Risk Shocks, Uncertainty Shocks, and Corporate Policies

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Abstract

We originate risk and uncertainty shock measures through textual analysis of corporate annual reports. Conceptually, risk shocks are associated with undesirable outcomes with conceivable probability assignment, while uncertainty shocks pertain to ambiguous outlook. We show that risk and uncertainty shocks carry very different implications for corporate policy. Risk shocks are followed by long-lasting diminishing leverage, investment, employment, dividend payouts, and increasing cash holdings, with small high credit risk firms displaying stronger effects. When the risk resolves, firms do not essentially reverse their cash holding and payout policies. Uncertainty shocks, on the other hand, are only followed by a short-term reduction in leverage, while other corporate policies remain virtually unchanged. Overall, risk shocks trigger persistent policy adjustments, while managers adopt a "wait-and-see" strategy until uncertainty resolves.

Keywords: Risk, uncertainty, leverage, investment, employment, payout, cash holdings, textual analysis

Risk: The possibility that something bad or unpleasant (such as an injury or a loss) will happen.

Uncertainty: Something that is doubtful or unknown, something that is uncertain.

—*Merriam-Webster Dictionary*

1. Introduction

Corporate environment dynamically changes in response to evolving business conditions. Firms constantly deal with complex uncertainty in making investment, financing, payout, and cash management decisions (Graham and Harvey, 2001, 2005). Nevertheless, the pattern of corporate policy in response to shocks to the surrounding uncertainty and risk environments largely remains an unexplored territory, possibly because such shocks are not easily quantifiable. This paper aims to fill in that gap. In particular, we originate new measures for risk and uncertainty shocks, and study, in a unified framework, their implications for a comprehensive set of policies on investment, capital structure, employment, cash holdings, dividend payouts, and stock repurchase.

Risk and uncertainty shocks are of distinct nature. As a well-studied concept,[1] risk describes undesirable circumstances with convincible probability assignment. For example, a firm can estimate the likelihood of a competitor introducing a new line of products based on public disclosure, private information, or past experience. Managers are able to evaluate competition risk and make required decisions accordingly. Uncertainty, on the other hand, is associated with corporate or macro events whose likelihood of occurrence and ultimate

[1] Past work has incorporated risk characteristics in studying various types of corporate policies. In particular, the literature has examined the relations between risk and firm leverage (Bradley, Jarrell, and Kim, 1984; Friend and Lang, 1988; Harris and Raviv, 1991; Frank and Goyal, 2009), investment (Panousi and Papanikolaou, 2012; Chen, Wang, Zhou, 2014), dividend payouts (Hoberg and Prabhala, 2009; Hoberg, Phillips, and Prabhala, 2014), and corporate cash holdings (Hoberg, Phillips, and Prabhala, 2014; Gao, Hartford, and Li, 2014).

implications are unknown or unpredictable.[2] For instance, in December 2012, Bill Ackman announced that the hedge fund he manages, Pershing Square, took a one billion dollar short position in Herbalife (HLF), sharing his view that HLF was an unsustainable pyramid scheme. Encountering such an uncertainty shock, HLF management had largely been unable to assess its implications for its future operations.

We measure risk and uncertainty shocks through textual analysis of corporate 10-K report, which describes a firm's exposure to multiple risk and uncertainty sources in a legally meaningful manner.[3] In particular, we develop a list of keywords which characterize the notion of risk and uncertainty. Level of risk (uncertainty) is defined as the ratio of risk (uncertainty)-relevant words to total meaningful words in the report. We then compute firm-level risk (uncertainty) shocks as the changes in risk (uncertainty) level from the previous year. In such sense, textual analysis assesses managerial perception of risk and uncertainty, making it less prone to market sentiments and investors' behavioral biases. The text-based measures are developed from qualitative information, and thus, are forward-looking in nature, and suffer less a data mining problem.

