document that low q firms react less sensitively to the start of an expansion compared to high q firms, supporting the idea that low q firms use their idle capacity to serve the increasing demand.

last seven years.[18] More specifically, I conduct rolling window regressions with a window of 28 quarters for each firm in the sample. The dependent variable is investment intensity measured by capital expenditures over lagged total assets and the explanatory variable is the market risk premium measure.[19] Each quarter I sort firms into quintile (decile) portfolios based on their investment sensitivity to changes in the market risk premium. In a final step, I analyze the returns of each portfolio with established performance-evaluation methods, e.g., CAPM, Fama-French-3-Factors and Fama-French-5-Factors:

$$R_{it} - R_{ft} = \alpha_i + \beta_1 RMRF_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \varepsilon_{it} \quad (4.5)$$

where R_{it} is the return on portfolio *i* in month *t*, R_{ft} is the risk-free return in month *t*, $RMRF_t$ is the market risk premium. SMB_t (small minus big), HML_t (high minus low), RMW_t (high profitability minus low profitability) and CMA_t (high investment intensity minus low investment intensity) are month *t* returns of zero-investment factor-mimicking portfolios.[20] These four last factors are designed to capture size, book-to-market, profitability, and investment effects, respectively. The α_i is the abnormal return of portfolio *i*. I use robust standard errors.

Table 4.6 presents summary statistics of variables related to the Fama-French risk factors size, Tobin's Q, investment intensity, and profitability for the investment flexibility-based quintile portfolio sorts. All portfolios share common characteristics such as Tobin's Q, liquidity measured by *Cash Flow*, and profitability measured by *ROA*. These variables are

[18]These results are robust to changes in this timing convention. In unreported tests, I conduct robustness tests with time periods ranging from five to ten years. I choose the time horizon of five to ten years to have enough data points.

[19]The regression specification: $Investment_{i,t} = \alpha_i + \beta_1 MRP_{i,t-1} + \varepsilon_{it}$

[20]The return data for the four portfolios is provided by the French data library.

comparable over all quintile portfolios. Only investment intensity and size show a distinct pattern with smaller firms and firms with a higher investment intensity in the bottom and top portfolios.

The results of the return analysis are documented in Panel A and Panel B of Table 4.7. Panel A summarizes the results for equally-weighted portfolio sorts and Panel B for value-weighted portfolio sorts. Firms in the top quintile show the highest sensitivity to changes in the market risk premium and firms in the lowest quintile show the lowest sensitivity to changes in the risk premium.[21]

In line with the hypothesis that firms with a high investment flexibility show the lowest (abnormal) returns, firms in the top quintile have the lowest value-weighted raw returns that are 50% lower compared to all other quintiles. Moreover, firms in the top quintile also show the lowest, even negative, abnormal returns. The return difference between the bottom and top quintile portfolio is mainly driven by the low (abnormal) returns in the top quintile portfolio. Considering the overall distribution of returns a weak U-shaped pattern emerges with lower returns at the top and bottom quintile.[22] For the equally-weighted portfolio sorts, there is no relation visible between investment flexibility and expected returns. This result indicates, that the investment flexibility return relationship is mostly driven by large firms.

Panel C and Panel D of Table 4.7 present the results for the long-short portfolio analysis. I buy stocks in the bottom quintile and sell stocks in the top quintile. For the equally-weighted portfolio, the return difference is insignificant, as documented in Panel A of Table 4.7. The value-weighted abnormal returns are significantly positive for the CAPM and

[21]Firms in the bottom and top portfolio have the highest absolute value of investment flexibility. However, firms in the bottom quintile seem not to invest optimally because these firms have a positive investment sensitivity to changes in the market risk premium.

[22]See Table C.3 in the appendix for the decile portfolio sort.

FF3 factor model benchmarks. After controlling for the investment factor, the abnormal returns are still positive but insignificant. These results confirm prior findings that investment flexibility is related to book-to-market and investment intensity, indicating that investment flexibility might be a contributing factor to the investment anomaly.

All in all, there is a negative relation between investment flexibility and returns for the value-weighted portfolio sorts. Firms with a higher investment flexibility tend to have lower (abnormal) returns. This finding supports *Hypothesis 1*. However, after controlling for the investment factor, the return difference between inflexible and flexible firms turns insignificant, supporting prior findings that the investment factor, as well as the book-to-market factor, are closely related to investment flexibility.

4.5 Conclusion

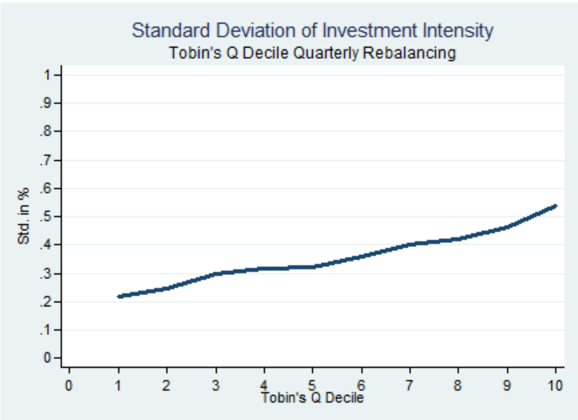
Several studies model the dynamic investment optimization problem, employing real-option models to explain the cross-section of stock returns and related asset-pricing patterns (e.g., Berk et al. (1999); Carlson et al. (2004); Zhang (2005); Cooper (2006)). A core concept within these models is investment flexibility. Investment flexibility describes the ability of firms to adapt their capital stock in response to aggregate shocks. Firms with a high degree of investment flexibility should show lower expected returns compared to firms with a low degree of investment flexibility. I show empirically that investment flexibility is indeed related to firm characteristics such as size, book-to-market, investment intensity, and profitability, supporting the predictions of several investment-based asset-pricing models. Moreover, the results of this study show that investment flexibility is negatively related to capital expansion costs for the firm characteristics: size, investment intensity, and profitability. For book-to-market, empirical evidence indicates that costly investment reversibility seems to lead to lower investment flexibility for value firms. The results also support the idea that investment flexibility is negatively related to stock returns. All in all, this chapter provides empirical evidence that investment flexibility is one potential determinant for return patterns related to firm characteristics such as size, book-to-market, and investment intensity.

4.6 Figures

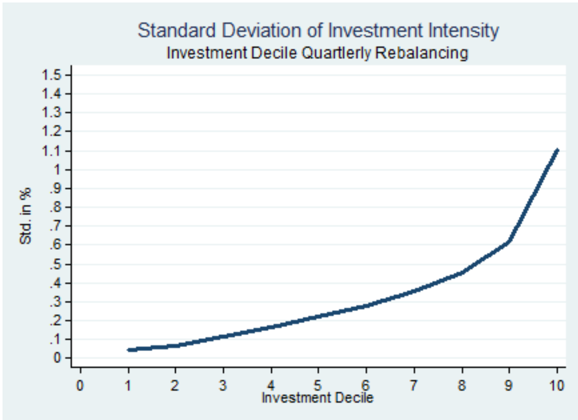
Figure 4.1: Standard deviation of investment - Portfolio level analysis

The figures depict the standard deviation of investment for each decile portfolio. I calculate the standard deviation of investment (y-axis) for each decile portfolio (x-axis) by calculating the mean investment intensity for each portfolio and calendar year quarter and subsequently deriving the standard deviation over the whole sample period. Figure a shows the results for the Tobin's Q decile sorts, Figure b for the investment intensity (capital expenditures over lagged total assets) decile sorts, Figure c for the size decile sorts and Figure d for the profitability decile sorts. See Appendix C.1 for a definition of all variables.

