Policy Uncertainty, Corporate Risk-Taking and CEO Incentives*

Mihai Ion †
University of Arizona

David Yin ‡
University of Arizona

Preliminary and incomplete. Comments welcome.

Abstract

Using a news-based index of aggregate policy uncertainty in the US economy, we document a strong negative relation between policy uncertainty and corporate risk-taking. We show that high levels of policy uncertainty are associated with a higher propensity to use financial hedging instruments, a higher preference for diversifying acquisitions, and a significantly lower future return volatility. Furthermore, we find that CEOs sell more own-firm shares and exercise fewer options when policy uncertainty is high. The relation between policy uncertainty and return volatility is stronger (more negative) when CEOs have higher delta and when they have more specialized skills, and it is weaker when they have higher vega. These results are consistent with the hypothesis that CEOs manage the potential effects that policy uncertainty may have on their wealth by adjusting both the risks taken by their firm, as well as their portfolios' exposure to their own firm. Furthermore, our results support the notion that the effect of policy uncertainty on the real economy is highly dependent on CEO risk-taking incentives.

*This paper has benefited from comments and discussions with Alice Bonaime, Scott Cederburg, Huseyin Gulen and Ryan Williams.

†Eller College of Management, University of Arizona, 1130 E Helen St, Tucson AZ 85721. Tel: (765) 656-4211, e-mail: mihaiion@email.arizona.edu.

‡Eller College of Management, University of Arizona, 1130 E Helen St, Tucson AZ 85721. Tel: (520) 241-3842, e-mail: davidyin@email.arizona.edu.

1. Introduction

The 2016 United States presidential election and the United Kingdom referendum on leaving the European Union are only some of the more recent and prominent examples that political and regulatory systems can generate a substantial amount of economic uncertainty for individuals and corporations. In this paper, we investigate if managers take steps to reduce firm-level risk when faced with high levels of policy uncertainty. We are particularly interested in how CEOs' risk-taking incentives affect the manner in which firms respond to policy uncertainty. Our main premise is that CEOs who have a significant proportion of their financial and human capital invested in their own firm will be particularly exposed to the effects of policy uncertainty and should therefore have a stronger incentive to mitigate these effects by either reducing the riskiness of their firm or by reducing their equity position in their own firm. We find evidence consistent with both of these predictions.

A growing literature in economics and finance attempts to understand the impact of policy uncertainty on the real economy. Generally, studies have found that high levels of policy uncertainty are associated with lower investment activity (e.g. Julio and Yook (2012), Gulen and Ion (2016), Bonaime, Gulen, and Ion (2017)) and higher costs of external financing (e.g. Pastor and Veronesi (2012, 2013), Gilchrist, Sim, and Zakrajek (2014), Arellano, Bai, and Kehoe (2010)). We contribute to this literature by providing evidence that CEOs play a crucial role in how policy uncertainty affects corporations. We argue that, due to CEOs' prominent roles in corporate decision making, the effect of policy uncertainty on corporate behavior must be, at least in part, a function of its effect on CEOs' wealth portfolios.

CEO compensation has received a great deal of scrutiny from both academics and the popular press. While much of the attention has gone to the significant surge in the *level* of compensation over the years, the changing *composition* of CEO compensation packages has also been of significant interest.[1] Notably, over the past three decades, equity-based compensation in the form of restricted shares and stock options has come to dominate all other sources of income for CEOs. While equity compensation may be designed to better align the interests of the CEO with those of the

[1] See, for example, Core, Guay, and Larcker (2003), Frydman and Jenter (2010), Edmans and Gabaix (2011), and Murphy (2013).

shareholders, it also exposes the CEO to firm-specific risk that cannot be easily diversified due, for example, to vesting restrictions and blackout periods. This gives rise to the possibility that, by changing the risk characteristics of their firm, policy uncertainty significantly impacts the risk of CEOs' wealth portfolios, which in turn may shift their preference for risk taking in the future. In addition to having a large proportion of their *financial* capital invested in their firm, CEOs may also possess highly specialized *human* capital, which can also tie their wealth to the performance of their firm. This provides another reason why CEOs would be motivated to mitigate the effects of policy uncertainty by implementing risk-reducing corporate policies.

Throughout our empirical analysis, we measure the level of uncertainty surrounding the political and regulatory system in the United States using the index constructed by Baker, Bloom, and Davis (2016, henceforth BBD). The main component of this index is a measure of overall policy uncertainty in the economy, constructed using automated newspaper searches of articles containing terms related to macroeconomics, policy, and uncertainty. As we discuss in further detail below, BBD validate this measure using several methods, including an extensive human audit. The remaining components of the BBD index capture uncertainty about tax policy (based on tax code provisions that are set to expire) and uncertainty about fiscal and monetary policy (based on forecaster disagreement about future government spending and inflation).

We begin by investigating the relation between policy uncertainty and several specific actions CEOs can take to affect the riskiness of their firm. First, we use an automated text search of firms' 10-K filings to determine if they used financial instruments to hedge commodity, currency, or interest rate risk that year. We then use logit regressions to show that high levels of policy uncertainty are associated with a significantly higher propensity to use such hedging instruments up to two or three years in the future. Second, we use SDC data on mergers and acquisitions and show that policy uncertainty increases acquirers' preference for cross-industry (versus within-industry) mergers and their preference for cross-border (versus domestic) mergers, both contemporaneously and in the following two years.[2]

Next, we analyze how policy uncertainty is related to CEOs' trading of own-firm stocks and options. If equity-based compensation causes policy uncertainty to increase the riskiness of CEOs'

[2]The latter result on cross-border acquisitions was first documented in Bonaime, Gulen, and Ion (2017). Here we extend their analysis to a longer horizon.

wealth portfolios, CEOs can mitigate this effect in two ways. One is by subsequently implementing corporate policies that reduce firm risk (the findings above support this prediction). The second is to simply reduce their portfolio's exposure to their own-firm risk by selling some of their shares. Consistent with this prediction, we find that in times of high policy uncertainty CEOs sell a significantly higher proportion of their own-firm shares. This effect is highly persistent, lasting up to five years in the future. This is consistent with the idea that CEOs cannot easily reduce their exposure to their own firm, and must do so gradually, due to vesting restrictions and blackout periods. We also find a negative relation between policy uncertainty and the percentage of options exercised by the CEO. This is consistent with the notion that the protection against downside risk offered by options is particularly valuable in times of high policy uncertainty.

The use of hedging instruments and diversifying merges are only some of the many actions CEOs can take to affect the riskiness of their firm. To investigate how policy uncertainty affects CEOs' *overall* risk-taking behavior, we use stock return volatility as an all-encompassing measure of corporate risk taking. We regress current and future (annual) stock return volatility on our measure of policy uncertainty and an extensive set of firm- and macro-level controls.[3] We find a strong negative relation between policy uncertainty and future total, idiosyncratic, and systematic return volatility. In terms of economic magnitude, our estimates indicate that a one standard deviation increase in policy uncertainty is associated with a fifth of a standard deviation increase in total return volatility the following year. Contemporaneously, we find a strong *positive* relation between policy uncertainty and systematic risk, which is consistent with the findings in Boutchkova, Doshi, Durnev, Molchanov (2011), who show that industry-level return volatility is higher in election years. Overall, these findings support our hypothesis that policy uncertainty can increase the risk of the firm contemporaneously, and CEOs react by subsequently engaging in risk-reducing corporate policies, which results in lower return volatility in the future.

[3]All our regressions include firm fixed effects and standard errors are clustered at the firm and year level. To control for the possibility that policy uncertainty is capturing the effect of poor investment opportunities, we control for (1) a proprietary leading economic indicator from the Conference Board designed to predict GDP growth, (2) the Chicago Fed National Activity Index, (3) the consumer confidence index from the University of Michigan, and (4) the mean forecast of GDP growth from the Philadelphia Fed Survey of Professional Forecasters. To ensure that policy uncertainty is not capturing more general macroeconomic uncertainty, we control for (1) the Jurado, Ludvigson, and Ng (2015) index based on the volatility of the unforecastable component in a system of 279 macroeconomic variables, (2) the CBOE VXO index of implied volatility on S&P 500 stocks, (3) the interquartile range of GDP forecasts of future GDP growth from the Philadelphia Fed Survey of Professional Forecasters, (4) the cross-sectional dispersion in firm-level year-on-year sales-growth from Compustat, and (5) the cross-sectional dispersion in firm-level 12 month cumulative returns from CRSP.

To more directly tie the relationship between policy uncertainty and corporate risk to CEO incentives, we investigate how the negative effect on return volatility documented above changes based on how CEOs are compensated. Two characteristics of CEOs' portfolio of own-firm stocks and options are of particular importance to our analysis. First is the sensitivity of the portfolio to changes in the firm's stock price (i.e. "delta") and second is the sensitivity of the portfolio to changes in the firm's stock price volatility (i.e. "vega"). All else equal, a higher delta implies a higher exposure to changes in firm value, which increases the CEO's incentive to reduce firm risk. High vega implies more protection against downside risk, which means the CEO has a lower incentive to reduce risk. The combination of delta and vega will strongly influence the CEO's attitudes towards risk-taking and should therefore act as mediating factors for the manner in which CEOs react to policy uncertainty.

We test this prediction by regressing return volatility on policy uncertainty, interactions between policy uncertainty and CEO delta and vega, and our standard set of firm-level and macro-level controls. We also include CEO age, tenure, and cash compensation to proxy for CEO risk aversion (e.g. Berger, Ofek, and Yermack (1997) and Guay (1999)). We find that, for CEOs with average delta and vega, policy uncertainty has a strong negative effect on future volatility, and this effect is significantly more negative for CEOs with higher delta and significantly less negative for CEOs with higher vega. In terms of economic magnitude, a one standard deviation increase in CEO delta amplifies the effect of policy uncertainty on return volatility by 11.5% and a one standard deviation increase in CEO vega reduces this effect by 10.4%.

Next, we investigate how the negative relation between policy uncertainty and return volatility depends on the degree to which the CEOs' human capital is firm-specific. The prediction is that CEOs with highly specialized human capital have stronger incentives to manage firm risk-taking because their wealth is more closely tied to their firm (i.e. they have fewer outside options). To test this prediction, we use the general ability index developed by Custodio, Ferreira, and Matos (2013) who use CEOs' resumes to measure the extent to which their skills are transferable across firms and industries. We include an interaction between policy uncertainty and this general ability index in our return volatility regressions and find that, consistent with our prediction, the negative relation between policy uncertainty and future volatility is significantly stronger the less transferable the CEO's skills are.

Our results support the hypothesis that the risk-management activity of under-diversified CEOs represents a significant mechanism through which policy uncertainty affects the economy. In the last part of our analysis, we perform several tests to ensure that our results are not driven by other channels through which policy uncertainty has been found to affect firms. Two mechanisms in particular have received significant attention in prior studies. First, by increasing the value of the real-option to wait (e.g. Gulen and Ion (2016), Bonaime, Gulen, and Ion (2017)), policy uncertainty can cause firms to delay investment projects. Second, by increasing firms' cost of external financing (e.g. Pastor and Veronesi (2012, 2013), Gilchrist, Sim, and Zakrajek (2014), Arellano, Bai, and Kehoe (2010)), policy uncertainty could result in lower leverage levels or foregone investments. Both of these effects could, in theory, result in lower future return volatility.

For the real-options and financial frictions mechanisms to be responsible for our cross-sectional results, it would have to be the case that CEOs' delta, vega, and skill specialization are capturing the degree to which firms are affected by real options or financial frictions. To address this possibility, we verify that our results are robust to controlling for interactions of policy uncertainty with proxies for firms' sensitivity to real option values and financial frictions. We argue that the real-option effect should be a function of how irreversible the firms' investments are (the option to delay is less important for firms that can easily reverse their investment) and on how competitive their industry is (firms in highly competitive industries are more likely to lose investment opportunities if they postpone them). We also posit that the financial-frictions mechanism should be a function of the firm's default probability (firms with higher default probability are more likely to be credit rationed if the credit market contracts) and the degree to which the firm is financially constrained (more constrained firms are more likely to have to forego projects if the cost of external capital increases). Controlling for interactions of policy uncertainty with various measures of investment irreversibility, industry competition, default probability, and financial constraints, we still find that the negative relationship between policy uncertainty and return volatility depends significantly on CEO incentives and skill specialization. These results cast doubt on the idea that the negative association between policy uncertainty and return volatility is simply a mechanical result of the reduction in investment and leverage induced by policy uncertainty through the real-options and financial frictions channels.

To further strengthen this point, we investigate how the effect of policy uncertainty on corporate investment and leverage depends on CEO incentives and skill specialization. We find that the previously documented negative relation between policy uncertainty and investment is significantly stronger when CEOs have higher delta and weaker when they have higher vega. We also find a negative association between policy uncertainty and book leverage and show that this relation is significantly weaker when CEOs have higher vega.[4] These results are robust to controlling for interactions between policy uncertainty and our proxies for firm sensitivity to real options and financial frictions.

It is difficult (and not the primary purpose of our study) to quantify the extent to which the negative relation between policy uncertainty and future return volatility is a consequence of delayed investments or reductions in leverage. The effect that policy uncertainty has on investment and leverage through the real-options and financial frictions channels may very well be responsible for some of its negative effect on return volatility. Nevertheless, our results suggest that this negative effect is, at least in part, a consequence of how CEO incentives affect the relation between policy uncertainty and corporate investment and financing.

2. Related Literature and Relative Contribution

Our paper contributes to the literature investigating how the uncertainty generated by the political and regulatory system affects the economy. Most studies have focused on how policy uncertainty affects investment and financing decisions.[5] To the best of our knowledge, we are the first to examine its effects on risk-taking activity as a whole. The closest paper to our study in this regard is Boutchkova, Doshi, Durnev, Molchanov (2011), who, in an international setting, show that several measures of political risk are associated with higher contemporaneous return volatility at the industry level.[6] The authors focus on showing that this effect is stronger for firms that are more exposed to different types of policies. However, they do not investigate how firms might *react* to a high-policy-uncertainty environment so as to reduce their overall risk *in the future*, which is the focus of our study. Hence, while the findings in Boutchkova, Doshi, Durnev, Molchanov (2011)

[4] We find no evidence that the relation between policy uncertainty and corporate investment and leverage decisions depends on the CEO's degree of skill specialization.

[5] For example, Julio and Yook (2012), Gulen and Ion (2016), Bonaime, Gulen, and Ion (2017), Gilchrist, Sim, and Zakrajek (2014), Arellano, Bai, and Kehoe (2010), and Pastor and Veronesi (2012, 2013).

[6] This is consistent with our result that policy uncertainty is associated with higher firm-level systematic risk contemporaneously.

show that policy uncertainty may contemporaneously increase the riskiness of the firm, we start from the premise that CEOs have some degree of control over their firm's risk-taking and we study how CEOs' incentives affect their response to policy uncertainty.