Our central hypothesis is that risk and uncertainty shocks exert very different impacts on corporate decisions. Specifically, we test the following hypotheses: (1) firms comprehensively adjust corporate policies in response to risk shocks; (2) firms adopt the

[2] Uncertainty in our paper refers to the concept of ambiguity in Knight (1921), Epstein and Wang (1994), Epstein and Schneider (2008), Ju and Miao (2012), and many others. From a broader perspective, Knight (1921) describes uncertainly as the combination of risk and ambiguity. We adopt the narrower definition of uncertainty because it is widely used and well understood by corporate managers, investors and researchers. Furthermore, the consistency of our definition with the Merriam-Webster dictionary enables us to use text analysis to construct the uncertainty measure.

[3] Firms with false or misleading disclosure or with omissions of key information in disclosure are subject to investigations by regulatory bodies and law suits filed by investors. The Private Securities Litigation Reform Act of 1995 establishes a safe harbor from liability in private lawsuits for companies making meaningful risk statements that accompany forward-looking statements. Kravet and Muslu (2013) have a detailed discussion of the regulatory environment for corporate risk disclosure.

"wait and see" strategy following uncertainty shocks. Indeed, risk shocks typically convey convincible information that could substantially alter managerial perception on fundamental conditions and economic environment. Hence, managers respond with broad-scale policy adjustments in a persistent manner. In contrast, uncertainty shocks reveal vague information that creates a blur and incomplete outlook. Managers are thus inclined to wait for the resolution of uncertainty. At most, they may be forced to selectively adjust some policies for temporary solution.

We further hypothesize that firms with different characteristics respond differently to risk and uncertainty shocks. For one, it is relatively easier for large and low credit risk firms to raise external capital even when the level of uncertainty and risk advances. Moreover, profitable firms can generate capital internally. Such firms are more capable to weather through shocks, and thus, should be less responsive to shocks compared with their counterparts. We also hypothesize that corporate policies respond asymmetrically to positive (rising) and negative (resolving) shocks.

Indeed, positive shocks reveal the down side possibilities of deteriorating rating quality, migration of customers and vendors, and even expensive bankruptcy costs. Thus, firms would actively respond to positive shock with broad scale policy adjustment to mitigate emergent negative outcomes, bearing direct financial loss and direct and indirect operating costs. Negative shocks, in contrast, are not as damaging as positive shocks. Further, when positive risk shocks resolve, cautious managers could take into account the possibility that positive shocks will quickly reappear. In such scenarios, potential adjustment costs may play a greater role in discouraging broad scale adjustment. Thus, managers may choose to reverse only those essential policies and leave the others intact. Accordingly, we test two additional hypotheses: (3) policies of small, unprofitable, and high credit risk firms are more

responsive to risk and uncertainty shocks; (4) positive risk and uncertainty shocks have stronger effects on corporate policies than negative shocks.

We show that risk shocks are indeed followed by persistent diminishing leverage, investment, employment, dividend and repurchase payouts, and increasing cash holdings in the presence of the other policy determinants identified in previous studies. The economic significance is striking. In our sample, 26.69%, 30.79%, 41.02%, and 7.25% of the annual median changes in book leverage ratio, capital expenditure, cash holdings, and employment, respectively, emerge in the year following a median risk shock. As the risk shock increases by one standard deviation from the mean, the likelihood of dividend omission advances by 50%, while the probability of large stock repurchase (over 1% of total assets) decreases by 8.94%. Interestingly, implications of risk shocks for corporate policy could last over two to three years, echoing the aggregate level findings in Bloom (2009) that risk shocks have long-term impact on investment and employment.

In contrast, uncertainty shocks are only followed by significant change in capital structure, but not in all other policies. While the correlation between uncertainty shock and subsequent leverage adjustment is economically significant, it lasts for only one year. This is again consistent with the aggregate level study of Bloom (2009), who shows that uncertainty shocks do not affect aggregate investment and hiring beyond a several-month horizon. To explain why uncertainty shocks only predict financing policy, we discover that leverage adjustment largely comes from debt reduction (not equity issuance) by non-investment grade firms. Capital structure policy is subject to supply side influence (Faulkender and Peterson, 2006). Therefore, credit supply might be tightened up when uncertainty arises, leading to leverage reduction.