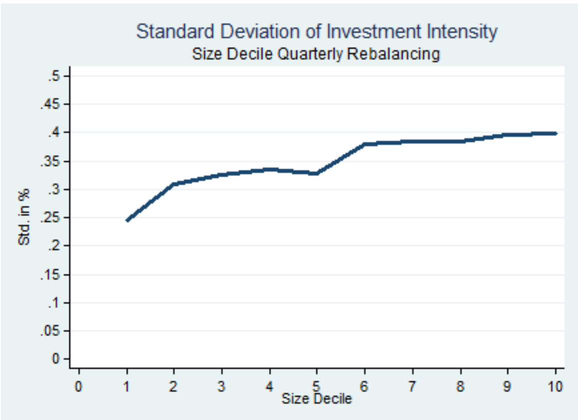
(a) Tobin's Q Portfolio Sorts



(b) Investment intensity portfolio sorts



(c) Size portfolio sorts



(d) Profitability portfolio sorts

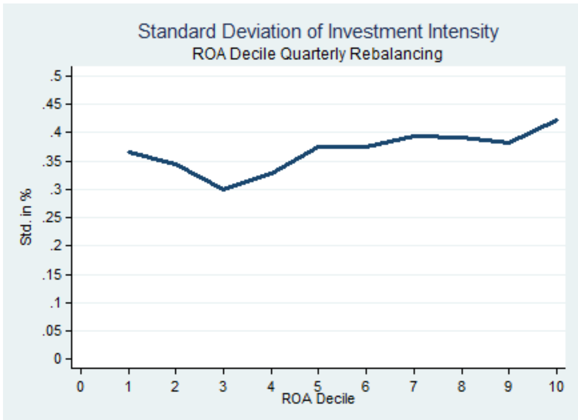
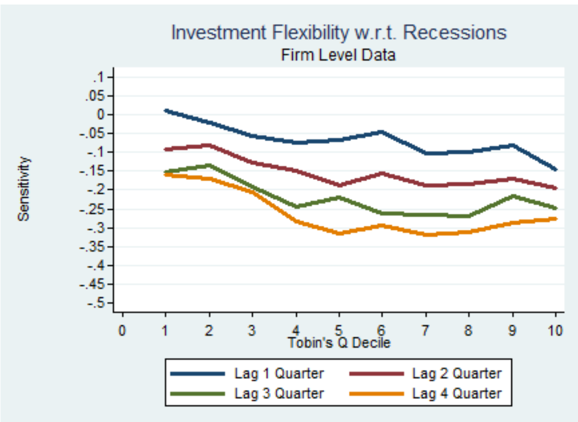


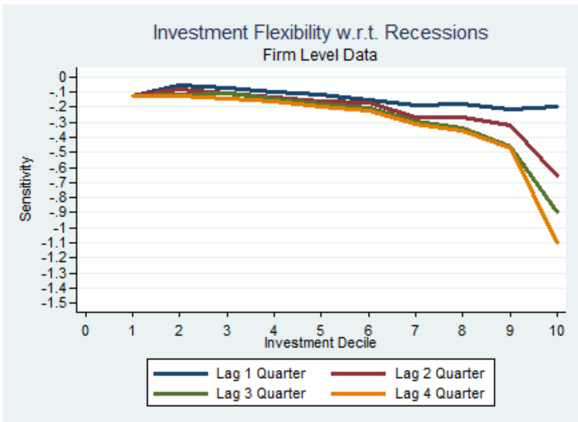
Figure 4.2: Investment sensitivity to recessions - Firm-level analysis

The figures depict the investment sensitivity to recessions, measured by a recession dummy, for each decile portfolio. I calculate the investment sensitivity (y-axis) for each decile portfolio (x-axis) by employing the following firm-level regression for the overall sample conditional on the respective decile portfolio: $\mathrm{Investment}_{i,t} = \alpha_i + \beta_{1j}\mathrm{Shock}_{i,t-l} + \mathrm{Controls} + \mathrm{QRT}_t + \varepsilon_{it}$, where *i* indexes firms, *j* indexes deciles, *t* indexes calendar quarter years, and $l \in$ {1,2,3,4} stands for the lead between the investment variable and the explanatory variable. β captures the investment sensitivity of decile *j* to recessions. I include Tobin's Q, cash flow over lagged assets and sales growth as control variables. The α_i is firm fixed effects and *QRT* represents quarter fixed effects to control for seasonality. Figure a shows the results for the Tobin's Q decile sorts, Figure b for the investment intensity (capital expenditures over lagged total assets) decile sorts, Figure c for the size decile sorts and Figure d for the profitability decile sorts. See Appendix C.1 for a definition of all variables.

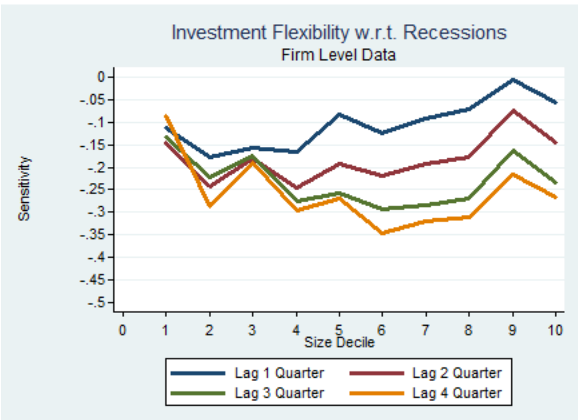
(a) Tobin's Q portfolio sorts



(b) Investment intensity portfolio sorts



(c) Size portfolio sorts



(d) Profitability portfolio sorts

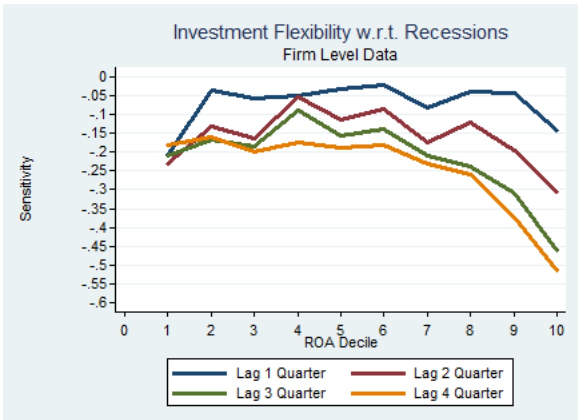
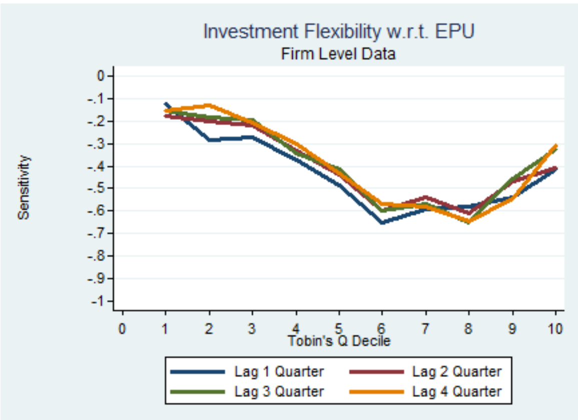


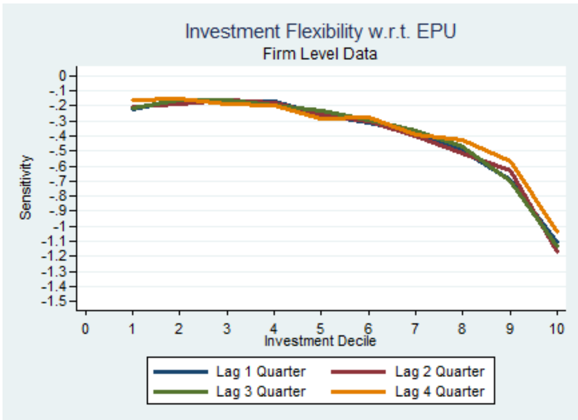
Figure 4.3: Investment sensitivity to political uncertainty - Firm-level analysis

The figures depict the investment sensitivity to political uncertainty, measured by the EPU index, for each decile portfolio. I calculate the investment sensitivity (y-axis) for each decile portfolio (x-axis) by employing the following firm-level regression for the overall sample conditional on the respective decile portfolio: $\mathtt{Investment}_{i,t} = \alpha_i + \beta_{1j}\mathtt{Shock}_{i,t-l} + \mathtt{Controls} + \mathtt{QRT}_t + \varepsilon_{it}$, where *i* indexes firms, *j* indexes deciles, *t* indexes calendar quarter years, and $l \in \{1,2,3,4\}$ stands for the lead between the investment variable and the explanatory variable. β captures the investment sensitivity of decile *j* to political uncertainty. I include Tobin's Q, cash flow over lagged assets and sales growth as my control variables. The α_i is firm fixed effects and *QRT* represents quarter fixed effects to control for seasonality. Figure a shows the results for the Tobin's Q decile sorts, Figure b for the investment intensity (capital expenditures over lagged total assets) decile sorts, Figure c for the size decile sorts and Figure d for the profitability decile sorts. See Appendix C.1 for a definition of all variables.