Our study is also related to the literature studying how CEO compensation affects firm risk-taking. The main challenge in this literature is the possibility that boards may be able to design compensation packages so as to elicit the optimal amount of risk-taking by CEOs. If this is the case, then observing a negative (positive) relation between CEO delta (vega) and firm risk-taking does not necessarily imply suboptimal behavior on the part of the CEO. Several recent studies have addressed this issue by either jointly modeling CEO compensation and firm risk-taking (e.g. Coles, Daniel, and Naveen (2006)), Rajgopal and Shevlin (2002), Rogers (2002)), or by extracting exogenous variation in either compensation or risk taking using instrumental variables (e.g. Armstrong and Vashishtha (2012), Shue and Townsend (2017)) or natural experiments (e.g. De Angelis, Grullon, and Michenaud (2017), Gormley, Matsa, and Milbourn (2013), Hayes, Lemmon, and Qiu (2012), Low (2009)). The general conclusions from these studies are that CEOs do seem to prefer taking less risk than is optimal for shareholders, and that the design of the compensation package can alleviate this problem.

In the context of our study, the reverse causality concern is that compensation packages (and hence CEO delta and vega) are set optimally so as to elicit the correct risk-taking response to a more uncertain political and regulatory environment. If this is the case, then our finding that policy uncertainty is associated with larger reductions in risk taking for firms with higher CEO delta may simply imply that these are the firms which *should have* reduced risk-taking more in the face of policy uncertainty. An analogous case can be made for our cross-sectional results involving CEO vega and skill specialization. As explained in more detail below, we address this issue by being very explicit about which firm characteristics should capture the optimal risk-reduction response to policy uncertainty and controlling for them and their interaction with policy uncertainty in all our cross-sectional tests. We choose this approach to the alternative solutions listed above because (1) our policy uncertainty measure is the same for all firms at any point in time and therefore natural experiments are not an option and (2) the instrumental-variables and joint-determination approaches proposed by the above studies rely on exclusion restrictions that we do not deem appropriate in the context of our study.

3. Data and methodology

In this section, we describe the main variables used in our empirical analysis and the data sources we used to obtain them. We start by describing how we measure the overall level of policy uncertainty in the economy and how it relates to other measures of macroeconomic risk and various estimates of expected economic growth. We end with a discussion of our accounting, stock return, and CEO compensation data. Table A1 in the Appendix contains more detailed information on variable construction and data sources.

3.1. Measuring policy uncertainty

Our measure of economic policy uncertainty is based on the Baker, Bloom, and Davis (2016) (BBD) index, which is constructed as a weighted average of four different components.[7] The main component is a measure of the general level of policy uncertainty in the economy. It is constructed using automated text searches in ten leading US newspapers, counting the frequency of articles that include key terms related to economics, policy, and uncertainty.[8] The assumption is that periods with a higher frequency of newspaper articles containing these terms are periods in which the economy is experiencing a higher level of policy-related uncertainty. BBD perform a battery of tests to validate their methodology and to ensure that their index does in fact capture policy uncertainty and not some other confounding macroeconomic factors.[9]

The remaining weight in the overall BBD index is equally divided between three variables meant to capture uncertainty about specific policies: a measure of tax-policy uncertainty based on the discounted value of the revenue effects of all tax provisions set to expire in the following ten years,

[7]We thank Scott Baker, Nick Bloom and Steven Davis for making the index and its components available at http://www.policyuncertainty.com/.

[8]More specifically, the authors record the number of articles that mention at least one of the terms ‘uncertainty’ or ‘uncertain’ at least one of the terms ‘economic’ or ‘economy’ and at least one of the terms ‘congress’, ‘White House’, ‘Federal Reserve’, ‘legislation’, ‘regulation’, or ‘deficit’. The newspapers included in the search are: USA Today, Miami Herald, Chicago Tribune, Washington Post, Los Angeles Times, Boston Globe, San Francisco Chronicle, Dallas Morning News, New York Times, and Wall Street Journal.

[9]For example, to test if newspaper searches can be used to capture uncertainty, the authors use their methodology (with different keywords) to capture equity-market uncertainty and they find that this yields an index which has a correlation of 0.73 with the CBOE VIX index. Moreover, the authors lead an extensive human audit of newspaper articles to identify the ones that actually discuss increases in policy uncertainty in the economy and use this human audit as a benchmark to obtain the optimal set of keywords in their automated search. Finally, to ensure that the variation in their index is not driven by media slant, the authors use the Gentzkow and Shapiro (2010) media slant index to divide the ten newspapers into the five most left-leaning and the five most right-leaning. They then use their methodology separately on the two groups of newspapers and they find that the two policy uncertainty indexes obtained closely track each other.

a measure of uncertainty about monetary policy using the dispersion in forecasts of the CPI, and a measure of uncertainty about future government spending based on the dispersion in forecasts of purchases of goods and services by federal, state and local governments.[10] The overall BBD index is calculated as follows:

$$BBD = \frac{1}{2}\text{News-based PU} + \frac{1}{6}\text{Tax PU} + \frac{1}{6}\text{Monetary PU} + \frac{1}{6}\text{Government spending PU} \quad (1)$$

As shown in Figure 1, the index does seem to spike around events that are ex-ante expected to increase policy uncertainty such as elections, wars, the debt ceiling crisis, the recent government shutdown, and the financial crisis. The index also exhibits substantial variation between these significant events. Because the index is measured at a monthly frequency and all our empirical tests are at an annual frequency, we use an annualized version of the index, which, for every firm i in the calendar year t, equals the average of the monthly values of the index in the firm's fiscal year ending in t.

3.2. Macro-level data

One concern with identifying the effects of policy uncertainty on corporate decisions is that high levels of policy uncertainty may simply be proxying for poor investment opportunities. To account for this possibility, we use four different proxies for expected economic growth. These include: (1) a proprietary leading economic indicator from the Conference Board designed to predict GDP growth,[11] (2) the Chicago Fed National Activity Index, (3) the consumer confidence index from the University of Michigan, and (4) the mean forecast of GDP growth from the Philadelphia Fed Survey of Professional Forecasters. To avoid multicollinearity issues, in all our regressions, we use the first principal component of these four measures, though we verify that our results are robust

[10] The data on tax code provisions come from the Congressional Budget Office and the data on forecast dispersion comes from the Survey of Professional Forecasters published by the Federal Reserve Board of Philadelphia.

[11] This index is a weighted average of 10 components: (1) average weekly hours, manufacturing, (2) average weekly initial claims for unemployment insurance, (3) manufacturers new orders, consumer goods, and materials, (4) ISM®Index of New Orders, (5) manufacturers' new orders, nondefense capital goods excluding aircraft orders, (6) building permits, new private housing units, (7) stock prices, 500 common stocks, (8) Leading Credit Index™, (9) interest rate spread, 10-year Treasury bonds less federal funds, and (10) average consumer expectations for business conditions. The components of the Leading Credit Index™ are: (1) 2-year Swap Spread, (2) LIBOR 3 month less 3 month Treasury-Bill yield spread, (3) Debit balances at margin account at broker dealer, (4) AAII Investors Sentiment Bullish (%) less Bearish (%), (5) Senior Loan Officers C&I loan survey Bank tightening Credit to Large and Medium Firms, (6) Total Finance: Liabilities Security Repurchase.

to controlling for all of them simultaneously. As shown in Panel A of Table 1, policy uncertainty is strongly negatively correlated with all our proxies for growth opportunities and has a significant, −0.32 correlation with their first principal component.

A second concern with the interpretation of our results is that different types of economic uncertainty tend to move together, and our policy uncertainty variable may be picking up the effects of other sources of uncertainty. We address this issue by using five different measures of general macroeconomic uncertainty: (1) the Jurado, Ludvigson, and Ng (2015) index based on the volatility of the unforecastable component in a system of 279 macroeconomic variables, (2) the CBOE VXO index of implied volatility on S&P 500 stocks, (3) the interquartile range of GDP forecasts of future GDP growth from the Philadelphia Fed Survey of Professional Forecasters, (4) the cross-sectional dispersion in firm-level year-on-year sales-growth from Compustat, and (5) the cross-sectional dispersion in firm-level 12 month cumulative returns from CRSP. Panel B in Table 1 shows that policy uncertainty is strongly positively correlated with all these measures of macroeconomic uncertainty. Once again, to avoid multicollinearity issues, in all our regressions, we use the first principal component of these five proxies, which has a 0.41 correlation with the policy uncertainty index.

3.3. Firm-level data

We obtain accounting data from the Compustat Annual database and stock return data from CRSP. Our sample runs from 1986 to 2016, though data availability on executive compensation restricts us to the 1992-2016 sample period for regressions involving CEO compensation variables. Our measures of overall risk-taking activity by the firm are based on the volatility of daily stock returns in the 12 months of each fiscal year. Specifically, for each firm, we regress the firm's daily excess returns over the entire fiscal year on the daily excess return on the market portfolio.[12] We measure firm-level idiosyncratic risk as the standard deviation of the regression residuals, systematic risk as the standard deviation of the fitted values, and total risk as the standard deviation of the firm's excess returns.[13]

CEO compensation data is obtained from the Execucomp database, which covers all S&P 500,

[12] Data on the risk-free rate and market portfolio return are from Kenneth French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[13] All three measures are annualized.

S&P Midcap 400, and S&P Smallcap 600 firms starting in 1992. We focus on restricted stock grants and option grants as the main components of compensation affecting CEO risk-taking incentives. In addition to these flow-compensation variables, we also calculate the delta and vega of CEOs' entire portfolio of shares and options, following Guay (1999) and Core and Guay (2002). Delta (sensitivity to stock price) is calculated as the change in the dollar value of the CEOs wealth associated with a one percentage point change in stock price. Vega (sensitivity to stock price volatility) equals to the change in the dollar value of the CEOs wealth associated with a 0.01 change in the annualized standard deviation of stock returns. See Appendix B for a detailed description of how we calculate delta and vega. All compensation variables are expressed in thousands of 2016 dollars. To minimize the effect of outliers, all firm-level variables are winsorized at the 1% and 99% level.

Table 2 presents summary statistics for the main variables used in our analysis. Panel A describes our proxies for corporate risk-taking as well as the firm-level controls used in all our tests. Comparing the full sample to the Execucomp sample statistics, we notice that Execucomp firms are on average larger, more profitable, and less risky. While we must restrict our sample to these firms for all tests involving CEO compensation data, it is important to note that Execucomp firms account for 60% of the market capitalization of all publicly traded firms and 56% of total assets. Hence, while some of our tests do not include all publicly traded firms, our results are certainly applicable to a large component of the US economy.

Panel B reports the mean and median of the main components of CEO compensation, expressed as percentages of total compensation. Over the full sample period (1992-2016), we observe approximately equal split between incentive pay (stock plus options) and fixed pay (bonus plus salary), with salary and option being the largest components. However, when we split the sample to before and after 2005, we observe two significant shifts that have been previously documented in the literature. First, in the latter part of the sample (2006-2016), incentive pay is almost twice as large as fixed pay, which means CEOs' portfolios have become increasingly dependent on own-firm stock and options. Second, after the 2005 change in reporting requirements for options, stock compensation has outstripped options as the most dominant component of equity pay (and total pay). To ensure that this regulatory change does not affect our results, we verify that all out tests involving CEO compensation variables hold when we control for a post-2005 indicator variable.

3.4. Baseline specification

Our baseline regressions will generally take the following form:

$$DV_{i,t+k} = \alpha_i + \beta_1 PU_t + \gamma F_{i,t} + \delta M_t + \varepsilon_{i,t+k} \tag{2}$$

The dependent variable $DV_{i,t+k}$ used in each particular test will be measured at the end of the fiscal year ending in calendar year $t+k$, where k takes values from 0 to 5. The α_i is a firm fixed effect. Policy uncertainty (PU_t) is measured over the fiscal year ending in calendar year t. Since firms have fiscal years ending at different times within the year, the PU_t variable has some (limited) variation with the year. We suppressed the firm index i to avoid confusion and to make it clear that this is not a firm-specific variable.

The $F_{i,t}$ term is a vector of firm-level controls which includes: Tobin's q, operating cash-flows to lagged assets, year-over-year sales growth, the natural logarithm of total assets, ROA, and the cumulative return over the past 12 months. The M_t term includes the first principal component of our four macroeconomic controls for expected growth opportunities and the first principle component of our five controls for macroeconomic uncertainty, as described in Section 3.2. In all tests, standard errors are clustered at the firm and year level.

In all our regressions, we transform all variables by demeaning them and dividing them by their sample standard deviation. This eases the assessment of economic magnitudes of the coefficients. After this transformation, the coefficient on any independent variable X can be interpreted as the estimated number of standard deviations the dependent variable will move from its mean if the X variable increases by one standard deviation from its mean.

4. Examining specific measures of risk management

In this section, we investigate how policy uncertainty is related to several specific actions CEOs can take to alter the riskiness of their firm. In particular, we analyze how policy uncertainty affects the use of financial hedging instruments and the likelihood of engaging in diversifying mergers. If policy uncertainty induces CEOs to engage in risk-reducing activities, we expect higher levels of policy uncertainty to be associated with an increased propensity of using financial hedging instruments and a stronger preference for diversifying (vs. non-diversifying) mergers. We then investigate if policy uncertainty changes the extent to which CEOs manage their exposure to their own firm by selling their shares or exercising their options.

4.1. Effect on financial hedging

We investigate the effect of policy uncertainty on firms' hedging of three different types of risk: commodity, currency, and interest rate risk. To identify if firms are hedging any of these risks, we use automated textual searches of firms' 10K filings. We create three dummy variables, each recording whether the 10K filings mentioned the use of commodity, currency, or interest rate hedging instruments. We use these dummy variables to run three logistic regressions, each taking the following general form:

$$Hedger_{i,t+k} = \alpha_{ind} + \beta_1 PU_t + \omega Exp_{i,t} + \gamma F_{i,t} + \delta M_t + \varepsilon_{i,t+k} \tag{3}$$

The $Hedger_{i,t+k}$ term is one of our commodity, currency, or interest-rate hedging dummies, which equals one if firm i used that particular type of hedging in year $t+k$, where $k = 0, ...5$. The $F_{i,t}$ and M_t terms contain the firm-level and macro-level controls described in our baseline specification from Equation 2 and α_{ind} is an industry fixed effect based on the Fama and French 48 industry classification. The $Exp_{i,t}$ term is meant to capture the extent to which the firm is exposed to the type of risk (commodity, currency, interest rate) analyzed in each equation. Following Alemida, Hankins, and Williams (2017), we measure exposure to commodity risk by the percentage of the industry's inputs that trade on commodity markets.[14] To proxy for exposure to currency risk, we use a dummy variable for whether the firm has positive foreign taxes and a dummy variable for whether the firm has positive foreign income. Finally, we proxy for exposure to interest rate risk using a dummy variable that equals one if the firm has positive debt.