Next, it is evident that firms respond asymmetrically to positive and negative shocks. For example, firms substantially increase cash holdings and decrease payouts after positive risk shocks, but virtually keep these policies unchanged when risk shocks resolve. Such asymmetric effect is consistent with the fact that cash holdings are mainly for precautionary purpose (Hoberg, Phillips, and Prabhala, 2014), and that dividend payouts are considered less important than investment and capital structure by managers (Graham and Harvey, 2001). Managers perhaps remain cautious and hesitate to reverse less urgent policies even after the risk shock being resolved, leading to inertia.

We find that firm characteristics play a remarkable role in shaping the relationships between risk shocks, uncertainty shocks, and corporate policies. Essentially, small firms, unprofitable firms, and firms with low credit ratings are more responsive to risk and uncertainty shocks. Small firms respond to risk shocks by reducing more leverage and employment than large firms. The presence of a median risk shock explains 55.61% (11.76%) of the median change in leverage (employment) for small firms, but only 6.42% (5.56%) for large firms. High credit risk firms are more responsive in adjusting leverage and payouts, while firms with negative earnings are more responsive with adjustments in employment and payouts. The results are consist with our prior that larger, more profitable, and investment-grade firms have greater operating flexibility and stronger endurance to shocks.

This paper is among the first to examine the dynamic relation between uncertainty and corporate decisions. Bloom (2009) illustrates theoretically how uncertainty shocks affect aggregate investment, employment, and productivity. Our paper provides comprehensive micro-level evidence on the implications of uncertainty versus risk shocks from both the real

economic and the firm operational perspectives. Along the way, we propose a novel approach to quantify firm-level risk and uncertainty. This paper also helps to enhance our understanding of the interactive nature and hierarchical pattern of corporate decisions.

Several papers using text analysis are closely related to ours. Hoberg, Phillips, and Prabhala (2014) develop the textual measure of product market fluidity as a proxy for product market risk, and relate it to dividend payout, share repurchase, and cash holdings. Li (2006) and Kravet and Muslu (2013) develop textual measures of corporate risk, respectively, and show that change in risk exposure has predictive power for future stock return, volatility, and trading volume. Tetlock (2007) and Tetlock, Saar-Tsechansky, and Macskassy (2008) employ Harvard psychosocial dictionary to characterize the tone of Wall Street Journal articles and corporate 10-K filings, and find that the tones of these texts predict future stock returns and earnings. Loughran and McDonald (2011) construct their own dictionary of words of negative tone, and relate them to 10-K filing return, trading volume, and unexpected earnings. Compared with previous work, our study focuses on the analysis of distinct implications of risk and uncertainty on an ecosystem of corporate policies. Examining the corporate polices jointly helps one identifying the intra-dependence and priority order of corporate decision-making in response to risk and uncertainty shocks.

The rest of the paper is organized as follows. Section 2 describes the methodology of textual analysis and data. Section 3 analyzes the relations between risk and uncertainty shocks and subsequent adjustments in corporate policies. Section 4 offers additional analysis on the impact of risk and uncertainty shocks by key firm characteristics, duration of the impact, and robustness tests. Section 5 concludes.

2. Empirical Design

This section describes the textual analysis methodology, regression setup, and variable selection. Further, it reports data sources and the summary statistics of key variables.

2.1. Textual Analysis

One novelty of the paper lies in using textual analysis to measure risk and uncertainty from corporate 10-K filings. We download annual 10-K reports filed during a time period between January 2001 and December 2010 from the Security and Exchange Commission's (SEC's) EDGAR website, and retrieve all EDGAR index files beginning in 2001.[4] The EDGAR index files contain the following information for each corporate filing: company name, form type, CIK, filing date, file name, and file location. We select the 10-K filings with the form types labeled as 10-K, 10-K/A, 10-KT, 10KT/A, 10-K405, or 10-KSB, and develop a web crawling program to collect all qualified 10-K filings in textual format.