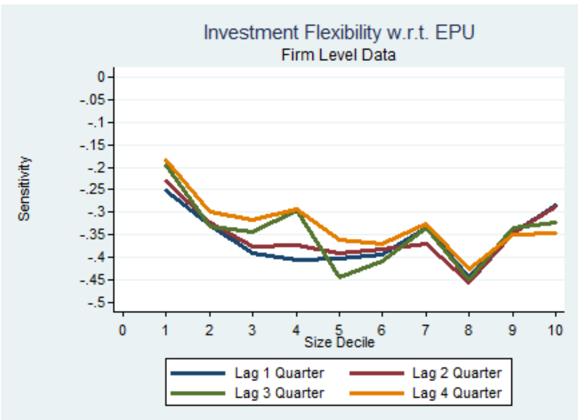
(a) Tobin's Q portfolio sorts



(b) Investment Intensity Portfolio Sorts



(c) Size portfolio sorts



(d) Profitability portfolio sorts

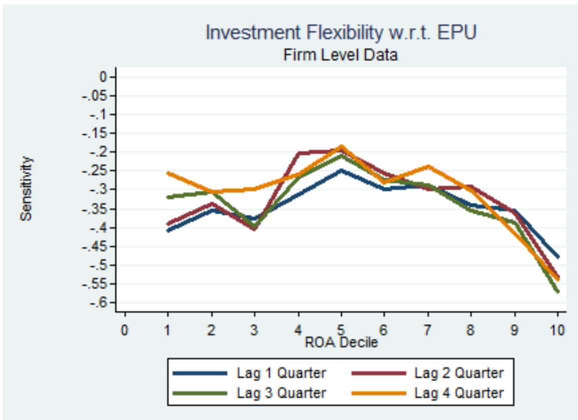
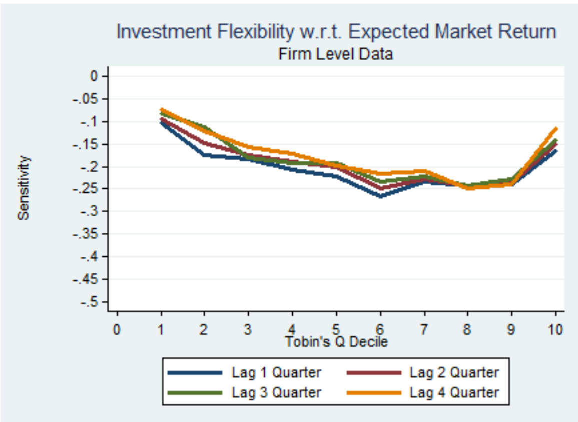


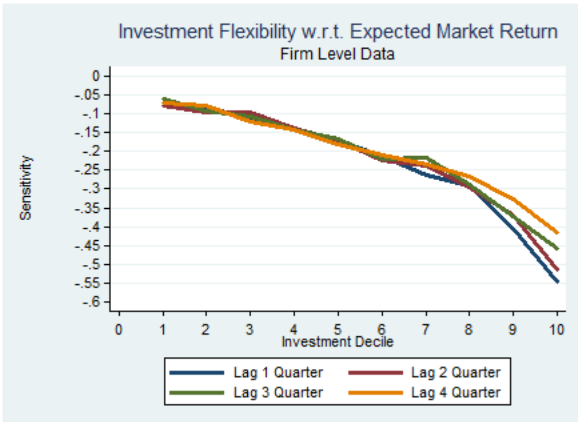
Figure 4.4: Investment sensitivity to the market risk premium - Firm-level analysis

The figures depict the investment sensitivity to the market risk premium (*MRP*) for each decile portfolio. I calculate the investment sensitivity (y-axis) for each decile portfolio (x-axis) by employing the following firm-level regression for the overall sample conditional on the respective decile portfolio: $\text{Investment}_{i,t} = \alpha_i + \beta_{1j}\text{Shock}_{i,t-l} + \text{Controls} + \text{QRT}_t + \varepsilon_{it}$,where *i* indexes firms, *j* indexes deciles, *t* indexes calendar quarter years, and *l* $\in$\{1,2,3,4\} stands for the lead between the investment variable and the explanatory variable. β captures the investment sensitivity of decile *j* to the market risk premium. I include Tobin's Q, cash flow over lagged assets and sales growth as my control variables. The α_i is firm fixed effects and *QRT* represents quarter fixed effects to control for seasonality. Figure a shows the results for the Tobin's Q decile sorts, Figure b for the investment intensity (capital expenditures over lagged total assets) decile sorts, Figure c for the size decile sorts and Figure d for the profitability decile sorts. See Appendix C.1 for a definition of all variables.

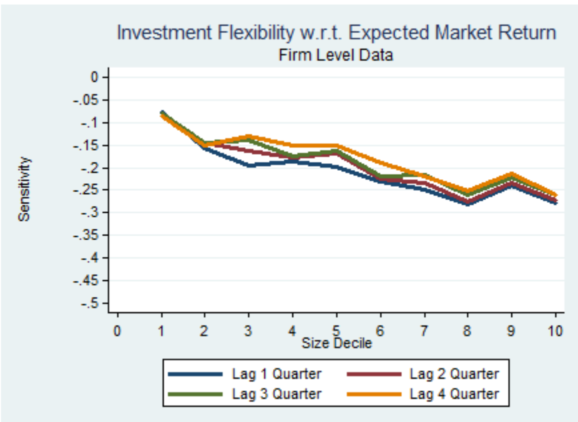
(a) Tobin's Q Portfolio Sorts



(b) Investment intensity portfolio sorts



(c) Size portfolio sorts



(d) Profitability portfolio sorts

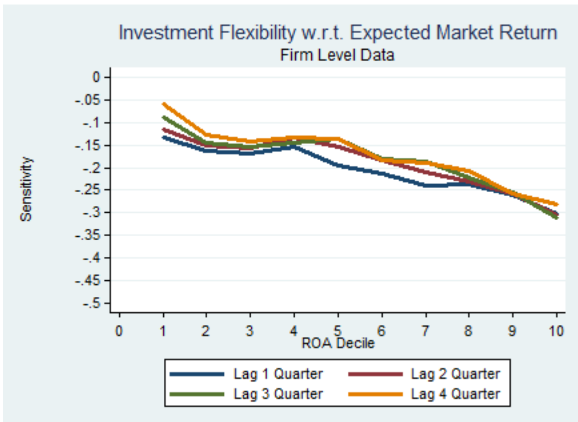
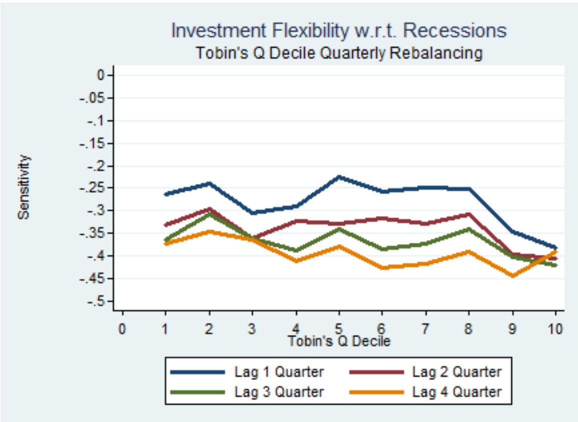


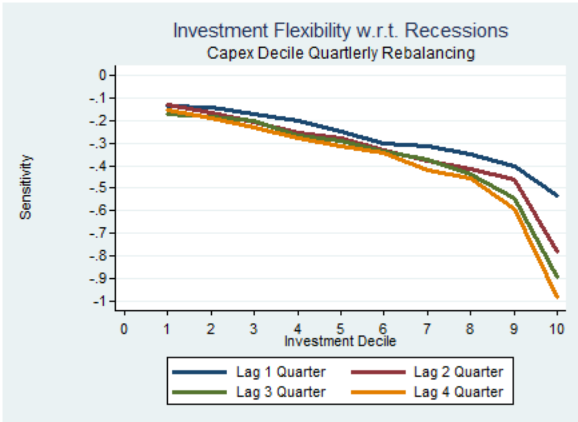
Figure 4.5: Investment sensitivity to recessions - Portfolio level analysis

The figures depict the investment sensitivity to recessions, measured by a recession dummy, for each decile portfolio. I calculate the investment sensitivity (y-axis) for each decile portfolio (x-axis) by calculating the mean investment intensity for each portfolio and calendar year quarter and subsequently employing the following regression for the overall sample conditional on the decile portfolio: $\mathrm{Investment}_{i,t} = \alpha_i + \beta_i \mathrm{Shock}_{i,t-l} + \varepsilon_{it}$, where *i* indexes firms, *j* indexes deciles, *t* indexes calendar quarter years, and $l \in$\{1,2,3,4\} stands for the lead between the investment variable and the explanatory variable. β captures the investment sensitivity to recessions. Figure a shows the results for the Tobin's Q decile sorts, Figure b for the investment intensity (capital expenditures over lagged total assets) decile sorts, Figure c for the size decile sorts and Figure d for the profitability decile sorts. See Appendix C.1 for a definition of all variables.