Table 3 presents the results of our estimation, using commodity (Panel A), currency (Panel B), and interest rate (Panel C) hedging dummies as dependent variables. For brevity, we present only the coefficients on the policy uncertainty and risk exposure variables (i.e. the PU_t and $Exp_{i,t}$ terms in Equation 3). Across the board, as expected, the exposure variables are strongly positively

[14] We thank Ryan Williams for generously providing us with this data.

related to the likelihood of hedging that particular risk. More importantly, we find that higher levels of policy uncertainty are associated with a significantly higher likelihood of engaging in both commodity, currency, and interest rate hedging. The strongest effects are generally seen in year zero or year one, but they persist up to two or three years in the future.

To get a sense of the economic magnitude of these results, we use our estimates to calculate marginal effects on the likelihood of hedging. We find that a one standard deviation increase in policy uncertainty is associated with reductions in the likelihood of using hedging instruments of 28% for commodity hedging, 22% for currency hedging, and 11% for interest-rate hedging in the same year.[15] These results suggest that policy uncertainty can have a significant impact on the markets for the financial instruments using in commodity, currency and interest rate hedging. To the best of our knowledge, we are the first to point out this effect.

4.2. Effect on diversifying mergers

The extant literature has found that policy uncertainty has a negative impact on corporate investment and M&A activity, and has generally attributed this effect to the fact that policy uncertainty increases the value of the real-option to delay investment decisions (e.g. Gulen and Ion (2016), Bonaime, Gulen, and Ion (2017)). In this section, we investigate the possibility that CEOs may react to policy uncertainty by changing their preference for diversifying over non-diversifying investments. In particular, we analyze how policy uncertainty affects the likelihood that firms engage in cross-industry and cross-border.[16] To do so, we estimate regressions of the following form:

$$DMerger_{i,t+k} = \alpha_{ind} + \beta_1 PU_t + \gamma F_{i,t} + \delta M_t + \varepsilon_{i,t+k} \tag{4}$$

Here, the $DMerger_{i,t+k}$ term is either an indicator variable for whether the firm engages in a cross-border acquisition, or an indicator variable for whether the firm engages in a cross-industry acquisition.[17] The α_{ind} term stands for an industry fixed effect and $F_{i,t}$ and M_t contain the same firm-level and macro-level controls as our baseline specification from Equation 2.

[15] The analogous marginal effects for Year 1 hedging likelihoods are 25%, 22% and 9%.

[16] Bonaime, Gulen, and Ion (2017) were the first to point out that policy uncertainty may affect merger activity through a diversification channel.

[17] The cross-industry acquisition indicator equals one if the firm acquires a target in a different four-digit SIC industry. Our results are not changed if we use three-digit SIC industries instead.

Because we only observe the status of the target for firms that actually announce a merger, our estimates may suffer from a selection bias. To guard against this possibility, we use a two-stage Heckman probit specification, where in the first stage we model the likelihood of being an acquirer, and in the second stage we model the choice between a diversifying and a non-diversifying merger. For identification purposes, we need a variable that affects the likelihood of announcing a merger, but does not affect the type of target being acquired. For this purpose, we follow the approach in Bonaime, Gulen, and Ion (2017) and use the Edmans, Goldstein, and Jiang (2012) measure of expected price pressure caused by mutual fund outflows as an instrument. Here we rely on the findings in Edmans, Goldstein, and Jiang (2012), who show that investor' unanticipated fund outflows can mechanically affect a firm's valuation and hence its likelihood of announcing a merger. Since these nonfundamental shocks to firm valuation are unlikely to be related to the *type* of target being acquired, the Edmans, Goldstein, and Jiang (2012) measure should satisfy the exclusion restriction in our setting.[18]

In Table 4, we present the results from the second stage (Equation 4) of our Heckman probit model. The first stage includes all the control variables in the second stage, plus the Edmans, Goldstein, and Jiang (2012) instrument described above. Panel A shows that high levels of policy uncertainty are associated with a significantly higher preference for foreign targets (versus domestic targets), both contemporaneously and in the following two years.[19] This finding is consistent with the idea that CEOs' desire to reduce their exposure to domestic political risk increases their preference for foreign targets that may not be as exposed to US policy uncertainty.

The results in Panel B show that policy uncertainty is strongly positively associated with the likelihood of acquiring cross-industry (versus within-industry) targets both contemporaneously and over the next two years. The effect is reversed in years four and five, presumably after the uncertainty has been resolved. The results in Panel B further support the idea that high levels of policy uncertainty can induce firms to adjust their acquisition activity in a manner that reduces risk-taking.

[18]Please see Appendix A in Edmans, Goldstein, and Jiang (2012) for a detailed description of how this measure is calculated.

[19]The result in the "Year 1" column is analogous to the result first reported by Bonaime, Gulen, and Ion (2017), that policy uncertainty increases the preference for foreign targets over the next year. Our results in Panel A extend that finding to a longer horizon.

4.3. Effect on CEO trades

As explained above, our main hypothesis is that equity-based compensation causes policy uncertainty to increase the riskiness of CEOs' wealth portfolios, which induces CEOs to take actions to mitigate this effect. If this is the case, then one approach would be to implement corporate policies that reduce firm risk (the findings above support this prediction). The second, is to simply reduce their portfolio's exposure to their own firm by selling some of their shares. We test the latter prediction in this section.

If high policy uncertainty increases CEOs' desire to reduce their exposure to changes in their own-firm value, then we expect to find a positive relationship between policy uncertainty and CEOs' sale of own-firm stock. The effect on CEO option exercise is less clear. On the one hand, exercising options (and selling the stock) would reduce their exposure to firm risk. On the other hand, this would also reduce their protection against downside risk. These opposing effects imply that the empirical relationship between policy uncertainty and option exercise will inform us as to which one of the effects dominates (if any).

We analyze the relation between policy uncertainty and CEOs' stock–selling and option–exercising activity by estimating Tobit models of the following form:

$$Sale_{i,t+k} = \beta_1 PU_t + \gamma F_{i,t} + \delta M_t + \omega C_{i,t} + \varepsilon_{i,t+k} \quad (5)$$

Here, $Sale_{i,t+k}$ stands either for the percentage of stock sold, or the percentage of options exercised in year $t + k$ by the CEO.[20] Because these two variables have large masses at the 0 and 1 values, we estimate Equation 5 using Tobit models left censored at 0 and right censored at 1. The $F_{i,t}$ and M_t vectors contain the same firm-level and macro-level controls used in our prior tests. The $C_{i,t}$ vector includes CEO age, tenure and cash compensation as proxies for CEO risk aversion (e.g. Berger, Ofek, and Yermack (1997) and Guay (1999)). For completeness, we also estimate Equation 5 using OLS with firm fixed effects. For both estimation methods, standard errors are clustered at the firm and year level.

In Panels A1 and A2 of Table 5, we report results using the percentage of stocks sold as the dependent variable. The results suggest that during, and following, times of high policy uncertainty,

[20] All percentages are calculated using dollar values of stocks and options.

CEOs sell a significantly higher percentage of their stocks. This result holds in both the Tobit (Panel A1) and OLS (Panel A2) specification and is highly persistent, lasting up to five years. This persistence is not very surprising considering that CEOs are often restricted in terms of the time when they can sell their shares (blackout periods) and the amount they can sell (vesting), which means that CEOs' efforts to reduce their exposure may have to span a long period of time.

Panels B1 and B2 show how policy uncertainty is related to the proportion of their options CEOs exercise every year. The Tobit estimates in Panel B1 show that in times of high policy uncertainty CEOs exercise a significantly smaller percentage of their options both contemporaneously as well as in the following two years. The OLS estimates in Panel B2 are qualitatively similar, but the statistical significance is lower. Taken together, the results show that, while CEOs could lower their exposure to their delta by exercising their options (and selling the stock), they are reluctant to give up the protection against downside risk offered by their options.

Overall, the results in Table 5 show that policy uncertainty can have a significant effect on the degree to which CEOs' wealth is tied to the value of their firm. If equity compensation better aligns the interests of CEOs with the interests of their shareholders, then by accelerating CEOs' stock selling, policy uncertainty may contribute to a deterioration in corporate incentive alignment. Our findings suggest that boards need to be aware of this possibility and assess whether compensation packages need to be restructured in times of high policy uncertainty.

5. Policy uncertainty and firm-level return volatility

Managers can alter the riskiness of their firm in a variety of ways, several of which we discussed in the previous section. To investigate how policy uncertainty affects CEOs' *overall* risk-taking behavior, we use stock return volatility as an all-encompassing measure of corporate risk taking. Return volatility is particularly important in the context of our study because, if policy uncertainty negatively affects CEO portfolios through its impact on their firms' stock returns, then CEOs' risk management decisions would be aimed at reducing stock return volatility in particular.

5.1. Average effect on return volatility

We examine how policy uncertainty affects both firms' total stock return volatility, as well as their systematic and idiosyncratic volatility.[21] In our baseline specification, we regress these volatility measures ($VOL_{i,t+k}$) on policy uncertainty (PU_t) and the firm- and macro-level controls ($F_{i,t}$ and M_t) discussed in Section 3:

$$VOL_{i,t+k} = \alpha_i + \beta_1 PU_t + \gamma F_{i,t} + \delta M_t + \varepsilon_{i,t+k} \tag{6}$$

Table 6 presents the results of estimating Equation 6 over our entire sample (all Compustat firms, from 1986 to 2016).[22] Each column corresponds to a different time horizon (k). For brevity, we report only the coefficients on the policy uncertainty variable. The dependent variable is total volatility in Panel A, idiosyncratic volatility in Panel B, and systematic volatility in Panel C.

The results in Panel A suggest that high levels of policy uncertainty in the current year are associated with significantly lower levels of firm return volatility in the following four years. The economic magnitude of this effect is large. For example, the −0.196 coefficient in column 2 ("Year 1") suggests that a one standard deviation increase in policy uncertainty is associated with 19.6% of a standard deviation decrease in total volatility. This negative effect peaks in year three, when one standard deviation increase in policy uncertainty is associated with 37% of a standard deviation decrease in return volatility. After year three, the effect begins to subside and it becomes insignificant in year five.

The persistence of the policy uncertainty effect is very strong. We do not interpret this persistence to mean that the uncertainty surrounding the political and regulatory environment in the current year is, in itself, driving the lower return volatility in four years. Instead, our interpretation is that high levels of policy uncertainty today will cause CEOs to implement risk-reducing corporate policies (e.g. delayed investment activity), which themselves have persistent negative effects on return volatility, even after the uncertainty may have subsided.

It is also important to point out that the Baker, Bloom, and Davis (2016) index captures

[21] See Section 3.3 for details on how we construct our volatility measures.

[22] Even though the Baker, Bloom, and Davis (2016) policy uncertainty index is available starting in 1985, we start in 1986 because that is when the VXO index (one of our controls for general macroeconomic uncertainty) becomes available.

the uncertainty associated with a potentially large set of policies. Thus, while the uncertainty surrounding any specific policy may subside rather quickly, the overall political environment may be generating large levels of uncertainty for a much longer time. CEOs' recognition that the aggregate level of political uncertainty could persist may very well be the reason why they are willing to implement risk-reducing corporate policies with effects lasting longer than the uncertainty surrounding any one particular policy.

Panel B in Table 6 suggests that high levels of policy uncertainty are associated with significantly lower levels of firm idiosyncratic volatility up to four years in the future. Once again, the effect is strongest in year three, when a one standard deviation increase in policy uncertainty is associated with 33.6% of a standard deviation increase in idiosyncratic risk. The fact that policy uncertainty has a negative effect on idiosyncratic volatility even in year zero is not surprising given the evidence in Gulen and Ion (2016) and Bonaime, Gulen, and Ion (2017). They find that, when faced with high levels of policy uncertainty, firms delay capital expenditures and mergers and acquisitions as early as the next quarter. If these delays result in lower return volatility, this would explain the early effect of policy uncertainty on idiosyncratic risk.

The first column in Panel C suggests that policy uncertainty has a strong positive effect on contemporaneous firm-level systematic risk. This result is consistent with Boutchkova, Doshi, Durnev, Molchanov (2011), who find that industry-level return volatility is significantly higher in election years (when policy uncertainty is presumably higher). This finding also shows that policy uncertainty has the potential to significantly increase the volatility of CEOs wealth portfolios if they are incentivized with equity in their own company. We examine this effect in more detail in the following section.

Columns two through six in Panel C show that policy uncertainty in year t has significant negative effects on firm systematic risk in years $t+2$ through $t+4$. The effect is strongest in year three, when a one standard deviation increase in policy uncertainty is associated with 30.9% of a standard deviation increase in systematic risk. Comparing the coefficients in Panels B and C (columns two through five), we observe that the effect of policy uncertainty on idiosyncratic risk is about 10% stronger (more negative) than the effect on systematic risk. This is consistent with the Armstrong and Vashishtha (2012) argument that CEOs may have a preference for systematic over idiosyncratic risk if they are better able to hedge against systematic risk by trading the market portfolio.

5.2. *Conditioning on CEO incentives*

By affecting firm stock returns, policy uncertainty has the potential to affect the wealth of CEOs who are incentivized with equity in their own firm (stocks and options). Our hypothesis is that CEOs' attempts to reduce this effect is an important driver of the negative relation between policy uncertainty and future return volatility documented in Table 6. If this is the case, then this negative relation should be stronger the more sensitive the CEO's wealth is to changes in the value of the firm, and it should be weaker the more the CEO is protected against downside risk. To test these predictions, we investigate how the relation between policy uncertainty and return volatility depends on the CEO's delta and vega.

We test our predictions by including in our specification from Equation 6, interactions of policy uncertainty with CEO delta and vega:

$$\begin{aligned} VOL_{i,t+k} = \alpha_i + \beta_1 PU_t + \beta_2 PU_t \times Delta_{i,t} + \beta_3 PU_t \times Vega_{i,t} + \beta_4 Delta_{i,t} + \beta_5 Vega_{i,t} \\ + \omega C_{i,t} + \gamma F_{i,t} + \delta M_t + \varepsilon_{i,t+k} \end{aligned} \quad (7)$$

Here, in addition to the interaction terms ($PU_t \times Vega_{i,t}$ and $PU_t \times Delta_{i,t}$), we also include the standalone controls for CEO delta and vega, as well as the vector $C_{i,t}$ of controls for CEO characteristics (CEO age, tenure, and cash compensation). Note that the use of CEO-level variables restricts these tests to firms in the Execucomp database. As we increase the time horizon from $k = 1$ to $k = 5$, we condition for the CEO to be the same as when $k = 0$. Our results do not change if we do not impose this restriction.