We initially collect 108,467 corporate 10-K filings. After selecting U.S. listed companies and merging the 10-K filings with CRSP and COMPUSTAT information, we are left with 54,010 well balanced observations, i.e., the percentage of filings in any single year to total filings varies slightly in the range of 9.17% to 11.26%. We employ textual analysis to extract the fiscal year information of each corporate 10-K filings, and lose 2,500 filings because these filings are not in the standard format. We further exclude 15,914 duplicate filings, in many of which case, firms filed amendments, e.g., 10-K/A's, to original reports. For data reliability, we delete both the original and amendment filings, because there is no guarantee that the computer program will always successfully distinguish whether the

[4] The SEC EDGAR website contains corporate 10-K filings beginning in 1994. We exclude filings in the early years, because they are in small number and lack of standardization.

amendment is a full report or a restatement of particular sections of the original report. Our final sample contains 35,596 10-K filings of U.S. listed companies.

To analyze the textual contents of the 10-K filings, we first delete numbers, tables, figures, and other non-textual contents in the filings. We then develop a word stemming program to filter out categories of standard words that are literally not meaningful in textual analysis, for example, propositions, articles, and pronouns. We further decompose the texts into the root form of words, that is, word stems, so that our analysis is based on the underlying meaning of words, regardless of their different tenses or formats.

To measure firms' risk or uncertainty exposure, we create dictionaries of word stems that describe various types of risk or uncertainty exposure. We first list meaningful word stems that appear more than once in all 10-K filings. From a list of 338 words stems, we select risk- or uncertainty-relevant words in the following way: first, each researcher is assigned to read 100 randomly selected 10-K reports representing different industries and years. Every researcher judges independently whether a specific word is risk- or uncertainty-relevant in the context. A word is included in the preliminary dictionary if and only if all three researchers agree so based on their independent judgment. Words in the preliminary dictionary are then checked for consistency with their definitions in the Merriam-Webster dictionary. Further, we solicit opinions from financial researchers and professionals, and eliminate words that appear to be controversial. In general, our methodology slightly tilts toward the conservative side in developing the dictionaries of risk- and uncertainty-relevant words.[5]

[5] We show in Section 4.3 that our main results are robust to several other specifications of dictionaries.

As shown in Panel A and B of Appendix 2, our final dictionaries are composed of 29 risk-related keywords and eight uncertainty-related keywords. Appendix 3 provides examples of sentences that contain each of these keywords in the 10-K filings. Uncertainty-related words in general appear less frequently than risk-related words. To complete our empirical measure, we follow the Merriam-Webster dictionary to include different formats of uncertainty (e.g., uncertain) and some keywords that convey the meaning of "unknown" or "uncertain" (e.g., unclear, unpredictable, unforeseen) in our final dictionary of uncertainty. Indeed, we find similar results if we only include different formats of uncertainty in the dictionary.

The Securities and Exchange Committee (SEC) provides specific and constantly updated guideline for risk disclosure of listed companies. Our dictionary of risk-related words include the word "risk" and its various formats (e.g., risky, risks) and additional words. It has long been a debate among the academics and the regulatory body on whether risk disclosure in 10-K filings is overly general (Kravet and Muslu, 2013). For instance, words such as "risk" itself are subject to the criticism of being “boilerplate”. Including only different formats of the word "risk" in our dictionary may substantially underestimate firm risk exposure, and moreover, introduce noise to the empirical measure. The Merriam-Webster dictionary defines risk as "*The possibility that something bad or unpleasant (such as an injury or a loss) will happen"*, which captures the finance concept that risk virtually captures downside possibility. Therefore, we include words that characterize downside possibilities, such as "loss", "adverse", and "pressure", in our dictionary. To capture specific types of risks encountered by firms, we include words such as "compete" and "competition". Hoberg, Phillips, and Prabhala (2014) show that product market competition affects corporate payouts, capital structure, and investment. Our

dictionary also includes words describing market risk such as “crisis”, and credit risk such as "downgrade".[6]