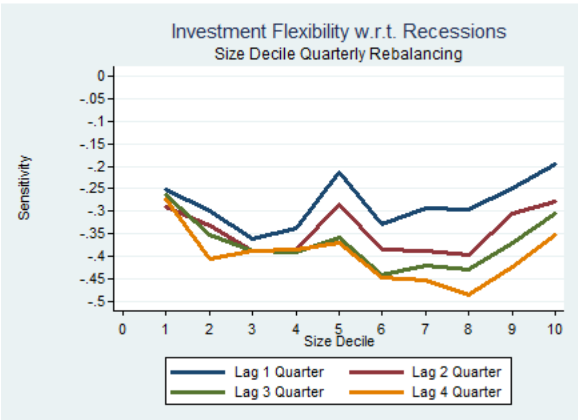
(a) Tobin's Q portfolio sorts



(b) Investment intensity portfolio sorts



(c) Size portfolio sorts



(d) Profitability portfolio sorts

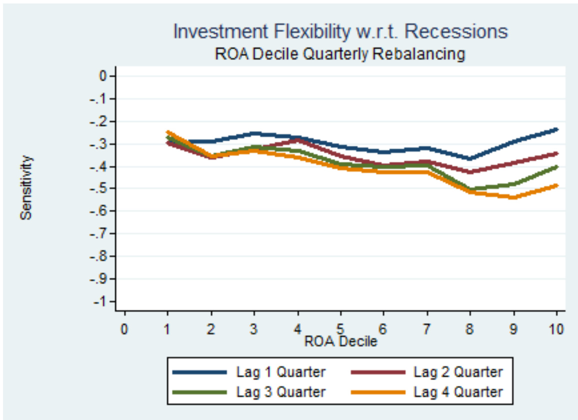
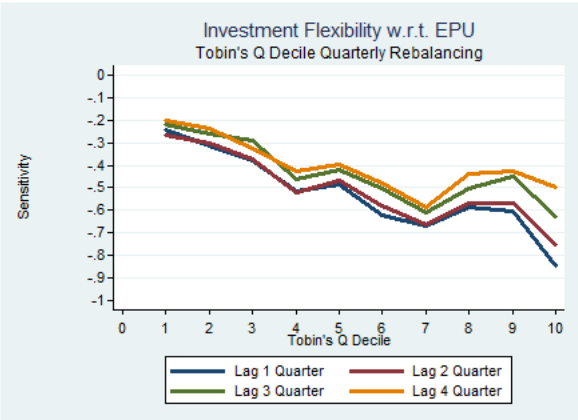


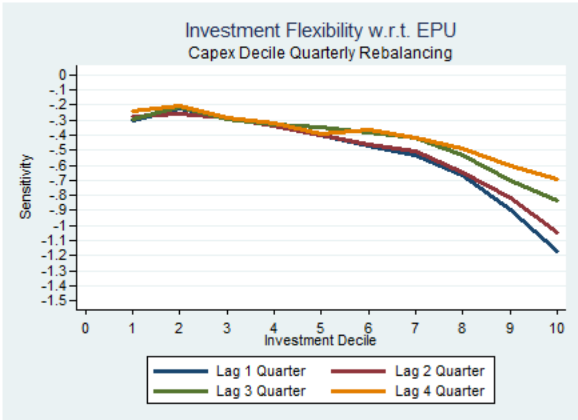
Figure 4.6: Investment sensitivity to political uncertainty - Portfolio level analysis

The figures depict the investment sensitivity to political uncertainty, measured by the EPU index, for each decile portfolio. I calculate the investment sensitivity (y-axis) for each decile portfolio (x-axis) by calculating the mean investment intensity for each portfolio and calendar year quarter and subsequently employing the following regression for the overall sample conditional on the decile portfolio: $\text{Investment}_{i,t} = \alpha_i + \beta_i \text{Shock}_{i,t-l} + \varepsilon_{it}$, where *i* indexes firms, *j* indexes deciles, *t* indexes calendar quarter years, and $l \in \{1,2,3,4\}$ stands for the lead between the investment variable and the explanatory variable. β captures the investment sensitivity to political uncertainty. Figure a shows the results for the Tobin's Q decile sorts, Figure b for the investment intensity (capital expenditures over lagged total assets) decile sorts, Figure c for the size decile sorts and Figure d for the profitability decile sorts. See Appendix C.1 for a definition of all variables.

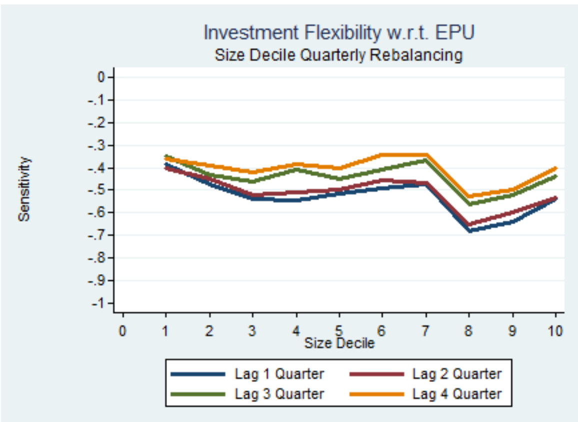
(a) Tobin's Q portfolio sorts



(b) Investment intensity portfolio sorts



(c) Size portfolio sorts



(d) Profitability portfolio sorts

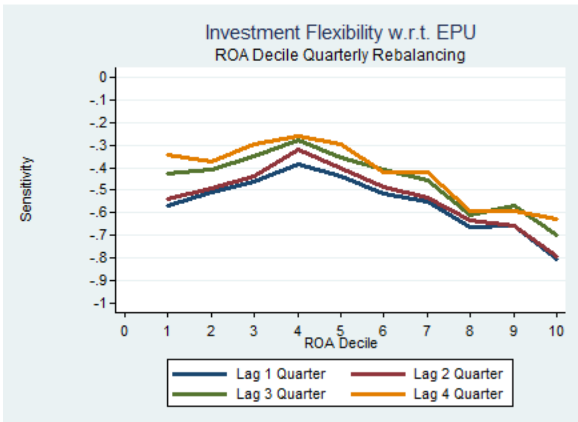
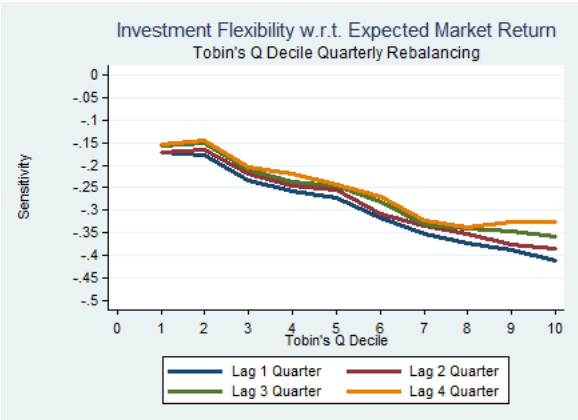


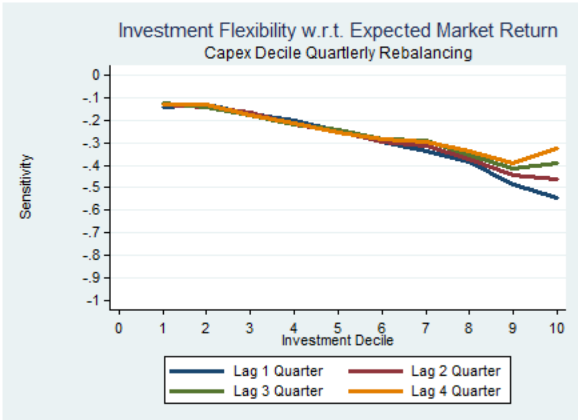
Figure 4.7: Investment sensitivity to the market risk premium - Portfolio level analysis

The figures depict the investment sensitivity to the market risk premium (*MRP*) for each decile portfolio. I calculate the investment sensitivity (y-axis) for each decile portfolio (x-axis) by calculating the mean investment intensity for each portfolio and calendar year quarter and subsequently employing the following regression for the overall sample conditional on the decile portfolio: $\mathrm{Investment}_{i,t} = \alpha_i + \beta_i \mathrm{Shock}_{i,t-1} + \varepsilon_{it}$.$\beta$ captures the investment sensitivity to the market risk premium, *i* indexes firm decile, *t* indexes calendar quarter years. Figure a shows the results for the Tobin's Q decile sorts, Figure b for the investment intensity (capital expenditures over lagged total assets) decile sorts, Figure c for the size decile sorts and Figure d for the profitability decile sorts. See Appendix C.1 for a definition of all variables.