In Table 7, we present the results from estimating Equation 7 using total (Panel A), idiosyncratic (Panel B), and systematic volatility (Panel C) as dependent variables. For simplicity, we report only the coefficients on the policy uncertainty related terms (β_1, β_2, and β_3 from Equation 7). The $Delta_{i,t}$ and $Vega_{i,t}$ variables are also transformed by demeaning and normalizing them by their standard deviation. Hence, the coefficient on the standalone policy uncertainty variable (β_1) can be interpreted as the effect on volatility of a one standard deviation change in policy uncertainty, for a firm with average levels of delta and vega. The β_2 and β_3 coefficients estimate how much larger or smaller this effect is for a firm with a one standard deviation higher delta or vega, respectively.

The results in Panel A support the two predictions of our hypothesis set out above. For firms with average levels of CEO delta and vega, policy uncertainty is associated with significantly lower levels of total return volatility in the following four years. This effect is significantly stronger (more negative) for firms with higher CEO delta and significantly weaker (less negative) for firms with higher CEO vega. This is consistent with the notion that CEOs who are more exposed to changes in firm value (i.e. high delta) are more eager to reduce firm-level risk in the face of policy uncertainty, while CEOs who have more to gain from higher volatility (i.e. high vega) have less of an incentive to do so. In terms of economic magnitudes, taking as an example the results in Year 1 and comparing the coefficient on the standalone policy uncertainty variable with the coefficient on its interaction with delta, suggests that a one standard deviation higher delta reduces the negative effect of policy uncertainty by 10.4% (i.e. 0.021/0.183). An analogous calculation indicates that a one standard deviation increase in vega amplifies the effect of policy uncertainty by 10.4%.

The results for idiosyncratic risk (Panel B) are very similar to the results on total risk. This is not surprising given that, in our sample, on average, 86% of firm total volatility is idiosyncratic. The results on systematic risk (Panel C) are consistent with the rest in that they suggest the effect of policy uncertainty is stronger for firms with higher delta. However, we do not find that the effect is significantly weaker for firms with higher vega. One possible explanation for this may be the fact that, on a percentage basis, managers would have to change systematic risk significantly more than they would idiosyncratic risk in order to obtain the same change in total risk (which is what drives the value of their options, and hence the benefit of having a high vega).

5.3. Conditioning on CEO specialization

Another reason why CEOs may be particularly exposed to the effects of policy uncertainty is the fact that a large fraction of their human capital may be tied to their firm. CEOs with highly specialized skills should have fewer outside options, which implies that they have more to lose if their firm underperforms. Hence, all else equal, we expect CEOs with specialized skills to have a lower preference for risk, which implies they should be more motivated to engage in risk-reducing activities when faced with high policy uncertainty.

To test this prediction, we use the general ability index of Custodio, Ferreira, and Matos (2013) who use information from CEOs' resumes to gather information on the extent to which their skills are transferable across firms and industries. Their index is the first principal components of five different CEO characteristics: (1) number of different past positions, (2) number of previous firms, (3) number of previous industries, (4) CEO experience at a previous firm, and (5) past experience at a conglomerate. The authors find that CEOs with more transferable skill are generally paid significantly more than CEOs with more specialized skills.

Following Custodio, Ferreira, and Matos (2013), we construct a "Specialist" dummy, which equals one if the CEO's general ability index is below the median that year. We interact this dummy with our policy uncertainty variable and we include it in the regressions discussed in the previous section:

$$\begin{aligned} VOL_{i,t+k} = \alpha_i + \beta_1 PU_t + \beta_2 PU_t \times Specialist_{i,t} + \beta_3 PU_t \times Delta_{i,t} + \beta_4 PU_t \times Vega_{i,t} \\ + \beta_5 Specialist_{i,t} + \beta_6 Vega_{i,t} + \beta_7 Delta_{i,t} + \omega C_{i,t} + \gamma F_{i,t} + \delta M_t + \varepsilon_{i,t+k} \end{aligned} \tag{8}$$

The results are reported in Table 8. In Panel A, we use total return volatility as the dependent variable. Note that, because the general ability index is only available from 1993 to 2007, our tests are necessarily restricted to that sample period. We find that the negative relation between policy uncertainty and total return volatility is significantly stronger when the CEO is a specialist (rather than a generalist), both contemporaneously and in the following year. The economic magnitude of this effect is also significant. In Year 1, the average effect of policy uncertainty on total return volatility is 8.6% stronger (i.e. 0.042/0.486) for firms where the CEO is a specialist. Panels B and C show that CEO skill specialization mostly affects the relation of policy uncertainty with idiosyncratic risk, though this moderating effect is also marginally significant for systematic risk in Year 1. Overall, the findings in Table 8 support the prediction that CEOs with fewer outside options have more of an incentive to reduce risk taking in times of high policy uncertainty.

6. Alternative mechanisms

The results in the previous section suggest that the risk–management activity of equity-incentivized CEOs is a significant determinant of how policy uncertainty affects the economy. To the best of our knowledge, we are the first to show evidence consistent with this transmission channel. The extant literature studying the effects of policy uncertainty has focused primarily on two different mechanisms. First, several papers have documented a negative relationship between policy uncertainty and corporate investment activity (e.g. Julio and Yook (2012), Gulen and Ion (2016), Bonaime, Gulen, and Ion (2017)) and have provided evidence suggesting that this is attributable to policy uncertainty increasing the value of the real option to wait. If these investment delays result in lower return volatility, then it is possible that our return volatility results are driven by a real-option effect of policy uncertainty and not a risk-management effect. Second, several papers (e.g. Pastor and Veronesi (2012, 2013), Gilchrist, Sim, and Zakrajek (2014), Arellano, Bai, and Kehoe (2010)) have argued that policy– and macroeconomic–uncertainty can significantly slow down economic growth by increasing the cost of external financing. If this results in lower leverage ratios or delayed investment projects, then this financial-frictions channel could also cause a reduction in future return volatility. In this section, we perform tests to alleviate the concern that our previous results may be attributable to these alternative mechanisms and not to the risk-management channel proposed by our study.

It is important to note that, if the real-options or financial-frictions channels are responsible for the negative effect of policy uncertainty on return volatility, then they must also explain the cross-sectional heterogeneity in this effect documented in Table 7 and Table 8. This would be the case if CEOs delta, vega, and skill specialization are capturing the extent to which firms have more of an incentive to delay investments or are more affected by financial frictions. To control for this possibility, we include in our specifications from Equation 7 and Equation 8 interactions between policy uncertainty and proxies for firm sensitivity to real-option values and financial frictions.

6.1. The Real-Options Mechanism

Our first proxy for the extent to which firms are affected by the value of the option to delay is investment irreversibility. The intuition is that, if the firm can easily reverse its investments, the option to delay does not play an important role in its investment decisions. We use several different measures of investment irreversibility : (1) an index of asset redeployability developed by Kim and Kung (2016), (2) the firm's capital intensity ratio, (3) an index of cost sunkness based on asset sales, depreciation and rent expenditures, and (4) an indicator for whether the firm is in a durables industry.[23]

In Panel A1 of Table 9, we regress total return volatility on all the controls from Equation 7 and an interaction between policy uncertainty and investment irreversibility, as measured by the asset redeployability proxy of Kim and Kung (2016). In Table A2 in the Appendix, we show that our results hold if we use any of the alternative measures specified above.[24] The results show that the negative effect of policy uncertainty on return volatility is still significantly stronger for high-delta CEOs and weaker for high-vega CEOs. In Panel A2, we introduce an interaction between policy uncertainty and our CEO specialist dummy to the specification from Panel A1. We find that the negative relation between policy uncertainty and return volatility is still significantly more negative if the CEO is a specialist rather than a generalist.

Our second proxy for the firm's sensitivity to real-option values is industry competition. We posit that firms operating in very competitive industries are more likely to lose investment opportunities to a competitor if they attempt to delay. If this is the case, then the real-option channel should play less of a role in more competitive industries. We use three different measures of industry competition: (1) the TNIC Herfindahl-Hirschman Index (HHI) from Hoberg and Phillips (2016), (2) the industry concentration ratio (top four firms) from the US Census Bureau, and (3) the Compustat sales HHI.

In Panels B1 and B2 of Table 9, we perform a similar analysis to Panels A1 and A2, this time controlling for interactions between policy uncertainty and industry competition, as measured by the TNIC HHI index of Hoberg and Phillips (2016). Table A3 in the Appendix shows that our results do not change if we use concentration ratios or Compustat HHIs instead. Once again, in both panels, the interactions of policy uncertainty with CEO delta and vega (Panel B1) and the CEO specialist dummy (Panel B2) are still statistically significant. Overall, the results in Table 9 help alleviate any concerns that CEO delta, vega, and skill specialization may be proxying for the firm's sensitivity to real-option values.

[23] Appendix A contains a detailed description of all these variables.

[24] Since higher asset redeployability implies lower investment irreversibility, we interact policy uncertainty with minus asset redeployability. In this way, the coefficient on the interaction term can be interpreted as the marginal effect of an increase in investment irreversibility on the relation between policy uncertainty and return volatility.

6.2. The Financial-Frictions Mechanism

To proxy for the exposure to a tightening credit market, we use several measures of firm default probability: (1) the Bharath and Shumway (2008) index, (2) the failure probability index of Campbell, Hilscher, and Szilagyi (2008), and (3) the Ohlson (1980) O score. The reasoning is that, if policy uncertainty causes credit markets to tighten, the firms most likely to experience credit rationing or a higher cost of debt are the ones that have higher default probabilities to begin with. Our second proxy for the extent to which firms are affected by financial frictions is the degree to which they are financially constrained. Firms that are more financially constrained are the ones more likely to forego investment projects when external financing becomes more costly. Hence, by raising the cost of external financing, policy uncertainty should have a more negative effect on corporate investment (and consequently on return volatility) for firms that are more financially constrained. We use four different proxies for financial constraints: (1) the Hadlock and Pierce (2010) index, (2) the Hoberg and Maksimovic (2014) index, (3) the Whited and Wu (2006) index, and (4) the Kaplan and Zingales (1997) index.

In Table 10 we test if our cross-sectional results from Table 7 and Table 8 are robust to controlling for interactions of policy uncertainty with default probability (Panels A1 and A2) and with financial constraints (Panels B1 and B2). For brevity, here we report only the results using the Bharath and Shumway (2008) index to measure default probability and the Hadlock and Pierce (2010) index to measure financial constraints.[25] Tables A4 and A5 in the Appendix show that our results hold when we use any of the alternative measures listed above. Overall, the results in Table 10 show that the negative relation between policy uncertainty and return volatility is still significantly affected by CEO delta and vega (Panels A1 and B1) and CEO skill specialization (Panels A2 and B2) after controlling for how policy uncertainty interacts with default probability and financial constraints. This helps alleviate any concerns that CEO delta, vega, and skill specialization may only mediate the effect of policy uncertainty on return volatility because they proxy for financial frictions.

[25] While the Hoberg and Maksimovic (2014) index is more recent than the Hadlock and Pierce (2010) index, we opted against using it in our main specification because it is available for only about half the observations in our sample.

7. CEO incentives and the effect of policy uncertainty on investment and financing

In the previous section, we provided evidence that the negative association between policy uncertainty and return volatility is unlikely to be a mechanical result of the reduction in investment and leverage caused by policy uncertainty through the real-options and financial frictions channels. In this section, we investigate if CEOs' risk-management incentives cause them to reduce return volatility, at least in part, by investing in fewer risky projects and by reducing leverage. We first examine the unconditional effect of policy uncertainty on corporate investments and leverage, and then analyze how this effect changes based on CEO incentives and skill specialization.

In Panel A1 of Table 11, we estimate our baseline regressions from Equation 2, using corporate investment as the dependent variable. We find a strong negative relation between policy uncertainty and investment, both contemporaneously and in the following year, which confirms the findings in Gulen and Ion (2016). In Panel A2, we include interactions of policy uncertainty with CEO delta and vega in the baseline regressions from Panel A1. We also include interactions with asset redeployability, industry competition, default probability and financial constraints to control for the possible effects of real-options and financial frictions. We find that the negative effect of policy uncertainty on investment is significantly stronger for high-delta CEOs and significantly weaker for high-vega CEOs. The economic magnitude of this effect is large. In year 0, a one standard deviation increase in CEO delta strengthens the effect of policy uncertainty by 60% (i.e. 0.017/0.028). A one standard deviation increase in CEO vega weakens the effect of policy uncertainty by 50% (i.e. 0.014/0.028). In Panel A3, we add to all regressions in Panel A2 the interaction between policy uncertainty and our CEO specialist dummy. We find that the degree of CEO specialization does not have a significant impact on the relation between policy uncertainty and corporate investment.

In Panel B1, we estimate our baseline regressions using firm-level book leverage as the dependent variable. We find a strong negative relation between policy uncertainty and leverage, both contemporaneously and up to two years in the future. This effect seems to revert in the long run (years four and five), presumably after the uncertainty has been resolved. Note that this reversal does not happen for corporate investments (Panel A1), which is consistent with the idea that investment opportunities can be lost, while leverage ratios can be more easily adjusted in the future.[26]

In Panel B2, we add to the regressions in Panel B1 interactions of policy uncertainty with CEO delta and vega, as well as interactions with asset redeployability and default probability. We find that the negative relation between policy uncertainty and leverage is significantly weaker for high-vega CEOs. This is consistent with the idea that, controlling for delta, CEOs with higher vega have less of an incentive to reduce risk. Finally, in Panel B3, we add to the regressions in Panel B2, an interaction between policy uncertainty and the CEO specialist dummy. Once again, we find that whether the CEO is a specialist (rather than a generalist) does not have a significant effect on the relation between policy uncertainty and leverage ratios. The results in Panels A2 and B2 of Table 11 suggest that the negative effect of policy uncertainty on return volatility is, at least in part, a consequence of how CEO incentives affect the relation between policy uncertainty and corporate investment and financing.

8. Conclusion

In this study, we provide evidence supporting the idea that the effect of policy uncertainty on the real economy depends significantly on CEOs' risk-taking incentives. The premise is that, through its effects on the firm, policy uncertainty can have a significant impact on the wealth of under-diversified CEOs. To mitigate this impact, CEOs have an incentive to engage in risk-reducing corporate policies and to decrease their exposure to their firm's stock returns. Our findings support both of these predictions.

We begin by investigating the effect of policy uncertainty on several specific ways through which CEOs can reduce firm risk. First, we find a strong positive association between policy uncertainty and the use of financial instruments for commodity, currency, and interest rate hedging. Second, we find that times of high policy uncertainty are associated with an increased preference for cross-border and cross-industry (i.e. diversifying) mergers. Finally, we analyze how policy uncertainty affects the extent to which CEOs adjust their equity position in their own firm. We provide evidence that, in times of high policy uncertainty, CEOs sell a higher percentage of their stock and exercise a lower percentage of their options. This is consistent with the idea that CEOs attempt to mitigate

[26] The lack of a reversal effect in the investment regressions is the reason why Gulen and Ion (2016) argue that policy uncertainty can cause long term effect on economic growth and not just temporary delays to investment.

the effect of policy uncertainty on their portfolio by reducing their exposure to their own firm, but preserving their protection against downside risk.