We define firm-level risk, *Risk Level*, as the percentage of meaningful word stems in 10-K texts that are included in our dictionary of risk-related words. Similarly, we define firm-level uncertainty, *Uncertainty Level,* as the percentage of meaningful word stems in 10-K texts that are included in our dictionary of uncertainty-related words. We compute *Risk (Uncertainty) Shock* for firm i at time t as the difference in *Risk (Uncertainty) Level* for firm i between time t and time t-1. This methodology allows us to study how corporate policy reacts to change in risk and uncertainty, respectively, to some degree alleviating concerns over latent factors and reverse causality.[7] In addition, firms have different styles in preparing their annual reports, e.g., some firms tend to use more cautionary tone, while some firms write relatively longer section of risk discussion. Using changes in risk and uncertainty levels helps to mitigate the style difference induced measurement errors.

10-K texts are supposed to convey unique information about risk and uncertainty. Financial reports are required to meet the regulatory standard, so that description must be representative, significant, and meaningful. False, misleading disclosure or omissions of key information are subject to investigation by the regulator, and litigation by investors. Thus, textual analysis can directly captures truthful managerial perception of uncertainty at the firm level, which is in sharp contrast to the indirect uncertainty measures, such as firm age, stock price reaction to earnings announcement, tangibility, and market to book ratio (see, for

[6] Legal professionals categorize risk factors into: market and industry risks, firm operational risks, and specific investment-related risks (see, for example, “Writing Effective Risk Factor Disclosure in Offering Documents and Exchange Act Reports”, INSIGHTS, Volume 19 Number 5, May 2005, and “Reminder: New Disclosure Considerations for Periodic Reports”, Legal News, Foley & Lardner LLP Information Bulletin, January 6, 2005. This paper focuses on vocabularies describing the former two categories of risks as they are relevant to our investigation on corporate policies.

[7] Li (2010) also suggests using change measures in textual analysis research to mitigate potential endogeneity issue.

example, He, Li, Wei and Yu, 2014; Pastor and Veronesi, 2003). Our text-based risk measure is less subject to valuation and trading noise than the stock return-based risk measures. Compared to earnings-based risk measures, which essentially describe historical performance, our text-based measure is forward-looking in terms of capturing future business outlook. Our text-based measures, developed from qualitative information, encompass information on various risk and uncertainty factors, and suffer less a data mining problem.

2.2. Empirical Methodology

We apply OLS panel regression analysis in our investigation. The regressions are specified in the following equation:

$$\triangle POLICY_{i,t+1} = \alpha + \beta_1 RISKSHOCK_{i,t} + \beta_2 UNCERTAINTYSHOCK_{i,t} + \beta_j CONTROL_{i,j,t} + \varepsilon_{i,t}. \quad (1)$$

where $\triangle POLICY_{i,t+1}$ represents change in various corporate policies: leverage, capital investment, employment, and cash holdings for firm i between time t and t + 1; RISKSHOCK i,t and UNCERTAINTYSHOCK i,t denote risk and uncertainty shock for firm i, measured by the changes in risk and uncertainty level between time t − 1 and t, respectively. We follow previous literature to include a comprehensive set of control variables measured at time t, denoted by $CONTROL_{i,j,t}$, in multivariate regressions. Appendix A describes in detail the key variables.

We use logistic regressions with similar specifications for dividend payouts and repurchase, since the dependent variables associated with these policies are dummy variables. In particular, the dependent variables are dividend increase, dividend decrease, dividend initiation, dividend omission, and stock repurchase, respectively. We control for the year fixed effect and the industry fixed effect in both the OLS and logistic regressions.

To investigate whether our text-based risk measure has additional predictive power over market-based risk measure, we control for stock return volatility in all regressions. The "change-on-lagged change" regression setup allows us to examine the impact of risk and uncertainty shocks on subsequent adjustment on corporate policy, and simultaneously control for omitted unobservable factors and potential endogeneity.