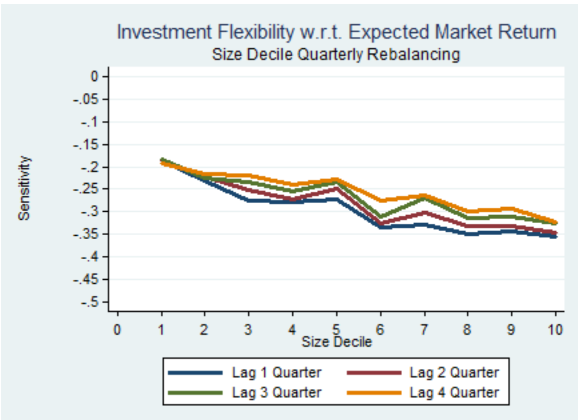
(a) Tobin's Q portfolio sorts



(b) Investment intensity portfolio sorts



(c) Size portfolio sorts



(d) Profitability portfolio sorts

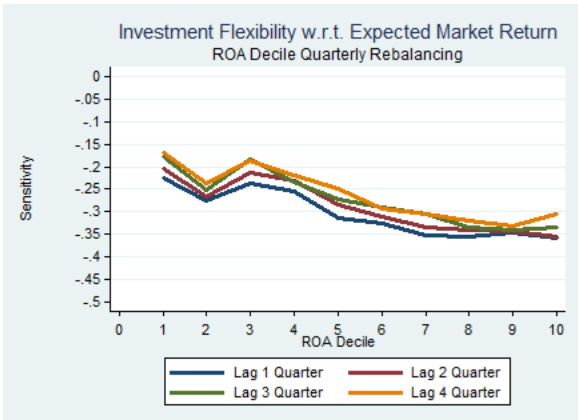
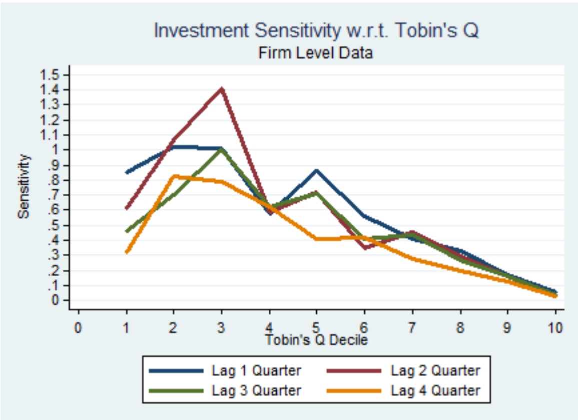


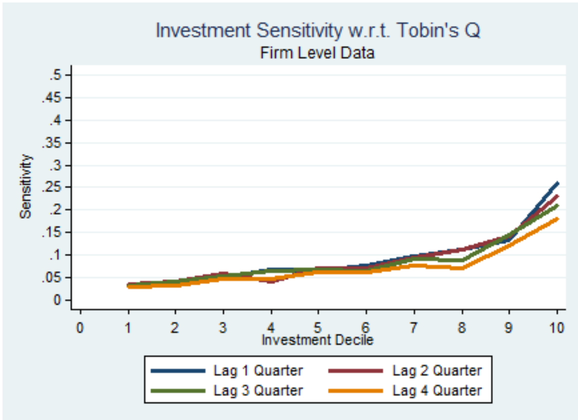
Figure 4.8: Investment sensitivity to Tobin's Q - Firm level analysis

The figures depict the investment sensitivity to Tobin's Q for each decile portfolio. I calculate the investment sensitivity (y-axis) for each decile portfolio (x-axis) by employing the following firm-level regression for the overall sample conditional on the respective decile portfolio: $\mathrm{Investment}_{i,t} = \alpha_i + \beta_{1j} Q_{i,t-l} + \mathrm{Time}_t + \varepsilon_{it}$, where *i* indexes firms, *j* indexes deciles, *t* indexes calendar quarter years, and *l* ∈{1,2,3,4} stands for the lead between the investment variable and the explanatory variable. β captures the investment sensitivity of decile *j* to Tobin's Q. The α_i is firm fixed effects and *Time* represents calendar quarter-year fixed effects. Figure a shows the results for the Tobin's Q decile sorts, Figure b for the investment intensity (capital expenditures over lagged total assets) decile sorts, Figure c for the size decile sorts and Figure d for the profitability decile sorts. See Appendix C.1 for a definition of all variables.

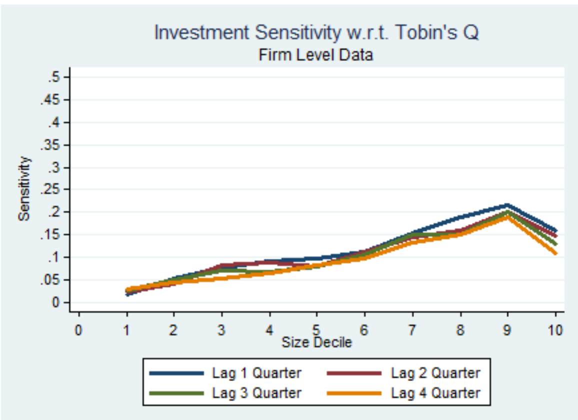
(a) Tobin's Q portfolio sorts



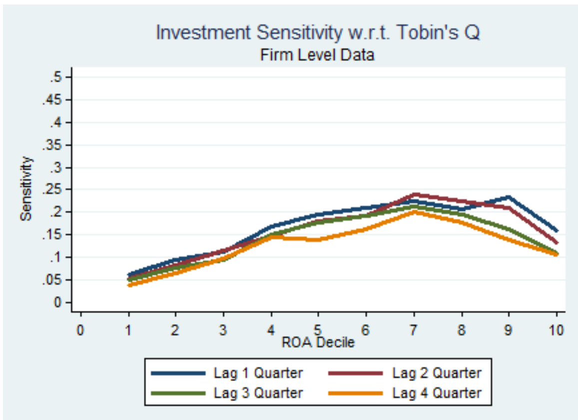
(b) Investment intensity portfolio sorts



(c) Size portfolio sorts



(d) Profitability portfolio sorts



4.7 Tables

Table 4.1: Summary statistics

The table reports the sample mean, median, and standard deviation of main variables used in this study. Panel A shows the summary statistics for the accounting-based variables. Panel B shows the summary statistics for the macroeconomic shock variables. Panel C depicts a correlation matrix for the shock variables. Accounting data is from Compustat, market data from CRSP, and macroeconomic data from FRED database. See Appendix C.1 for a definition of all variables.

Panel A: Accounting-based Variables

	N	Mean	Median	SD
Investment	447.544	1.558	0.851	2.204
Tobin's Q	447.544	2.363	1.489	2.818
Cash Flow	447.544	0.310	2.467	9.655
ROA	407.973	0.351	2.619	9.626
Disinvestment	428.894	0.082	0.000	0.372
Sales Growth	447.544	25.650	8.111	97.695
Total Assets	447.544	1.953	0.108	14.027

Panel B: Macroeconomic Shock Variables

	N	Mean	Median	SD
MRP	447.544	0.562	0.594	0.840
EPU	447.544	4.610	4.576	0.270
Recession	447.544	0.102	0.000	0.303

Panel C: Correlation of Macroeconomic Shock Variables

	MRP	EPU	Recession
MRP	1		
EPU	0.479	1	
Recession	0.168	0.271	1

Table 4.2: Unconditional investment sensitivity to macroeconomic shocks

The tables present the results for the analysis of investment sensitivity to macroeconomic shocks. I calculate the investment sensitivity by employing the following firm-level regression for the overall sample conditional on the respective decile portfolio: $\mathit{Investment}_{i,t} = \alpha_i + \beta_1 \mathit{Shock}_{i,t-l} + \mathit{Controls} + \mathit{Time}_t + \varepsilon_{it}$. β captures the average investment sensitivity to the macroeconomic shock of interest, i indexes firms, t indexes calendar quarter years, and $l \in 1,2,3,4$ stands for the lead between the investment variable and the explanatory variable. I include Tobin's Q and cash flow over lagged assets as control variables. The α_i is firm fixed effects and Time represents calendar quarter-year fixed effects. Panel A shows the results for the recession analysis, Panel B for the political uncertainty analysis (EPU index), and Panel C for the market risk premium analysis. See Appendix C.1 for a definition of all variables. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Recession analysis