Next, we use stock return volatility as an all-encompassing measure of firm risk-taking. We find that policy uncertainty is associated with significantly lower levels of stock return volatility over the following two to three years. More importantly, we find that this effect is significantly stronger when CEOs are more exposed to changes in firm value (delta) and when they have highly specific skills (i.e. fewer outside options), and significantly weaker when CEOs are more protected against downside risk (vega). These results are robust to controlling for the effects that policy uncertainty could have on corporate investment and financing through the real-options or financial-frictions channels.

Our findings have several important implications. First, they suggest that any analysis of the economic consequences of policy uncertainty must take into consideration CEOs risk-taking incentives. Second, our findings imply that boards of directors must recognize the possibility that CEOs' risk-taking behavior, as well as their equity positions, might change in times of high policy uncertainty. As such, boards must be prepared to reassess the optimality of compensation packages during these times. Third, our results suggest that policy uncertainty can have significant effects on the market for financial hedging instruments and the market for diversifying mergers.

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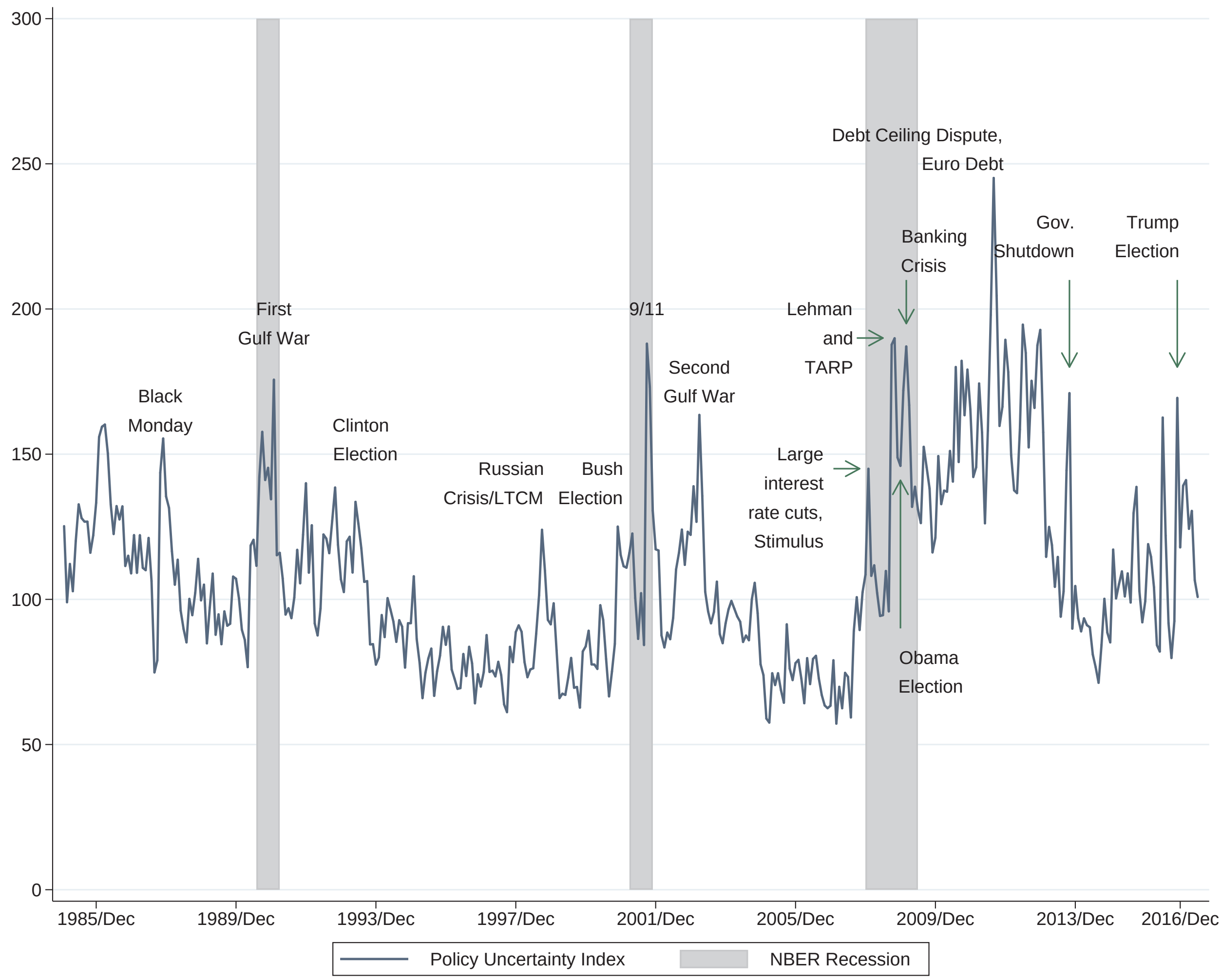

Figure 1
Policy Uncertainty Index
This figure plots the Baker, Bloom, and Davis (2016) index of policy uncertainty (solid line) together with the NBER recession periods (shaded areas).

Table 1
Correlation between Policy Uncertainty and First and Second-moment Controls

This table presents the correlation coefficients between the Baker, Bloom, and Davis (2016) policy uncertainty index and macroeconomic controls for investment opportunities (Panel A) and general macroeconomic uncertainty (Panel B). The sample period is from 1985 to 2016. The Appendix provides a detailed description for all the variables..

Panel A: Correlations with first-moment controls

	Policy uncertainty	Michigan consumer conf.	Leading econ. ind.	CFNAI index	Forecasted GDP growth
Michigan consumer confidence	-0.17				
	(0.06)				
Leading economic indicator index	-0.23	0.55			
	(0.01)	(0.00)			
CFNAI index	-0.41	0.57	0.81		
	(0.00)	(0.00)	(0.00)		
Forecasted GDP growth	-0.23	0.18	0.04	0.19	
	(0.01)	(0.03)	(0.64)	(0.02)	
First principal component	-0.32	0.80	0.90	0.92	0.23
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Panel B: Correlations with second-moment controls

	Policy uncertainty	JLN index	VXO index	Forecast dispersion	CS σ sales growth	CS σ returns
Jurado, Ludvigson, and Ng (2015) index	0.31					
	(0.00)					
VXO index	0.40	0.61				
	(0.00)	(0.00)				
Forecast dispersion (GDP growth)	0.33	0.60	0.49			
	(0.00)	(0.00)	(0.00)			
CS σ sales growth	0.34	0.17	0.25	-0.20		
	(0.00)	(0.01)	(0.01)	(0.01)		
CS σ stock returns	0.11	0.34	0.37	0.21	0.26	
	(0.23)	(0.00)	(0.00)	(0.00)	(0.00)	
First principal component	0.41	0.88	0.78	0.74	0.48	0.67
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Table 2
Summary Statistics

This table presents summary statics for the main variables used in our analysis. The sample period is from 1986 to 2016. "Full sample" includes all Compustat firms and "Execucomp sample" includes all Execucomp firms that have an identifiable CEO. Panel B summarizes the composition of CEO compensation for various parts of our sample period. The Appendix provides a detailed description for all the variables.

Panel A: Firm-level variables

	Full sample				Execucomp sample			
	N	Mean	Median	SD	N	Mean	Median	SD
Total risk	130,060	0.682	0.599	0.352	37,614	0.544	0.476	0.274
Idiosyncratic risk	130,060	0.55	0.465	0.32	37,614	0.368	0.316	0.203
Systematic risk	130,060	0.126	0.105	0.096	37,614	0.168	0.149	0.093
CAPX to lagged assets	122,421	0.065	0.038	0.085	36,470	0.061	0.041	0.07
Book leverage	129,582	0.225	0.182	0.212	37,462	0.225	0.207	0.187
Cash to assets	130,045	0.165	0.078	0.202	37,608	0.144	0.075	0.169
Tobin's Q	130,060	1.846	1.297	1.547	37,614	1.914	1.459	1.373
Cash flow to assets	130,060	0.027	0.063	0.202	37,614	0.09	0.09	0.118
Sales growth	130,060	0.176	0.08	0.518	37,614	0.119	0.074	0.319
Log assets	130,060	5.857	5.806	2.182	37,614	7.739	7.614	1.691
ROA	130,060	-0.041	0.02	0.249	37,614	0.033	0.046	0.131

Panel B: CEO compensation variables (percent of total compensation)

	1992-2016		1992-2005		2006-2016	
	Mean	Median	Mean	Median	Mean	Median
Stock	0.188	0	0.059	0	0.328	0.326
Options	0.25	0.185	0.327	0.295	0.166	0.078
Bonus	0.119	0.021	0.19	0.168	0.04	0
Salary	0.301	0.231	0.338	0.273	0.262	0.196

Table 3
Policy Uncertainty and Financial Hedging

This table presents results from logistic regressions of commodity risk hedging (Panel A), currency risk hedging (Panel B), and interest rate risk hedging (Panel C) on the Baker, Bloom, and Davis (2016) policy uncertainty index and firm- and macro-level controls. Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. Each panel also contains controls for the extent to which the firm is exposed to the particular type of risk being hedged. See Section 4.1 for details. In all regressions, we include industry fixed effects and we cluster standard errors at the firm and year level. t-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A: Hedging commodity risk					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.365***	0.319***	0.305***	0.291***	0.151	-0.002
	(3.77)	(4.17)	(9.57)	(6.53)	(1.59)	(-0.01)
Exposure to commodities	1.945***	1.451***	1.032***	0.916*	0.760*	0.881
	(4.54)	(3.42)	(2.58)	(1.71)	(1.68)	(1.54)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	48,273	41,640	35,751	30,538	25,902	21,813
pseudo–R^2	0.226	0.226	0.233	0.234	0.217	0.214

	Panel B: Hedging currency risk					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.350***	0.353***	0.305***	0.201***	0.110	-0.101
	(8.32)	(7.91)	(6.62)	(5.47)	(1.52)	(-0.59)
Positive foreign tax	0.753***	0.731***	0.702***	0.688***	0.685***	0.657***
	(15.68)	(14.06)	(13.40)	(13.23)	(12.62)	(11.97)
Positive foreign income	0.496***	0.515***	0.505***	0.504***	0.479***	0.488***
	(10.41)	(10.34)	(9.38)	(8.19)	(7.78)	(7.62)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	88,488	82,436	76,684	71,007	65,798	61,152
pseudo–R^2	0.224	0.224	0.221	0.218	0.210	0.201

	Panel C: Hedging Interest Rate Risk					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.176***	0.148***	0.111***	0.054	-0.031	-0.173
	(3.72)	(4.03)	(3.55)	(1.33)	(-0.39)	(-1.57)
Positive debt	1.158***	1.111***	1.032***	0.997***	0.911***	0.851***
	(16.54)	(15.48)	(13.11)	(11.89)	(11.79)	(11.67)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	88,488	82,436	76,684	71,007	65,798	61,152
pseudo–R^2	0.216	0.212	0.207	0.202	0.197	0.194

Table 4
Policy Uncertainty and Diversifying Acquisitions

This table presents results from a two-stage Heckman probit model, where the second stage predicts the likelihood of acquiring a firm from a different country (Panel A) or from a different industry (Panel B). This second stage controls for the Baker, Bloom, and Davis (2016) policy uncertainty index and firm- and macro-level controls. The first stage equation predict the likelihood of being an acquirer and it contains the same controls as the second stage, plus the Edmans, Goldstein, and Jiang (2012) measure of expected price pressure caused by mutual fund outflows as an instrument for selection into being an acquirer. See Section 4.2 for details. Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. t-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A: Cross-Border Mergers					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.111***	0.079***	0.052*	0.014	-0.013	-0.037
	(2.86)	(2.61)	(1.81)	(0.53)	(-0.49)	(-1.10)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	128,856	117,242	104,278	93,066	83,217	74,547

	Panel B: Cross-Industry Mergers					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.059**	0.053***	0.037**	-0.004	-0.035**	-0.071***
	(2.40)	(2.74)	(2.51)	(-0.33)	(-2.11)	(-2.74)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	128,856	117,242	104,278	93,066	83,217	74,547

Table 5
Policy Uncertainty and CEO Portfolio Adjustments

This table presents results from regressing the percentage of stock sold (Panels A1 and A2) and the percentage of options exercised (Panels B1 and B2) by CEOs, on the Baker, Bloom, and Davis (2016) policy uncertainty index and firm-, macro-, and CEO-level controls. Panels A1 and B1 are OLS estimates with firm fixed effects and Panels A2 and B2 are Tobit estimates with lower censoring at 0 and upper censoring at 1. Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. See Section 4.3 for details. In all regressions we cluster standard errors at the firm and year level. t-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A1: Percent Stock Sold–Tobit					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.045***	0.043***	0.055***	0.069***	0.065***	0.060***
	(4.13)	(4.24)	(5.57)	(7.09)	(6.23)	(4.13)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	19,933	16,723	13,856	11,298	9,126	7,244
	Panel A2: Percent Stock Sold–OLS					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.043**	0.047***	0.073***	0.109***	0.106***	0.092***
	(2.25)	(3.25)	(5.09)	(7.48)	(5.92)	(4.78)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	19,660	16,451	13,561	11,015	8,850	6,982
R^2	0.055	0.047	0.054	0.058	0.060	0.050
	Panel B1: Percent Options Exercised–Tobit					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.037***	-0.023***	-0.020**	-0.013	-0.004	-0.005
	(-3.98)	(-3.10)	(-2.03)	(-0.90)	(-0.32)	(-0.39)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	28,007	23,092	18,681	14,913	11,755	9,154
	Panel B2: Percent Options Exercised–OLS					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.029*	-0.035	-0.051*	-0.026	0.009	0.009
	(-1.92)	(-1.35)	(-1.86)	(-0.76)	(0.31)	(0.29)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	27,753	22,811	18,370	14,571	11,460	8,891
R^2	0.041	0.019	0.013	0.006	0.003	0.004

Table 6
Policy Uncertainty and Return Volatility

This table presents results from OLS regressions of firm total (Panel A), idiosyncratic (Panel B), and systematic (Panel C) return volatility on the Baker, Bloom, and Davis (2016) policy uncertainty index and firm- and macro-level controls. Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. See Section 5.1 for details. In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. t-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A: Total Return Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.050	-0.196**	-0.347***	-0.370***	-0.222***	-0.007
	(-0.96)	(-2.44)	(-4.74)	(-5.40)	(-3.63)	(-0.08)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	130,058	115,262	102,517	91,381	81,669	73,151
R^2	0.200	0.133	0.097	0.112	0.103	0.080

	Panel B: Idiosyncratic Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.102*	-0.216***	-0.322***	-0.336***	-0.188***	0.021
	(-1.75)	(-2.79)	(-4.88)	(-5.66)	(-3.16)	(0.27)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	130,058	115,262	102,517	91,381	81,669	73,151
R^2	0.186	0.142	0.095	0.100	0.087	0.071