We use book leverage, measured by the ratio of total liabilities to total assets, as a proxy for capital structure, which is supposed to be affected by a set of fundamental and macroeconomic factors (Harris and Raviv, 1991; Rajan and Zingales, 1995; Frank and Goyal, 2005; Graham and Leary, 2011). Beside lagged book leverage ratio and stock return volatility, we consider the following control variables: (1) logarithm of sales as a proxy for size; (2) stock return between time $t-1$ and t; (3) tangibility measured by the ratio of gross properties, plant and equipment (PPE) to total assets; (4) market-to-book ratio as a proxy for growth; (5) return on assets (ROA) as a proxy for profitability; (6) effective corporate tax rate; (7) short-term solvency measured by the ratio of cash to interest expenses; (8) dividend yield measured by the ratio of common equity dividend to the market value of common equity; (9) external financing need measured by financial deficit normalized by sales. We follow Chen, Wang, and Zhou (2014) to compute financial deficit as the difference between cash outflow and internally generated cash flow. In particular, cash outflow includes investment in PPE and intangible assets, and increase in working capital. Internally generated cash flow is the summation of net income, depreciation and amortization, and deferred tax minus dividend payout. We also control for macro conditions by including annual S&P 500 value-weighted return, one year swap rate, default risk premium measured by the difference between the Moody's Baa and Aaa index spreads, option-implied volatility (VIX), and Industrial Production Index growth between time $t-1$ and t.

In examining investment and employment decisions, we compute the percentage change in capital expenditure, $\%dcapx_{i,t+1}$, and percentage change in employment, $\%demp_{i,t+1}$, as the primary dependent variables. Following Panousi and Papanikolaou (2012), we incorporate the following firm characteristics measured at time t as controls: (1) ratio of earnings before extraordinary items plus depreciation to PPE; (2) Tobin's Q computed as the ratio of market value of assets to book value of assets; (3) total risk, measured by stock return volatility; (4) market leverage, measured as total liabilities divided by the sum of total liabilities and market value of equity. We also control for logarithm of sales and ROA.

Risk and uncertainty shocks can possibly alter managerial prior on firm prospects, and lead to change in corporate cash holdings. We define our main dependent variable, $dcash_{i,t+1}$, as change in the ratio of the sum of cash and short-term investments to total assets between time t and t+1. Following previous literature (Bates, Kahle and Stulz, 2009: Hoberg, Phillips and Prabhala, 2014; and Gao, Harford, and Li, 2014), we incorporate the following control variables: (1) lagged cash as the sum of cash and short-term investments ($cash_{i,t}$); (2) lagged change in the cash ratio ($dcash_{i,t}$); (3) ratio of working capital (measured as net working capital minus cash and short-term investments) to total assets; (4) *Dividend Dummy*, which equals one if common dividends are paid at time t, and zero otherwise; (5) ratio of research and development expenses (R&D) to sales; (6) ratio of capital expenditure to total assets. Other control variables include logarithm of sales, market-to-book ratio, book leverage, and stock return volatility.

As in Hoberg, Phillips and Prabhala (2014), we develop four measures to examine changes in dividend payout policy: (i) $Dividend\ Initiation_{i,t+1}$, which equals one if firm *i* initiates dividend payments at time t+1, and zero otherwise; (ii) $Dividend\ Omission_{i,t+1}$,

which equals one if firm *i* terminates dividends at time t+1, and zero otherwise; (iii) *Dividend Increase* $_{i,t+1}$, which equals one if firm *i* increases dividend payments between time t and t+1, and zero otherwise; (iv) *Dividend Decrease* $_{i,t+1}$, which equals one if firm *i* decreases dividend payments between time t and t+1, and zero otherwise. Measures (i) and (ii) capture abrupt changes in dividend policy, while measures (iii) and (iv) reflect moderate adjustment in payout.