	Lag 1	Lag 2	Lag 3	Lag 4
Recession	−0.13***	−0.23***	−0.27***	−0.32***
	(−11.86)	(−21.79)	(−25.62)	(−29.41)
Tobin's Q	0.14***	0.13***	0.12***	0.10***
	(32.19)	(31.60)	(29.94)	(26.89)
Cash Flow	0.02***	0.02***	0.02***	0.02***
	(19.66)	(21.76)	(21.61)	(18.75)
Constant	1.22***	1.23***	1.24***	1.27***
	(118.59)	(125.46)	(129.82)	(139.87)
Observations	428,710	415,328	403,627	394,337
Firm FE	Yes	Yes	Yes	Yes
Quarter-Year FE	No	No	No	No

Panel B: Political uncertainty analysis

	Lag 1	Lag 2	Lag 3	Lag 4
EPU	-0.47^{***}	-0.47^{***}	-0.41^{***}	-0.39^{***}
	(-24.28)	(-24.15)	(-21.14)	(-20.50)
Tobin's Q	0.13^{***}	0.12^{***}	0.12^{***}	0.10^{***}
	(31.27)	(30.67)	(29.09)	(26.06)
Cash Flow	0.02^{***}	0.02^{***}	0.02^{***}	0.02^{***}
	(19.36)	(21.64)	(21.58)	(18.77)
Constant	3.39^{***}	3.38^{***}	3.09^{***}	3.06^{***}
	(37.34)	(37.23)	(34.39)	(34.01)
Observations	428,710	415,328	403,627	394,337
Firm FE	Yes	Yes	Yes	Yes
Quarter-Year FE	No	No	No	No

Panel C: Market risk premium analysis

	Lag 1	Lag 2	Lag 3	Lag 4
MRP	-0.26^{***}	-0.24^{***}	-0.23^{***}	-0.22^{***}
	(-36.60)	(-34.75)	(-33.08)	(-32.28)
Tobin's Q	0.13^{***}	0.12^{***}	0.11^{***}	0.10^{***}
	(31.68)	(31.11)	(29.44)	(26.44)
Cash Flow	0.02^{***}	0.02^{***}	0.02^{***}	0.02^{***}
	(18.57)	(20.97)	(20.91)	(18.10)
Constant	1.37^{***}	1.36^{***}	1.35^{***}	1.37^{***}
	(129.70)	(133.17)	(134.84)	(143.59)
Observations	428,710	415,328	403,627	394,337
Firm FE	Yes	Yes	Yes	Yes
Quarter-Year FE	No	No	No	No

Table 4.3: Conditional investment sensitivity to macroeconomic shocks - Firm-level analysis

The tables present the results for the analysis of investment sensitivity to macroeconomic shocks. I calculate the investment sensitivity by employing the following firm-level regression for the overall sample: $\mathtt{Investment}_{i,t} = \alpha_i + \beta_1 \mathtt{Inter}_{i,t-l} + \beta_2 \mathtt{Shock}_{i,t-l} + \beta_3 \mathtt{Firm}_{i,t-l} + \mathtt{Controls} + \mathtt{Time}_t + \varepsilon_{it}$, where i indexes firms, t indexes calendar quarter years, and l $\in$ 1,2,3,4 stands for the lead between the investment variable and the explanatory variable. I only present the results for β_1, which captures the investment sensitivity to the macroeconomic shock of interest depending on the decile portfolio. I include Tobin's Q, cash flow over lagged assets, and sales growth as control variables. The α_i is firm fixed effects and Time represents calendar quarter-year fixed effects. Panel A shows the results for the recession analysis, Panel B for the political uncertainty analysis (EPU index), and Panel C for the market risk premium analysis. See Appendix C.1 for a definition of all variables. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Recession analysis

	Lag 1	Lag 2	Lag 3	Lag 4
Recession x Size Dec	0.0045	−0.0014	−0.0099***	−0.0134***
	(1.54)	(−0.50)	(−3.39)	(−4.55)
Recession x Q Dec	−0.0079**	−0.0068**	−0.0089***	−0.0090***
	(−2.45)	(−2.19)	(−2.86)	(−2.90)
Recession x ROA Dec	−0.0018	−0.0108***	−0.0217***	−0.0286***
	(−0.52)	(−3.30)	(−6.70)	(−8.68)
Recession x Investment Dec	−0.0189***	−0.0418***	−0.0539***	−0.0626***
	(−5.18)	(−11.78)	(−15.03)	(−17.31)

Panel B: Political uncertainty analysis

	Lag 1	Lag 2	Lag 3	Lag 4
EPU x Size Dec	-0.0177^{***}	-0.0183^{***}	-0.0148^{***}	-0.0158^{***}
	(-3.19)	(-3.28)	(-2.69)	(-2.87)
EPU x Q Dec	-0.0239^{***}	-0.0201^{***}	-0.0185^{***}	-0.0142^{***}
	(-4.35)	(-3.60)	(-3.32)	(-2.58)
EPU x ROA Dec	-0.0236^{***}	-0.0272^{***}	-0.0306^{***}	-0.0349^{***}
	(-4.12)	(-4.77)	(-5.39)	(-6.25)
EPU x Investment Dec	-0.0978^{***}	-0.0922^{***}	-0.0791^{***}	-0.0678^{***}
	(-16.94)	(-15.52)	(-13.54)	(-11.49)

Panel C: Market risk premium analysis

	Lag 1	Lag 2	Lag 3	Lag 4
MRP x Size Dec	-0.0235^{***}	-0.0222^{***}	-0.0212^{***}	-0.0203^{***}
	(-11.00)	(-10.46)	(-10.02)	(-9.64)
MRP x Q Dec	-0.0159^{***}	-0.0146^{***}	-0.0145^{***}	-0.0132^{***}
	(-7.59)	(-6.98)	(-6.99)	(-6.37)
MRP x ROA Dec	-0.0207^{***}	-0.0224^{***}	-0.0246^{***}	-0.0236^{***}
	(-9.92)	(-10.85)	(-12.03)	(-11.55)
MRP x Investment Dec	-0.0487^{***}	-0.0426^{***}	-0.0383^{***}	-0.0333^{***}
	(-23.36)	(-20.11)	(-18.60)	(-15.99)

Table 4.4: Conditional investment sensitivity to macroeconomic shocks - Portfolio analysis

The tables present the results for the analysis of investment sensitivity to macroeconomic shocks. I calculate the investment sensitivity by employing the following portfolio-level regression for the overall sample:
$Investment_{i,t} = \beta_1 Inter_{i,t-l} + \beta_2 Shock_{i,t-l} + \beta_3 Firm_{i,t-l} + Time_t + \varepsilon_{it}$, where i indexes deciles, t indexes calendar quarter years, and l $\in$ 1,2,3,4 stands for the lead between the investment variable and the explanatory variable. I only present the results for β_1, which captures the investment sensitivity to the macroeconomic shock of interest depending on the decile portfolio. The $Firm_{i,t-l}$ is decile fixed effects and Time represents calendar quarter-year fixed effects. Panel A shows the results for the recession analysis, Panel B for the political uncertainty analysis (EPU index), and Panel C for the market risk premium analysis. See Appendix C.1 for a definition of all variables. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Recession analysis

	1 Lag	2 Lag	3 Lag	4 Lag
Recession x Size Dec	0.0073	0.0009	−0.0054	−0.0097
	(1.28)	(0.14)	(−0.68)	(−1.21)
Recession x Q Dec	−0.0088	−0.0068	−0.0066*	−0.0064*
	(−1.75)	(−1.79)	(−2.05)	(−2.23)
Recession x Investment Dec	−0.0406***	−0.0571***	−0.0640***	−0.0717***
	(−7.99)	(−4.54)	(−4.04)	(−4.05)
Recession x ROA Dec	−0.0010	−0.0088*	−0.0192***	−0.0273***
	(−0.22)	(−2.03)	(−3.53)	(−5.86)