	Panel C: Systematic Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.158***	-0.044	-0.277***	-0.309***	-0.220***	-0.091
	(3.52)	(-0.53)	(-3.29)	(-3.60)	(-3.50)	(-1.45)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	130,058	115,262	102,517	91,381	81,669	73,151
R^2	0.326	0.154	0.160	0.148	0.132	0.096

Table 7
Conditioning on CEO Delta and Vega

This table presents results from OLS regressions of firm total (Panel A), idiosyncratic (Panel B), and systematic (Panel C) return volatility on the Baker, Bloom, and Davis (2016) policy uncertainty index, its interactions with CEO delta and vega, and firm-, macro-, and CEO-level controls. Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. See Section 5.2 for details. In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A: Total Return Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.037	-0.168**	-0.348***	-0.335***	-0.208***	0.059
	(1.27)	(-2.34)	(-4.22)	(-3.50)	(-2.62)	(0.88)
PU x Delta	-0.012*	-0.016**	-0.022***	-0.024***	-0.004	-0.009
	(-1.84)	(-2.05)	(-3.62)	(-3.80)	(-0.73)	(-1.46)
PU x Vega	-0.011	0.021**	0.037***	0.005	-0.003	0.013
	(-1.44)	(2.55)	(3.34)	(0.61)	(-0.31)	(1.27)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	34,364	28,111	22,510	17,903	14,062	11,057
R^2	0.432	0.207	0.205	0.205	0.186	0.140

	Panel B: Idiosyncratic Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.030	-0.163***	-0.258***	-0.230***	-0.089	0.115**
	(-0.92)	(-2.91)	(-4.45)	(-3.05)	(-1.19)	(2.10)
PU x Delta	-0.012*	-0.014**	-0.016***	-0.019***	-0.007	-0.009
	(-1.95)	(-2.03)	(-3.01)	(-2.94)	(-1.00)	(-1.35)
PU x Vega	-0.010	0.021***	0.035***	0.015*	0.002	0.010
	(-1.24)	(3.09)	(3.95)	(1.87)	(0.27)	(1.27)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	34,364	28,111	22,510	17,903	14,062	11,057
R^2	0.331	0.191	0.164	0.148	0.122	0.125

	Panel C: Systematic Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.207***	-0.127	-0.476***	-0.508***	-0.447***	-0.111
	(3.79)	(-1.14)	(-3.86)	(-4.34)	(-5.52)	(-1.24)
PU x Delta	-0.015*	-0.021**	-0.035***	-0.033***	0.003	-0.005
	(-1.75)	(-2.09)	(-3.37)	(-3.55)	(0.42)	(-0.69)
PU x Vega	-0.019**	0.015	0.029*	-0.018	-0.012	0.018
	(-1.98)	(1.10)	(1.86)	(-1.25)	(-0.77)	(0.97)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	34,364	28,111	22,510	17,903	14,062	11,057
R^2	0.520	0.199	0.287	0.315	0.291	0.170

Table 8
Conditioning on CEO Specialization

In this table, we add an interaction between policy uncertainty and a CEO specialist dummy to all the regressions from Table 7. The CEO specialist dummy equals one if the CEO's general ability index of Custodio, Ferreira, and Matos (2013) is below the median that year. Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. See Section 5.3 for details. In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A: Total Return Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.077	-0.486***	-0.785***	-0.776***	-0.074	0.502**
	(-1.11)	(-3.37)	(-6.08)	(-5.84)	(-0.43)	(2.52)
PU x CEO specialist dummy	-0.048**	-0.042**	-0.013	-0.009	-0.035	0.034
	(-2.29)	(-2.39)	(-0.48)	(-0.30)	(-1.01)	(0.86)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	18,404	15,916	13,370	11,196	9,335	7,752
R^2	0.396	0.258	0.250	0.284	0.211	0.239

	Panel B: Idiosyncratic Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.148*	-0.483***	-0.647***	-0.612***	-0.065	0.450***
	(-1.85)	(-3.38)	(-6.13)	(-5.87)	(-0.43)	(2.75)
PU x CEO specialist dummy	-0.053**	-0.043**	-0.009	-0.001	-0.019	0.020
	(-2.52)	(-2.24)	(-0.38)	(-0.05)	(-0.58)	(0.52)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	18,404	15,916	13,370	11,196	9,335	7,752
R^2	0.380	0.240	0.190	0.234	0.203	0.224

	Panel C: Systematic Volatility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.263**	-0.267**	-0.918***	-0.956***	-0.046	0.444*
	(2.32)	(-2.01)	(-5.09)	(-4.83)	(-0.23)	(1.73)
PU x CEO specialist dummy	-0.001	-0.028*	-0.021	-0.010	-0.055	0.070*
	(-0.05)	(-1.66)	(-0.59)	(-0.30)	(-1.38)	(1.69)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	18,404	15,916	13,370	11,196	9,335	7,752
R^2	0.283	0.286	0.355	0.296	0.169	0.192

Table 9
Robustness to Real-Options Mechanism

This table presents results from OLS regressions of firm total return volatility on the Baker, Bloom, and Davis (2016) policy uncertainty index and its interactions with CEO delta and vega (Panels A1 and B1) and with a CEO specialist dummy (Panels A2 and B2). In panels A1 and B2 we also include an interaction between policy uncertainty and firm asset redeployability (our proxy for investment irreversibility). In panels B1 and B2 we control for the interaction between policy uncertainty and industry competition as measured by the TNIC HHI of Hoberg and Phillips (2016). Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. All regressions include our baseline firm-, macro- and CEO-level controls. See Section 6 for details. In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A1: Conditioning on CEO Incentives–Controlling for Investment Irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.003	-0.184**	-0.343***	-0.300***	-0.188***	0.010
	(0.08)	(-2.45)	(-4.63)	(-4.05)	(-3.27)	(0.16)
PU x Delta	-0.011*	-0.019**	-0.027***	-0.033***	-0.012	-0.005
	(-1.73)	(-2.37)	(-4.36)	(-3.86)	(-1.50)	(-0.69)
PU x Vega	-0.016*	0.019*	0.034***	0.007	0.003	0.014
	(-1.68)	(1.82)	(3.09)	(0.70)	(0.41)	(1.34)
PU x Investment irreversibility	-0.017*	-0.001	0.018	0.030***	0.029***	0.027***
	(-1.70)	(-0.14)	(1.58)	(2.86)	(2.89)	(2.79)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	35,263	28,813	23,059	18,315	14,412	11,264
R^2	0.418	0.214	0.214	0.207	0.196	0.150

	Panel A2: Conditioning on CEO Specialization–Controlling for Investment Irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.074	-0.492***	-0.800***	-0.792***	-0.082	0.510***
	(-1.05)	(-3.40)	(-6.19)	(-5.80)	(-0.47)	(2.58)
PU x CEO specialist	-0.052**	-0.037**	-0.002	0.004	-0.027	0.027
	(-2.50)	(-2.15)	(-0.08)	(0.14)	(-0.85)	(0.75)
PU x Investment irreversibility	-0.018	0.035**	0.062***	0.065***	0.023	-0.028
	(-1.14)	(2.35)	(2.85)	(2.58)	(0.87)	(-1.02)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	18,405	15,917	13,370	11,196	9,335	7,752
R^2	0.396	0.259	0.252	0.286	0.212	0.241

Table 9
Robustness to Real-Options Mechanism (continued)

	Panel B1: Conditioning on CEO Incentives–Controlling for Competition					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.013	-0.172**	-0.331***	-0.288***	-0.174***	0.012
	(0.40)	(-2.28)	(-4.46)	(-3.84)	(-2.97)	(0.19)
PU x Delta	-0.009	-0.018**	-0.026***	-0.031***	-0.010	-0.007
	(-1.45)	(-2.15)	(-4.00)	(-3.56)	(-1.37)	(-1.06)
PU x Vega	-0.015*	0.023**	0.039***	0.009	0.002	0.012
	(-1.65)	(2.15)	(3.57)	(0.92)	(0.20)	(1.15)
PU x Industry competition	0.003	0.014***	0.015***	0.015**	-0.009	-0.007
	(0.57)	(2.74)	(3.11)	(2.31)	(-1.45)	(-0.94)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	30,140	25,611	20,435	16,200	12,727	9,914
R^2	0.430	0.219	0.222	0.218	0.203	0.136

	Panel B2: Conditioning on CEO Specialization–Controlling for Competition					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.134	-0.618***	-0.853***	-0.709***	0.303*	0.889***
	(-1.62)	(-3.70)	(-5.89)	(-4.10)	(1.78)	(6.41)
PU x CEO specialist	-0.060***	-0.049**	-0.015	-0.027	-0.086***	-0.019
	(-2.62)	(-2.21)	(-0.57)	(-0.85)	(-2.71)	(-0.81)
PU x Industry competition	-0.023	0.006	0.009	0.036**	0.003	0.029*
	(-1.43)	(0.46)	(0.58)	(2.16)	(0.24)	(1.71)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	15,708	13,531	11,326	9,463	7,879	6,516
R^2	0.408	0.263	0.257	0.307	0.301	0.345

Table 10
Robustness to Financial-Frictions Mechanism

This table presents results from OLS regressions of firm total return volatility on the Baker, Bloom, and Davis (2016) policy uncertainty index and its interactions with CEO delta and vega (Panels A1 and B1) and with a CEO specialist dummy (Panels A2 and B2). In panels A1 and A2 we also include an interaction between policy uncertainty and firm default probability, as measured by the Bharath and Shumway (2008) index. In panels B1 and B2 we include an interaction between policy uncertainty and the Hadlock and Pierce (2010) financial constraints index. Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. All regressions include our baseline firm-, macro- and CEO-level controls. See Section 6 for details. In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. t-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A1: Conditioning on CEO Incentives–Controlling for Default Probability					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.015	-0.181**	-0.355***	-0.302***	-0.184***	0.008
	(0.55)	(-2.41)	(-4.53)	(-4.01)	(-3.30)	(0.12)
PU x Delta	-0.008	-0.019**	-0.030***	-0.033***	-0.013	-0.004
	(-1.29)	(-2.25)	(-4.27)	(-3.81)	(-1.47)	(-0.62)
PU x Vega	-0.013*	0.018*	0.033***	0.004	0.001	0.012
	(-1.74)	(1.78)	(3.05)	(0.36)	(0.11)	(1.01)
PU x Default probability	0.056**	-0.046**	-0.072**	-0.013	0.000	0.014
	(1.98)	(-2.06)	(-2.02)	(-0.90)	(0.00)	(1.00)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	30,122	24,746	19,781	15,700	12,322	9,601
R^2	0.496	0.282	0.225	0.200	0.187	0.150

	Panel A2: Conditioning on CEO Specialization–Controlling for Default Probability					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.069	-0.457***	-0.774***	-0.789***	-0.087	0.461**
	(-1.32)	(-3.39)	(-5.86)	(-5.79)	(-0.50)	(2.28)
PU x CEO specialist	-0.038*	-0.035**	-0.008	-0.007	-0.032	0.052
	(-1.89)	(-2.22)	(-0.30)	(-0.23)	(-0.78)	(1.12)
PU x Default probability	0.089***	-0.045	-0.132*	-0.090***	-0.049	-0.068*
	(4.46)	(-0.72)	(-1.73)	(-2.87)	(-1.16)	(-1.87)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	16,107	13,955	11,692	9,783	8,121	6,711
R^2	0.423	0.282	0.259	0.285	0.203	0.238

Table 10
Robustness to Financial-Frictions Mechanism (continued)

	Panel B1: Conditioning on CEO Incentives–Controlling for Financial Constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.001	-0.186**	-0.345***	-0.301***	-0.190***	0.009
	(0.02)	(-2.49)	(-4.69)	(-4.09)	(-3.32)	(0.15)
PU x Delta	-0.012*	-0.020**	-0.028***	-0.033***	-0.014	-0.006
	(-1.78)	(-2.33)	(-4.29)	(-3.69)	(-1.56)	(-0.87)
PU x Vega	-0.022**	0.013	0.030**	0.002	-0.006	0.010
	(-2.15)	(1.05)	(2.31)	(0.16)	(-0.88)	(0.82)
PU x Financial constraints	-0.024**	-0.020	-0.003	-0.004	-0.027*	-0.013
	(-2.31)	(-1.27)	(-0.18)	(-0.21)	(-1.66)	(-0.93)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	35,263	28,813	23,059	18,315	14,412	11,264
R^2	0.419	0.215	0.216	0.208	0.197	0.148

	Panel B2: Conditioning on CEO Specialization–Controlling for Financial Constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.070	-0.486***	-0.783***	-0.774***	-0.079	0.501**
	(-0.97)	(-3.35)	(-6.12)	(-5.98)	(-0.46)	(2.53)
PU x CEO specialist	-0.059***	-0.037*	-0.013	-0.010	-0.024	0.039
	(-2.99)	(-1.94)	(-0.53)	(-0.32)	(-0.67)	(0.97)
PU x Financial constraints	0.054	-0.026	0.003	0.005	-0.051**	-0.026
	(1.36)	(-0.73)	(0.08)	(0.14)	(-2.09)	(-0.77)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	18,405	15,917	13,370	11,196	9,335	7,752
R^2	0.397	0.259	0.254	0.287	0.215	0.240

Table 11
Policy Uncertainty and Corporate Investment and Financing Policies

This table presents results from OLS regressions of corporate investment (Panels A1, A2 and A3) and book leverage (Panels B1, B2 and B3) on the Baker, Bloom, and Davis (2016) policy uncertainty index and firm- and macro-level controls. In panels A2 and B2 we also include interactions of policy uncertainty with CEO delta and vega. In panels A3 and B3 we include an interaction between policy uncertainty and a CEO specialist dummy. All panels except for A1 and B1 also include interactions of policy uncertainty with asset redeployability, industry competition, default probability and financial constraints. Each column corresponds to a different lag (in years) between the dependent variable and the independent variables. All regressions include our baseline firm-, macro- and CEO-level controls. See Section 7 for details. In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A1: Corporate Investment					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.047***	-0.025***	0.006	0.028	0.032	0.024
	(-2.96)	(-2.92)	(0.48)	(1.55)	(1.48)	(1.16)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	122,322	108,649	97,148	87,207	78,528	70,742
R^2	0.082	0.107	0.074	0.062	0.054	0.050

	Panel A2: Corporate Investment–Conditioning on CEO Incentives					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.028**	-0.011	0.022	0.029*	0.020	0.016
	(-2.15)	(-1.17)	(1.61)	(1.91)	(1.30)	(1.12)
PU x Delta	-0.017***	-0.013**	-0.001	0.013***	0.017***	0.007
	(-2.72)	(-2.20)	(-0.21)	(2.70)	(3.38)	(1.08)
PU x Vega	0.014***	0.011***	-0.003	-0.007*	-0.006	0.003
	(2.65)	(2.58)	(-0.54)	(-1.65)	(-1.31)	(0.78)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	29,183	24,028	19,247	15,309	12,029	9,388
R^2	0.184	0.194	0.132	0.101	0.080	0.061