To investigate change in repurchase payouts, we construct an indicator variable, *Repurchase More than 1% Asset Dummy*, which equals one if the value of net stock repurchase at time t+1 is over 1% of total assets, and zero otherwise. Following Hoberg, Nagpurnanand, and Phillips (2014), we define the value of net repurchase as purchase of common and preferred stocks less the reduction in the value of preferred stocks outstanding. We consider the following factors measured at time t in examining dividend and repurchase payouts: (1) firm age since the date of IPO; (2) sales growth as percentage change in net sales; (3) *Negative Earnings Dummy* equals one if net income is negative, and zero otherwise; (4) ratio of retained earnings to total assets as a proxy for firm maturity. Other control variables include logarithm of sales, ratio of R&D to sales, market-to-book ratio, stock return volatility, and ROA.

2.3. Data and Summary Statistics

Our sample contains 35,596 observations of risk and uncertainty shocks, involving 7,371 unique firms in 67 two-digit SIC industries. We collect policy variables including leverage, capital expenditure, employment, cash holdings, dividend payouts, and stock repurchase from COMPUSTAT. A majority of control variables, e.g., financial deficit, stock returns and return volatilities, and credit ratings, are estimated with data from CRSP and

COMPUSTAT. We obtain macroeconomic variables such as VIX, Industrial Productivity Index growth, and swap rates from the website of the Federal Reserve Bank at St. Louis.

The descriptive statistics of key variables are reported in Table 1. The average risk and uncertainty levels are 0.99% and 0.04% with standard deviations of 0.36% and 0.03%, respectively, implying that in general, risks are mentioned more frequently than uncertainties in 10-K reports. Book leverage has a mean of 55.36% and a standard deviation of 28.37%. The average change in book leverage is -0.17%, consistent with the notion that leverage ratio is mean-reverting (Fama and French, 2002; Baker and Wurgler, 2002; Leary and Roberts, 2005). The average annual percentage changes in capital expenditure and employment are 23.68% and 3.76%, respectively, suggesting that American listed firms evolved to be more capital-dependent than labor-intensive during our sample period.

Insert Table 1 here

The average change in the ratio of cash to assets is 0.03%, with a standard deviation of 8.08%. 1% of the sample firms initiate or omit dividends, while 27% of the firms increase dividends and 9% of the firms decrease dividends. 36% of the firms are engaged in stock repurchase whose value exceeds 1% of total assets, consistent with the statement that stock repurchases have become the most popular form of payout since 1997 (Farre-Mensa, Michaely and Schmalz, 2014). The high standard deviations of the change-in-policy variables such as *dlev, %dcapx,* and *dcash* indicate substantial variations in time series. Overall, the statistics of key variables are similar to those reported in previous studies.

Appendix 3 reports the pair-wise correlations of key variables. The correlation between risk shock and uncertainty shock is 27.5%, suggesting that the two types of shocks are positively but imperfectly correlated. The correlation between risk (uncertainty) shock and

stock return volatility is low with a coefficient of 0.089 (-0.057).[8] In addition, risk shocks are negatively and significantly correlated to changes in leverage, capital expenditure, employment, and positively correlated to change in cash holdings. Risk shocks are significantly and positively associated with the propensity to dividend decrease and dividend omission, while negatively associated with the propensity to repurchase, dividend increase, and dividend initiation. In contrast, the correlations between uncertainty shock and corporate policy adjustments are virtually insignificant except for the negative correlation to change in leverage. The correlations among corporate policies are in general consistent with those reported in previous literature.

3. Result Analysis

In this section, we investigate whether risk and uncertainty shocks are followed by changes in capital structure, capital expenditure, employment, cash holdings, and payout policies. In addition, we examine whether firms adjust their corporate policies differently to positive versus negative shocks.

3.1. Leverage

According to the trade-off theory (Modigliani and Miller, 1958; Black and Sholes, 1973; Merton, 1974), firms choose their capital structure to balance the benefits of debt financing with the direct and indirect costs of financial distress. Since firms with high risk are likely to face higher probability of financial distress, they should use less debt. On the other hand, there is no clear prediction regarding the relation between uncertainty and capital structure.