Panel B: Political uncertainty analysis

	1 Lag	2 Lag	3 Lag	4 Lag
EPU x Size Dec	-0.0177^{**}	-0.0163^{**}	-0.0103	-0.0090
	(-2.34)	(-2.90)	(-1.70)	(-1.63)
EPU x Q Dec	-0.0550^{***}	-0.0466^{***}	-0.0399^{***}	-0.0307^{***}
	(-6.81)	(-7.02)	(-5.44)	(-4.19)
EPU x Investment Dec	-0.0922^{***}	-0.0809^{***}	-0.0592^{***}	-0.0495^{***}
	(-4.88)	(-5.69)	(-4.96)	(-7.77)
EPU x ROA Dec	-0.0286^{**}	-0.0314^{**}	-0.0330^{**}	-0.0374^{***}
	(-2.36)	(-2.46)	(-3.12)	(-4.57)

Panel C: Market risk premium analysis

	1 Lag	2 Lag	3 Lag	4 Lag
MRP x Size Dec	-0.0173^{***}	-0.0166^{***}	-0.0146^{***}	-0.0135^{***}
	(-7.08)	(-11.03)	(-11.22)	(-15.50)
MRP x Q Dec	-0.0282^{***}	-0.0266^{***}	-0.0251^{***}	-0.0231^{***}
	(-22.91)	(-16.40)	(-12.96)	(-8.59)
MRP x Investment Dec	-0.0461^{***}	-0.0394^{***}	-0.0329^{***}	-0.0283^{***}
	(-10.09)	(-18.30)	(-14.57)	(-6.78)
MRP x ROA Dec	-0.0156^{***}	-0.0176^{***}	-0.0183^{***}	-0.0171^{***}
	(-7.17)	(-7.25)	(-6.23)	(-5.40)

Table 4.5: (Dis)Investment over the business cycle for Tobin's Q-based portfolios

The tables present the results for the analysis of (dis)investment levels over the business cycle conditional on Tobin's Q. I calculate the mean investment intensity level (disinvestment level) conditional on the Tobin's Q decile portfolio for expansions (recessions). Panel A shows the investment results for the expansion analysis and Panel B presents the disinvestment results for the recession analysis. See Appendix C.1 for a definition of all variables. I also calculate the difference in investment (disinvestment) intensity relative to the bottom decile. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Investment - Expansion

	N	Mean	SD	Diff	t-test
TobinQ1	91	1.100	0.236		
TobinQ2	91	1.307	0.257	0.207***	(5.665)
TobinQ3	91	1.483	0.363	0.383***	(8.451)
TobinQ4	91	1.525	0.342	0.425***	(9.766)
TobinQ5	91	1.595	0.365	0.495***	(10.869)
TobinQ6	91	1.675	0.392	0.575***	(12.000)
TobinQ7	91	1.705	0.410	0.605***	(12.196)
TobinQ8	91	1.808	0.485	0.708***	(12.515)
TobinQ9	91	1.854	0.490	0.754***	(13.219)
TobinQ10	91	1.825	0.560	0.725***	(11.383)

Panel B: Disinvestment - Recession

	N	Mean	SD	Diff	t-test
TobinQ1	21	0.087	0.032		
TobinQ2	21	0.100	0.043	0.013	(1.120)
TobinQ3	21	0.096	0.038	0.009	(0.817)
TobinQ4	21	0.093	0.036	0.005	(0.513)
TobinQ5	21	0.086	0.045	−0.001	(−0.088)
TobinQ6	21	0.074	0.033	−0.013	(−1.300)
TobinQ7	21	0.069	0.049	−0.018	(−1.417)
TobinQ8	21	0.060	0.035	−0.027*	(−2.631)
TobinQ9	21	0.044	0.024	−0.043***	(−4.888)
TobinQ10	21	0.051	0.024	−0.037***	(−4.174)

Table 4.6: Summary statistics

The table reports the sample means of the main variables for each investment flexibility quintile. Accounting data is retrieved from Compustat and market data is retrieved from CRSP. See Appendix C.1 for a definition of all variables.

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Investment Flex	0.560	0.045	−0.112	−0.326	−1.131
Investment	1.756	0.963	0.959	1.242	2.085
Tobin's Q	2.102	1.861	1.834	1.878	1.904
Cash Flow	2.123	2.067	2.226	2.242	2.484
ROA	0.022	0.021	0.022	0.023	0.025
Size	3.048	4.426	4.766	3.871	2.667
Sales Growth	17.451	13.223	12.269	11.907	13.910

Table 4.7: Investment flexibility and expected returns

The table presents results for OLS regressions with monthly portfolio returns as dependent variable. Each month, I construct equally-weighted (value-weighted) investment flexibility-based quintile portfolios. I analyze the returns of all portfolios with established performance-evaluation methods, e.g., CAPM, Fama-French-3-Factors, and Fama-French-5-Factors. See Appendix C.1 for a definition of all variables. Panel A and B summarizes the regression results for the equally-weighted and value-weighted quintile portfolios. Panel C and Panel D show the results for the equally-weighted and value-weighted long-short portfolios. To construct these portfolio, I buy (sell) each month stocks of firms that are in the bottom (top) investment flexibility quintile. The table displays the alpha estimate, the abnormal return, for each performance-evaluation method. I use robust standard errors. t-statistics are shown in parenthese. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Equally-weighted portfolio sorts

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Raw Return	0.7819***	1.0572***	0.9632***	0.8431***	0.8630***
	(2.80)	(3.93)	(3.38)	(2.91)	(2.85)
CAPM Alpha	0.0239	0.3747***	0.1913	0.0957	0.0706
	(0.18)	(2.83)	(1.46)	(0.73)	(0.42)
FF3 Alpha	−0.0490	0.2815**	0.1201	0.0181	−0.0176
	(−0.38)	(2.17)	(0.93)	(0.14)	(−0.11)
FF5 Alpha	0.4938*	0.6924**	0.6264**	0.5277*	0.5539*
	(1.71)	(2.52)	(2.20)	(1.79)	(1.78)

Panel B: Value-weighted portfolio sorts

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Raw Return	1.0098***	1.1188***	1.2742***	1.2602***	0.5521
	(4.14)	(4.76)	(5.59)	(4.71)	(1.52)
CAPM Alpha	0.3767***	0.5466***	0.6295***	0.5644***	−0.3829
	(2.69)	(4.30)	(7.11)	(4.97)	(−1.64)
FF3 Alpha	0.3616**	0.5158***	0.6244***	0.5709***	−0.3117
	(2.56)	(3.83)	(7.03)	(4.87)	(−1.39)
FF5 Alpha	0.8110***	0.9955***	1.0965***	1.0767***	0.5602
	(2.98)	(3.70)	(4.71)	(3.86)	(1.60)

Panel C: Equally-weighted long-short portfolio

	Raw Return	CAPM	FF3	FF5
MKTRF		-0.0277	-0.0231	-0.0240
		(-1.07)	(-0.79)	(-0.64)
SMB			-0.0281	-0.0289
			(-0.49)	(-0.56)
HML			0.0070	0.0088
			(0.17)	(0.15)
CMA				-0.0019
				(-0.02)
RMW				-0.0028
				(-0.04)
Alpha	-0.0811	-0.0640	-0.0621	-0.0601
	(-0.77)	(-0.59)	(-0.59)	(-0.53)

Panel D: Value-weighted long-short portfolio

	Raw Return	CAPM	FF3	FF5
MKTRF		-0.2094***	-0.1636**	-0.0521
		(-2.92)	(-2.21)	(-0.61)
SMB			-0.0518	-0.0005
			(-0.37)	(-0.00)
HML			0.3510***	0.1180
			(2.82)	(0.78)
CMA				0.3618*
				(1.75)
RMW				0.2361
				(1.33)
Alpha	0.4577	0.5872**	0.4835*	0.2509
	(1.60)	(2.02)	(1.82)	(0.94)

4.8 Appendix

Table C.1: Variable definitions

The table describes the construction of all variables used in this analysis. Accounting data is retrieved from Compustat, market data from CRSP, and macroeconomic data form the FRED database.