	Panel A3: Corporate Investment–Conditioning on CEO Specialization					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.014	-0.039	0.053**	0.110***	0.121***	0.047
	(-0.30)	(-1.20)	(2.40)	(4.54)	(4.83)	(1.57)
PU x CEO specialist dummy	-0.026	-0.024	0.017	0.052*	0.078***	0.056**
	(-1.10)	(-1.04)	(0.80)	(1.92)	(3.11)	(2.29)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	15,286	13,314	11,204	9,425	7,849	6,509
R^2	0.169	0.211	0.156	0.122	0.092	0.069

Table 11
Policy Uncertainty and Corporate Investment and Financing Policies (continued)

	Panel B1: Book Leverage					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.033**	-0.043***	-0.031***	0.000	0.036***	0.066***
	(-2.47)	(-3.64)	(-2.66)	(0.03)	(2.78)	(5.71)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	129,566	114,673	102,204	91,263	81,680	73,244
R^2	0.067	0.041	0.025	0.016	0.014	0.011

	Panel B2: Book Leverage–Conditioning on CEO Incentives					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.038***	-0.042***	-0.028**	0.011	0.046***	0.070***
	(-3.11)	(-3.32)	(-2.23)	(0.68)	(3.79)	(5.50)
PU x Delta	0.000	0.001	0.005	0.003	0.007	0.002
	(0.06)	(0.19)	(0.62)	(0.37)	(0.71)	(0.21)
PU x Vega	0.008*	0.014***	0.012**	0.012	0.013	0.012
	(1.74)	(2.83)	(2.07)	(1.46)	(1.44)	(1.48)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	30,123	24,712	19,746	15,665	12,291	9,576
R^2	0.113	0.078	0.043	0.027	0.028	0.029

	Panel B3: Book Leverage–Conditioning on CEO Specialization					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.065***	-0.103***	-0.142***	-0.113***	0.031	0.093***
	(-3.44)	(-4.97)	(-7.36)	(-4.54)	(0.87)	(2.66)
PU x CEO specialist dummy	0.004	0.000	0.004	0.014	-0.018	-0.025
	(0.19)	(0.03)	(0.20)	(0.61)	(-0.80)	(-0.89)
CEO-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes
N	16,106	13,940	11,676	9,770	8,106	6,698
R^2	0.115	0.070	0.034	0.032	0.026	0.024

Appendix

A. Proxies For Investment Irreversibility

Capital intensity ratio

The industry median net PP&E to total asset ratio. The industry is defined as the Fama-French 48 industry.

Asset Redeployability

The industry-level asset redeployability ratio is calculated as follows. First, for each of the 180 assets listed on the 1997 capital flows table from the Bureau of Economic Analysis (BEA), we calculate the percentage of the 123 industries that use such asset. Second, for each asset, we calculate its weight in each industry as the percentage of the industry's capital expenditures on this asset. Third, we calculate the weighted average asset redeployability as the weighted average of the asset redeployability scores across the 180 assets, weighted on the percentage of industry's total expenditures on this asset. The 123 industries are based on the North American Industry System (NAICS). We match these industries to Compustat firms using the 5-digit NAICS code. The unmatched industries are then matched at the 4-, 3-, and 2-digit level.

Sunk cost

The industry sunk cost is calculated as follows. First, we create three proxies for sunk cost based on rent expense, depreciation, and past sales of PP&E. All of these proxies are adjusted by the total PP&E at the beginning of the period. Second, we calculate the industry-average of these three proxies at the 3-digit SIC level. Finally, following Farinas and Ruano (2005), we create sunk cost, which takes a value of 0,1, or 2. 0 for industries with all three proxies above their cross-sectional medians; 2 for industries with all proxies below their medians; and 1 for the remaining industries.

Durables indicator

First, we calculate the firm-level correlation between quarterly sales and GNP over the entire sample period. Second, we calculate the industry average correlation at the 3-digit SIC level. Finally, we create an indicator variable that equals one if the industry has an above median correlation, and 0 for the rest of the industries.

B. Calculation of Delta and Vega

CEO total delta is calculated as the sum of CEO's option delta and stock delta:

$$\text{Option Delta} = e^{-dT} * N(Z) * (price/100)$$

Stock Delta = Number of restricted stock awards granted in the fiscal year * (price/100)

Total Delta = Option Delta + Stock Delta

CEO total vega is calculated as:

$$\text{Option Vega} = e^{-dT} * N'(Z) * ST^{1/2} * 0.01$$

Total Vega = sum of Black-Scholes Vega of all option awards granted in the fiscal year

The terms in the formulas above are defined as follows:
Z = $(Ln(S/X) + T(r - d + \sigma^2/2))\sigma * T^{1/2}$

S = price of the underlying stock at the fiscal year end

X = strike price of the option

T = time to maturity of the option in years. If option has a maturity that is longer than 10 years, we set it to 10 years

N = cumulative probability function for the normal distribution

N' = normal density function

r = natural logarithm of the risk-free rate. It is obtained from the Federal Reserve website. We download the 1, 2, 3, 5, 7, 10 year treasury securities and interpolate the rates to fill the risk-free rates for the 4, 6, 8, and 9 year rates

d = natural logarithm of the dividend yield over the past three years

Table A1
Variable Definitions

Name	Definition	Source
Delta	The change in the dollar value of the CEOs wealth for a one percentage point change in stock price.	Execucomp
Vega	The change in the dollar value of the CEOs wealth for a one percentage change in the annualized standard deviation of stock returns.	Execucomp
Idiosyncratic volatility	The annualized standard deviation of the residuals from a regression of daily stock returns on market returns.	CRSP
Systematic volatility	The annualized standard deviation of the fitted values from a regression of daily stock returns on market returns.	CRSP
Total return volatility	Systematic volatility plus idiosyncratic volatility.	CRSP
Log assets	Natural logarithm of total assets.	Compustat
Sales growth	The percentage increase in net sales from year t-1 to year t.	Compustat
Book leverage	The book value of long-term debt plus debt in current liabilities divided by book value of assets.	Compustat
Market-to-book	(Market value of equity + book value of debt) / book value of total assets.	Compustat
ROA	Net income over total assets.	Compustat
CAPX	Capital expenditures divided by total assets.	Compustat
Consumer confidence	A monthly index of consumer confidence developed by the University of Michigan.	University of Michigan
Leading economic indicator	A proprietary index that measures future economic activity based on 11 economic indicators that have been found to have significant predictive power over future GDP growth.	Conference Board
CFNAI	The Chicago Fed National Activity index, which measures current economic activity and inflationary pressure using 85 monthly economic indicators.	Chicago FED
Expected GDP growth	The average one-year-ahead GDP growth forecast from the Livingstone Survey of Professional Forecasters	Philadelphia FED
Investment opportunities	The first principal component of the consumer confidence, leading economic indicator, CFNAI, and expected GDP growth	
JLN uncertainty index	A Monthly index of macroeconomic uncertainty.	Jurado, Ludvigson, and Ng (2015)
VXO index	A daily index of implied volatility calculated based on trading of S&P 100 options.	Chicago Board Options Exchange
CS σ past returns	The cross-sectional standard deviation of cumulative returns of all CRSP firms over the past three months.	CRSP
CS σ past sales growth	The cross-sectional standard deviation of annual sales growth of all Compustat firms.	Compustat
Macroeconomic uncertainty	The principal component extracted from JLN uncertainty index, VXO index, CS σ past returns, and CS σ past sales growth.	

Table A2
Controlling for Investment Irreversibility

This table presents results from OLS regressions of firm total return volatility on the Baker, Bloom, and Davis (2016) policy uncertainty index and its interactions with CEO delta and vega (Panels A1 through A4) and with a CEO specialist dummy (Panels B1 through B4). We also include interactions between policy uncertainty and four different proxies for investment irreversibility: (1) the index of asset redeployability of Kim and Kung (2016) (Panels A1, B1) (2) the firm's capital intensity ratio (Panels A2, B2) (3) an index of cost sunkness based on asset sales, depreciation and rent expenditures (Panels A3, B3) and (4) an indicator for whether the firm is in a durables industry (Panels A4, B4). Each column corresponds to a different lag between the dependent and independent variables. All regressions include our baseline firm-, macro- and CEO-level controls (see Section 3.4). In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. t-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A1: Using asset redeployability as proxy for investment irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.003	-0.184**	-0.343***	-0.300***	-0.188***	0.010
	(0.08)	(-2.45)	(-4.63)	(-4.05)	(-3.27)	(0.16)
PU x Delta	-0.011*	-0.019**	-0.027***	-0.033***	-0.012	-0.005
	(-1.73)	(-2.37)	(-4.36)	(-3.86)	(-1.50)	(-0.69)
PU x Vega	-0.016*	0.019*	0.034***	0.007	0.003	0.014
	(-1.68)	(1.82)	(3.09)	(0.70)	(0.41)	(1.34)
N	35,263	28,813	23,059	18,315	14,412	11,264
R^2	0.418	0.214	0.214	0.207	0.196	0.150

	Panel A2: Using capital intensity as proxy for investment irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.005	-0.182**	-0.341***	-0.299***	-0.185***	0.013
	(0.15)	(-2.43)	(-4.55)	(-4.02)	(-3.22)	(0.21)
PU x Delta	-0.012*	-0.020**	-0.028***	-0.032***	-0.012	-0.007
	(-1.91)	(-2.50)	(-4.49)	(-3.95)	(-1.60)	(-1.06)
PU x Vega	-0.015	0.020*	0.035***	0.008	0.006	0.018*
	(-1.56)	(1.92)	(3.17)	(0.75)	(0.69)	(1.83)
N	35,263	28,813	23,059	18,315	14,412	11,264
R^2	0.423	0.216	0.214	0.208	0.198	0.154

	Panel A3: Using cost sunkness as proxy for investment irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.012	-0.185**	-0.353***	-0.332***	-0.234***	-0.020
	(0.30)	(-2.32)	(-4.40)	(-4.22)	(-3.62)	(-0.29)
PU x Delta	-0.011*	-0.019**	-0.027***	-0.032***	-0.011	-0.005
	(-1.75)	(-2.38)	(-4.22)	(-3.84)	(-1.38)	(-0.66)
PU x Vega	-0.015	0.019*	0.033***	0.006	0.002	0.014
	(-1.64)	(1.85)	(3.14)	(0.57)	(0.31)	(1.29)
N	35,263	28,813	23,059	18,315	14,412	11,264
R^2	0.418	0.214	0.214	0.207	0.199	0.150

	Panel A4: Using durables indicator as proxy for investment irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.015	-0.178**	-0.319***	-0.281***	-0.144**	0.057
	(0.52)	(-2.35)	(-4.18)	(-3.40)	(-2.32)	(0.86)
PU x Delta	-0.010*	-0.019**	-0.027***	-0.033***	-0.011	-0.004
	(-1.65)	(-2.39)	(-4.08)	(-3.90)	(-1.46)	(-0.63)
PU x Vega	-0.016*	0.019*	0.032***	0.005	-0.000	0.010
	(-1.73)	(1.84)	(2.97)	(0.57)	(-0.02)	(0.93)
N	35,263	28,813	23,059	18,315	14,412	11,264
R^2	0.418	0.216	0.216	0.207	0.198	0.152

Table A2
Controlling for Investment Irreversibility (continued)

	Panel B1: Using asset redeployability as proxy for investment irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.074	-0.492***	-0.800***	-0.792***	-0.082	0.510***
	(-1.05)	(-3.40)	(-6.19)	(-5.80)	(-0.47)	(2.58)
PU x CEO specialist	-0.052**	-0.037**	-0.002	0.004	-0.027	0.027
	(-2.50)	(-2.15)	(-0.08)	(0.14)	(-0.85)	(0.75)
N	18,405	15,917	13,370	11,196	9,335	7,752
R^2	0.396	0.259	0.252	0.286	0.212	0.241

	Panel B2: Using capital intensity as proxy for investment irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.089	-0.510***	-0.805***	-0.790***	-0.072	0.514***
	(-1.35)	(-3.80)	(-6.56)	(-6.08)	(-0.42)	(2.66)
PU x CEO specialist	-0.057***	-0.043**	-0.007	0.001	-0.027	0.032
	(-2.68)	(-2.27)	(-0.27)	(0.02)	(-0.88)	(0.92)
N	18,405	15,917	13,370	11,196	9,335	7,752
R^2	0.408	0.268	0.252	0.285	0.214	0.241

	Panel B3: Using cost sunkness as proxy for investment irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.029	-0.517***	-0.853***	-0.859***	-0.146	0.510***
	(-0.35)	(-3.20)	(-6.08)	(-5.73)	(-0.82)	(2.69)
PU x CEO specialist	-0.055***	-0.039**	-0.005	0.002	-0.024	0.033
	(-2.64)	(-2.20)	(-0.18)	(0.05)	(-0.75)	(0.97)
N	18,405	15,917	13,370	11,196	9,335	7,752
R^2	0.396	0.258	0.252	0.286	0.217	0.241

	Panel B4: Using durables indicator as proxy for investment irreversibility					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.140**	-0.480***	-0.777***	-0.801***	-0.030	0.538**
	(-2.08)	(-3.43)	(-4.99)	(-4.94)	(-0.16)	(2.38)
PU x CEO specialist	-0.046**	-0.044**	-0.014	-0.008	-0.034	0.033
	(-2.09)	(-2.47)	(-0.49)	(-0.26)	(-0.99)	(0.83)
N	18,405	15,917	13,370	11,196	9,335	7,752
R^2	0.398	0.260	0.254	0.284	0.213	0.240

Table A3
Controlling for Industry Competition

This table presents results from OLS regressions of firm total return volatility on the Baker, Bloom, and Davis (2016) policy uncertainty index and its interactions with CEO delta and vega (Panels A1 through A3) and with a CEO specialist dummy (Panels B1 through B3). We also include interactions between policy uncertainty and three different proxies for industry competition: (1) the TNIC HHI index of Hoberg and Phillips (2016) (Panels A1, B1) (2) the industry concentration ratio from the US Census Bureau (Panels A2, B2) and (3) the Compustat sales HHI (Panels A3, B3). Each column corresponds to a different lag between the dependent and independent variables. All regressions include our baseline firm-, macro- and CEO-level controls (see Section 3.4). In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A1: Using Hoberg & Phillips (2016) TNIC HHI as proxy for competition					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.013	-0.172**	-0.331***	-0.288***	-0.174***	0.012
	(0.40)	(-2.28)	(-4.46)	(-3.84)	(-2.97)	(0.19)
PU x Delta	-0.009	-0.018**	-0.026***	-0.031***	-0.010	-0.007
	(-1.45)	(-2.15)	(-4.00)	(-3.56)	(-1.37)	(-1.06)
PU x Vega	-0.015*	0.023**	0.039***	0.009	0.002	0.012
	(-1.65)	(2.15)	(3.57)	(0.92)	(0.20)	(1.15)
N	30,140	25,611	20,435	16,200	12,727	9,914
R^2	0.430	0.219	0.222	0.218	0.203	0.136

	Panel A2: Using census concentration ratio as proxy for competition					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.002	-0.184***	-0.313***	-0.295***	-0.176***	0.008
	(0.09)	(-2.73)	(-4.35)	(-4.00)	(-3.02)	(0.14)
PU x Delta	-0.014*	-0.017**	-0.022***	-0.027***	-0.001	-0.008
	(-1.94)	(-2.06)	(-3.04)	(-2.72)	(-0.13)	(-1.30)
PU x Vega	-0.007	0.020**	0.021**	-0.008	-0.013	0.011
	(-0.94)	(2.29)	(2.02)	(-0.52)	(-1.00)	(0.78)
N	20,211	15,898	12,195	9,317	6,899	5,222
R^2	0.428	0.249	0.242	0.238	0.203	0.137

	Panel A3: Using Compustat HHI as proxy for competition					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.000	-0.186**	-0.345***	-0.300***	-0.188***	0.011
	(0.00)	(-2.46)	(-4.60)	(-4.02)	(-3.25)	(0.17)
PU x Delta	-0.011*	-0.019**	-0.027***	-0.033***	-0.013	-0.006
	(-1.66)	(-2.34)	(-4.27)	(-3.82)	(-1.52)	(-0.82)
PU x Vega	-0.015*	0.019*	0.034***	0.006	0.002	0.014
	(-1.67)	(1.85)	(3.10)	(0.60)	(0.30)	(1.30)
N	35,263	28,813	23,059	18,315	14,412	11,264
R^2	0.418	0.214	0.214	0.206	0.194	0.148

Table A3
Controlling for Industry Competition (continued)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Panel B1: Using Hoberg & Phillips (2016) TNIC HHI as proxy for competition						
Policy uncertainty	-0.134	-0.618***	-0.853***	-0.709***	0.303*	0.889***
	(-1.62)	(-3.70)	(-5.89)	(-4.10)	(1.78)	(6.41)
PU x CEO specialist	-0.060***	-0.049**	-0.015	-0.027	-0.086***	-0.019
	(-2.62)	(-2.21)	(-0.57)	(-0.85)	(-2.71)	(-0.81)
N	15,708	13,531	11,326	9,463	7,879	6,516
R^2	0.408	0.263	0.257	0.307	0.301	0.345
Panel B2: Using census concentration ratio as proxy for competition						
Policy uncertainty	-0.037	-0.600***	-0.832***	-0.744***	0.336**	0.938***
	(-0.50)	(-3.40)	(-4.89)	(-4.50)	(1.97)	(6.39)
PU x CEO specialist	-0.068***	-0.066***	-0.017	0.001	-0.078*	-0.046**
	(-2.83)	(-2.69)	(-0.67)	(0.01)	(-1.74)	(-2.47)
N	8,893	7,587	6,280	5,197	4,276	3,518
R^2	0.399	0.233	0.259	0.359	0.306	0.362
Panel B3: Using Compustat HHI as proxy for competition						
Policy uncertainty	-0.075	-0.486***	-0.788***	-0.779***	-0.079	0.498**
	(-1.07)	(-3.35)	(-6.07)	(-5.85)	(-0.46)	(2.51)
PU x CEO specialist	-0.050**	-0.043**	-0.014	-0.009	-0.032	0.036
	(-2.41)	(-2.43)	(-0.49)	(-0.30)	(-0.93)	(0.93)
N	18,405	15,917	13,370	11,196	9,335	7,752
R^2	0.396	0.258	0.251	0.285	0.212	0.240

Table A4
Controlling for Default Probability

This table presents results from OLS regressions of firm total return volatility on the Baker, Bloom, and Davis (2016) policy uncertainty index and its interactions with CEO delta and vega (Panels A1 through A4) and with a CEO specialist dummy (Panels B1 through B4). We also include interactions between policy uncertainty and three different measures of default probability: (1) the Bharath and Shumway (2008) measure (Panels A1, B1) (2) the Campbell, Hilscher, and Szilagyi (2008) index (Panels A2, B2) and (3) the Ohlson (1980) O score (Panels A3, B3). Each column corresponds to a different lag between the dependent and independent variables. All regressions include our baseline firm-, macro- and CEO-level controls (see Section 3.4). In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A1: Using Bharath & Shumway (2008) index to estimate default probability					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.015	-0.181**	-0.355***	-0.302***	-0.184***	0.008
	(0.55)	(-2.41)	(-4.53)	(-4.01)	(-3.30)	(0.12)
PU x Delta	-0.008	-0.019**	-0.030***	-0.033***	-0.013	-0.004
	(-1.29)	(-2.25)	(-4.27)	(-3.81)	(-1.47)	(-0.62)
PU x Vega	-0.013*	0.018*	0.033***	0.004	0.001	0.012
	(-1.74)	(1.78)	(3.05)	(0.36)	(0.11)	(1.01)
N	30,122	24,746	19,781	15,700	12,322	9,601
R^2	0.496	0.282	0.225	0.200	0.187	0.150

	Panel A2: Using Campbell,Hilscher&Szilagyi (2008) index to estimate default probability					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.012	-0.192**	-0.348***	-0.303***	-0.186***	0.008
	(0.38)	(-2.49)	(-4.55)	(-4.09)	(-3.22)	(0.12)
PU x Delta	-0.003	-0.020**	-0.031***	-0.035***	-0.013	-0.006
	(-0.44)	(-2.46)	(-5.08)	(-4.45)	(-1.62)	(-0.76)
PU x Vega	-0.007	0.016	0.030***	0.004	0.002	0.014
	(-1.16)	(1.44)	(3.19)	(0.34)	(0.26)	(1.31)
N	32,296	27,600	22,930	18,215	14,331	11,197
R^2	0.576	0.245	0.236	0.210	0.194	0.149

	Panel A3: Using Ohlson (1980) O score to estimate default probability					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.001	-0.180**	-0.328***	-0.282***	-0.178***	0.014
	(-0.04)	(-2.50)	(-4.73)	(-4.06)	(-3.36)	(0.23)
PU x Delta	-0.004	-0.018**	-0.027***	-0.031***	-0.014*	-0.013
	(-0.50)	(-2.07)	(-4.21)	(-4.07)	(-1.74)	(-1.58)
PU x Vega	-0.014	0.019*	0.041***	0.015	0.014**	0.023**
	(-1.42)	(1.68)	(3.49)	(1.51)	(2.01)	(2.03)
N	30,812	25,127	20,068	15,883	12,445	9,697
R^2	0.401	0.213	0.213	0.202	0.195	0.156

Table A4
Controlling for Default Probability (continued)

	Panel B1: Using Bharath & Shumway (2008) index to estimate default probability					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.069	-0.457***	-0.774***	-0.789***	-0.087	0.461**
	(-1.32)	(-3.39)	(-5.86)	(-5.79)	(-0.50)	(2.28)
PU x CEO specialist	-0.038*	-0.035**	-0.008	-0.007	-0.032	0.052
	(-1.89)	(-2.22)	(-0.30)	(-0.23)	(-0.78)	(1.12)
N	16,107	13,955	11,692	9,783	8,121	6,711
R^2	0.423	0.282	0.259	0.285	0.203	0.238

	Panel B2: Using Campbell,Hilscher&Szilagyi (2008) index to estimate default probability					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.016	-0.454***	-0.762***	-0.773***	-0.090	0.502**
	(-0.21)	(-3.12)	(-5.92)	(-5.79)	(-0.51)	(2.55)
PU x CEO specialist	-0.023	-0.039***	-0.020	-0.018	-0.035	0.038
	(-1.43)	(-2.60)	(-0.77)	(-0.60)	(-1.02)	(0.93)
N	18,293	15,833	13,310	11,144	9,290	7,707
R^2	0.542	0.274	0.264	0.292	0.217	0.240

	Panel B3: Using Ohlson (1980) O score to estimate default probability					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.085	-0.480***	-0.774***	-0.765***	-0.096	0.457**
	(-1.22)	(-3.48)	(-6.27)	(-6.11)	(-0.58)	(2.45)
PU x CEO specialist	-0.032	-0.039**	-0.008	-0.018	-0.051	0.019
	(-1.22)	(-2.08)	(-0.25)	(-0.59)	(-1.49)	(0.48)
N	16,123	13,923	11,692	9,778	8,138	6,749
R^2	0.399	0.274	0.246	0.285	0.211	0.237

Table A5
Controlling for Financial Constraints

This table presents results from OLS regressions of firm total return volatility on the Baker, Bloom, and Davis (2016) policy uncertainty index and its interactions with CEO delta and vega (Panels A1 through A4) and with a CEO specialist dummy (Panels B1 through B4). We also include interactions between policy uncertainty and four different proxies for financial constraints: (1) the Hadlock and Pierce (2010) index (Panels A1, B1) (2) the Hoberg and Maksimovic (2014) index (Panels A2, B2) (3) the Whited and Wu (2006) index (Panels A3, B3) and (4) the Kaplan and Zingales (1997) index (Panels A4, B4). Each column corresponds to a different lag between the dependent and independent variables. All regressions include our baseline firm-, macro- and CEO-level controls (see Section 3.4). In all regressions, we include firm fixed effects and we cluster standard errors at the firm and year level. *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Panel A1: Using Hadlock & Pierce (2010) index as proxy for financial constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.001	-0.186**	-0.345***	-0.301***	-0.190***	0.009
	(0.02)	(-2.49)	(-4.69)	(-4.09)	(-3.32)	(0.15)
PU x Delta	-0.012*	-0.020**	-0.028***	-0.033***	-0.014	-0.006
	(-1.78)	(-2.33)	(-4.29)	(-3.69)	(-1.56)	(-0.87)
PU x Vega	-0.022**	0.013	0.030**	0.002	-0.006	0.010
	(-2.15)	(1.05)	(2.31)	(0.16)	(-0.88)	(0.82)
N	35,263	28,813	23,059	18,315	14,412	11,264
R^2	0.419	0.215	0.216	0.208	0.197	0.148

	Panel A2: Using Hoberg & Maksimovic (2015) index as proxy for financial constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.012	-0.166**	-0.324***	-0.279***	-0.164***	0.021
	(0.35)	(-2.20)	(-4.75)	(-4.05)	(-2.86)	(0.35)
PU x Delta	-0.005	-0.025**	-0.034***	-0.032***	-0.008	-0.007
	(-0.49)	(-2.15)	(-3.81)	(-3.17)	(-1.00)	(-0.90)
PU x Vega	-0.019	0.034***	0.057***	0.013	0.006	0.012
	(-1.56)	(2.58)	(4.59)	(1.21)	(0.73)	(1.08)
N	19,587	16,596	13,366	10,694	8,489	6,645
R^2	0.406	0.223	0.230	0.216	0.186	0.132

	Panel A3: Using Whited & Wu (2006) index as proxy for financial constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.005	-0.177**	-0.336***	-0.296***	-0.184***	0.007
	(0.15)	(-2.43)	(-4.62)	(-4.05)	(-3.27)	(0.12)
PU x Delta	-0.013*	-0.020**	-0.028***	-0.035***	-0.013	-0.006
	(-1.86)	(-2.30)	(-4.24)	(-3.67)	(-1.47)	(-0.77)
PU x Vega	-0.016*	0.023**	0.037***	0.010	0.005	0.015
	(-1.76)	(2.11)	(3.33)	(0.93)	(0.66)	(1.43)
N	32,632	26,653	21,316	16,875	13,265	10,326
R^2	0.421	0.213	0.213	0.205	0.193	0.147

	Panel A4: Using Kaplan & Zingales (1997) index as proxy for financial constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	0.004	-0.182**	-0.342***	-0.299***	-0.188***	0.008
	(0.14)	(-2.44)	(-4.60)	(-4.07)	(-3.29)	(0.13)
PU x Delta	-0.010	-0.019**	-0.027***	-0.033***	-0.012	-0.005
	(-1.48)	(-2.31)	(-4.26)	(-3.88)	(-1.46)	(-0.72)
PU x Vega	-0.016*	0.019*	0.034***	0.008	0.003	0.013
	(-1.68)	(1.80)	(3.03)	(0.84)	(0.37)	(1.21)
N	34,724	28,382	22,720	18,041	14,199	11,099
R^2	0.421	0.215	0.215	0.210	0.197	0.152

Table A5
Controlling for Financial Constraints (continued)

	Panel B1: Using Hadlock & Pierce (2010) index as proxy for financial constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.070	-0.486***	-0.783***	-0.774***	-0.079	0.501**
	(-0.97)	(-3.35)	(-6.12)	(-5.98)	(-0.46)	(2.53)
PU x CEO specialist	-0.059***	-0.037*	-0.013	-0.010	-0.024	0.039
	(-2.99)	(-1.94)	(-0.53)	(-0.32)	(-0.67)	(0.97)
N	18,405	15,917	13,370	11,196	9,335	7,752
R^2	0.397	0.259	0.254	0.287	0.215	0.240

	Panel B2: Using Hoberg & Maksimovic (2015) index as proxy for financial constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.148*	-0.647***	-0.841***	-0.719***	0.247	0.822***
	(-1.77)	(-4.05)	(-6.54)	(-4.46)	(1.61)	(8.25)
PU x CEO specialist	-0.056*	-0.049*	-0.001	0.015	-0.061*	0.002
	(-1.69)	(-1.70)	(-0.03)	(0.42)	(-1.96)	(0.06)
N	10,421	8,932	7,484	6,256	5,243	4,353
R^2	0.417	0.299	0.285	0.337	0.290	0.347

	Panel B3: Using Whited & Wu (2006) index as proxy for financial constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.077	-0.479***	-0.781***	-0.782***	-0.061	0.498***
	(-1.19)	(-3.42)	(-6.12)	(-5.89)	(-0.36)	(2.58)
PU x CEO specialist	-0.049**	-0.052***	-0.011	-0.003	-0.044	0.037
	(-2.30)	(-2.77)	(-0.39)	(-0.10)	(-1.23)	(0.90)
N	16,669	14,416	12,103	10,120	8,456	7,009
R^2	0.399	0.257	0.251	0.286	0.214	0.239

	Panel B4: Using Kaplan & Zingales (1997) index as proxy for financial constraints					
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Policy uncertainty	-0.076	-0.480***	-0.780***	-0.770***	-0.082	0.488**
	(-1.10)	(-3.38)	(-6.14)	(-6.03)	(-0.48)	(2.50)
PU x CEO specialist	-0.050**	-0.046***	-0.016	-0.018	-0.033	0.037
	(-2.29)	(-2.65)	(-0.59)	(-0.61)	(-0.94)	(0.91)
N	18,108	15,660	13,158	11,017	9,189	7,632
R^2	0.396	0.262	0.252	0.291	0.212	0.241