Variable	Description	Source
Cash Flow	is operating cash flow (income before extraordinary items + depreciation and amortization) over lagged total assets.	Compustat Quarterly Data
Disinvestment	is asset sales over lagged total assets.	Compustat Quarterly Data
EPU	is the logarithm of the EPU index, which measures the political uncertainty based on three underlying components: newspaper coverage of policy-related economic uncertainty, the number of federal tax code provisions set to expire in future years, and the disagreement among economic forecasters as a proxy for uncertainty.	Baker, Bloom, and Davis (2016)
Investment	is capital expenditures over lagged total assets.	Compustat Quarterly Data
MRP	is the predicted value of the following regression: $r_{t+1} = \alpha + \beta_1 TS_t + \beta_2 DFS_t + \beta_3 GAP_t + \beta_4 TB3_t + \beta_4 CAPE_t + u_{t+1}$, where r_{t+1} is the excess log return on the market, CAPE is the price-earnings ratio, TS is the term spread, GAP is the output gap, TB3 is the short rate, and DFS is the default spread. I take the average predicted value over the preceeding three months to match this monthly return data with my quarterly accounting data.	CRSP Database, R. Shiller Data Library
Recession	is 1 during a recession and 0 otherwise.	FRED Database
ROA	is operating income before depreciation over total assets.	Compustat Quarterly Data

Variable Definitions continued

Variable	Description	Source
Sales Growth	is the year-on-year growth of quarterly sales.	Compustat Quarterly Data
Size	is market value of equity.	Compustat Quarterly Data
Tobin's Q	is market value of total assets (Product of the shares outstanding and market price + book value of total assets - book value of equity - deferred taxes and investment tax credit (if available)) over the lagged book value of total asset.	Compustat Quarterly Data
Total Asset	is book value of total assets.	Compustat Quarterly Data

Table C.2: Conditional investment sensitivity to macroeconomic shocks - Firm-level analysis - Raw data

The tables present the results for the analysis of investment sensitivity to macroeconomic shocks. I calculate the investment sensitivity by employing the following firm-level regression for the overall sample: $\mathtt{Investment}_{i,t} = \alpha_i + \beta_1 \mathtt{Inter}_{i,t-l} + \beta_2 \mathtt{Shock}_{i,t-l} + \beta_3 \mathtt{Firm}_{i,t-l} + \mathtt{Controls} + \mathtt{Time}_t + \varepsilon_{it}$, where i indexes firms, t indexes calendar quarter years, and $l \in 1,2,3,4$ stands for the lead between the investment variable and the explanatory variable. I only present the results for β_1, which captures the investment sensitivity to the macroeconomic shock of interest depending on the firm characteristic of interest (raw data o investment, Tobin's Q, size, ROA). I include Tobin's Q, cash flow over lagged assets, and sales growth as control variables. The α_i is firm fixed effects and Time represents calendar quarter-year fixed effects. Panel A shows the results for the recession analysis, Panel B for the political uncertainty analysis (EPU index) and Panel C for the market risk premium analysis. See Appendix C.1 for a definition of all variables. For each independent variable, the table displays the slope estimate and, in parentheses, the t-value of the two-sided t-test for zero slope. In all OLS regressions t-statistics are based on heteroscedasticity-robust standard errors clusterd at the firm level. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Recession analysis

	Lag 1	Lag 2	Lag 3	Lag 4
Recession x Size	0.0014	−0.0041	−0.0112***	−0.0147***
	(0.42)	(−1.22)	(−3.28)	(−4.22)
Recession x Tobin's Q	−0.0105**	−0.0011	−0.0027	0.0001
	(−2.00)	(−0.21)	(−0.55)	(0.02)
Recession x ROA	0.0008	−0.0019	−0.0058***	−0.0079***
	(0.59)	(−1.44)	(−4.19)	(−5.42)
Recession x Investment	−0.0157*	−0.0812***	−0.1118***	−0.1322***
	(−1.81)	(−9.50)	(−12.50)	(−14.23)

Panel B: Political uncertainty analysis

	Lag 1	Lag 2	Lag 3	Lag 4
EPU x Size	-0.0294^{***}	-0.0276^{***}	-0.0188^{***}	-0.0180^{***}
	(-4.35)	(-4.07)	(-2.79)	(-2.67)
EPU x Tobin's Q	-0.0192^{**}	-0.0080	-0.0022	0.0094
	(-2.39)	(-0.98)	(-0.27)	(1.20)
EPU x ROA	-0.0011	-0.0027	-0.0045^{**}	-0.0063^{***}
	(-0.53)	(-1.22)	(-1.98)	(-2.95)
EPU x Investment	-0.1014^{***}	-0.1121^{***}	-0.1169^{***}	-0.0870^{***}
	(-8.41)	(-8.74)	(-9.15)	(-6.42)

Panel C: Market risk premium analysis

	Lag 1	Lag 2	Lag 3	Lag 4
MRP x Size	-0.0371^{***}	-0.0330^{***}	-0.0295^{***}	-0.0269^{***}
	(-13.64)	(-12.28)	(-11.09)	(-10.25)
MRP x Tobin's Q	-0.0153^{***}	-0.0101^{***}	-0.0072^{**}	-0.0046
	(-5.05)	(-3.42)	(-2.34)	(-1.49)
MRP x ROA	-0.0047^{***}	-0.0061^{***}	-0.0072^{***}	-0.0072^{***}
	(-5.98)	(-7.68)	(-8.75)	(-8.61)
MRP x Investment	-0.0244^{***}	-0.0279^{***}	-0.0315^{***}	-0.0230^{***}
	(-5.73)	(-6.29)	(-7.36)	(-5.13)

Table C.3: Investment flexibility and expected returns - Deciles

The table presents results for OLS regressions with monthly portfolio returns as dependent variable. Each month, I construct equally-weighted (value-weighted) investment flexibility-based decile portfolios. I analyze the returns of all portfolios with established performance-evaluation methods, e.g., CAPM, Fama-French-3-Factors, and Fama-French-5-Factors. See Appendix C.1 for a definition of all variables. Panel A and B summarize the regression results for the equally-weighted and value-weighted quintile portfolios. The table displays the alpha estimate, the abnormal return, for each performance-evaluation method. I use robust standard errors. t-statistics are shown in parenthese. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

Panel A: Equally-weighted portfolio sorts

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
Raw Return	0.9063***	0.6629**	1.1181***	1.0028***	1.0738***	0.8587***	0.7860***	0.8989***	0.8802***	0.8421***
	(3.10)	(2.40)	(4.01)	(3.73)	(3.89)	(2.83)	(2.68)	(3.07)	(2.99)	(2.61)
CAPM Alpha	0.1331	−0.0811	0.4224***	0.3352**	0.3449**	0.0454	0.0380	0.1506	0.0680	0.0707
	(0.87)	(−0.62)	(2.84)	(2.48)	(2.32)	(0.33)	(0.28)	(1.06)	(0.46)	(0.35)
FF3 Alpha	0.0529	−0.1455	0.3326**	0.2388*	0.2558*	−0.0079	−0.0560	0.0890	−0.0111	−0.0265
	(0.36)	(−1.14)	(2.25)	(1.81)	(1.77)	(−0.06)	(−0.43)	(0.63)	(−0.08)	(−0.13)
FF5 Alpha	0.6253**	0.3679	0.7267**	0.6655**	0.7241**	0.5357*	0.4086	0.6456**	0.5451*	0.5591*
	(2.06)	(1.28)	(2.51)	(2.45)	(2.56)	(1.79)	(1.37)	(2.16)	(1.80)	(1.67)

Panel B: Value-weighted portfolio sorts

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
Raw Return	1.1974***	0.9416***	1.3294***	0.9151***	0.9998***	1.5251***	0.9840***	1.4865***	0.4851	0.7661*
	(3.62)	(3.70)	(5.17)	(3.49)	(4.62)	(5.87)	(3.38)	(5.26)	(1.45)	(1.79)
CAPM Alpha	0.4982**	0.3442**	0.7314***	0.3468**	0.4433***	0.8065***	0.2496*	0.8486***	−0.4136**	−0.2107
	(2.17)	(2.01)	(4.68)	(2.00)	(3.67)	(7.61)	(1.81)	(4.89)	(−2.03)	(−0.67)
FF3 Alpha	0.4650**	0.3188*	0.7070***	0.3115*	0.4281***	0.8042***	0.2634*	0.8326***	−0.3315	−0.1582
	(2.02)	(1.84)	(4.35)	(1.76)	(3.48)	(7.59)	(1.86)	(4.80)	(−1.65)	(−0.52)
FF5 Alpha	0.8754**	0.7956***	1.2593***	0.7389**	0.7927***	1.3771***	0.7948***	1.3243***	0.4802	0.8130*
	(2.36)	(2.77)	(4.23)	(2.59)	(3.45)	(5.31)	(2.63)	(4.37)	(1.45)	(1.97)

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