[8] Unreported, we find that the correlation between risk level and stock return volatility is 14.85%. The relatively low correlation suggests that our text-based risk measure captures additional unique information than the commonly used risk measure of stock return volatility.

We examine the impact of risk shocks, uncertainty shocks, and risk and uncertainty shocks together on capital structure in this section.

Columns 1, 2, and 3 of Table 2 report the results on the impact of risk shocks, uncertainty shocks, and risk and uncertainty shocks together , respectively. The estimation results in Column 1 shows that risk shocks are followed by a significant downward adjustment in leverage in the subsequent year. The coefficient estimate of risk shock is -1.231, significant at the 1% level. This result is consistent with notion that firms adjust capital structure over time (Leary and Roberts, 2005), and supports the trade-off theory prediction. The impact of risk shock on leverage is economically significant. A median-level risk shock (0.03%) in our sample is associated with an absolute reduction in book leverage ratio of 0.03% in the following year. Since a median firm in our sample adjusts its leverage by 0.12% each year, 26.69% of the median absolute change in leverage can be explained by the presence of a median risk shock.

Insert Table 2 here

Consistent with previous literature, we find that large firms are more likely to increase their leverage (e.g., Graham and Leary, 2011; Frank and Goyal, 2009; Faulkender and Petersen, 2006). In addition, firms with higher equity returns are associated with reductions in leverage (e.g.,Welch, 2004; Faulender and Petersen, 2006). Leverage ratio is negatively correlated with change in leverage in the following year, confirming that leverage ratios are mean-reverting (Fama and French, 2002; Baker and Wurgler, 2002; Leary and Roberts, 2005) . The coefficient estimate of stock return volatility is significant at 1% in all specifications (Columns 1 to 9), consistent with previous evidence that more risky firms are

associated with lower leverage (e.g., Lemmon, Roberts, and Zender, 2008; Faulkender and Petersen, 2006). [9]

As shown in Column 2 of Table 2, uncertainty shocks also negatively affect change in leverage ratio in the subsequent year. The coefficient estimate of uncertainty shock is −14.19, statistically significant at the 1% level. The economic impact of a uncertainty shock on leverage is of similar magnitude to that of a risk shock. More specifically, a median-level uncertainty shock (0.002%) in our sample leads to an absolute reduction in book leverage ratio of 0.03% in the following year, which explains 24.3% of the median absolute change in leverage in our full sample. The coefficient estimates of other firm characteristics, such as leverage, size, ROA, remain similar to those in the first column.

We further compare the impact of risk versus uncertainty shocks in Column 3. The results show that the impact of both risk and uncertainty shocks remain significant when they are simultaneously included in a multivariate regression. The coefficient estimate of risk shock and uncertainty shock is -0.765 and -9.871, respectively, both significant at the 10% level. The economic significance of uncertainty shocks is comparable to that of risk shocks when they are both present: a median-level risk shock and uncertainty shock separately explains 16.83% and 16.90% of the median absolute change in book leverage ratio in the following year.

In Columns 4-9 of Table 2, we investigate whether firms adjust their leverage differently to positive versus negative shocks. The variables of our interest, positive and negative shocks, differ than the previous shock measures along two dimensions. First, we break the

[9] Some studies find opposite or insignificant results regarding the relation between leverage and firm size (e.g., Titman and Wessels, 1988), and between leverage and risk (e.g.,Frank and Goyal, 2009; Titman and Wessels, 1988) . Please see Harris and Raviv (1991) for a comprehensive review of the empirical findings on capital structure.

previous shock measure into two indicator variables based on whether the shock is positive or negative. Generally, a positive shock is present when risk or uncertainty level increases than last year. On the other hand, a negative shock happens when risk or uncertainty resolves. Second, compared with the continuous shock measure, here we select only the shocks that are larger than median shocks in the full sample and construct the dummy variables. More specifically, *Positive Risk (Uncertainty) Shock* is an indicator variable that equals one if the firm experiences a positive risk (uncertainty) shock larger than the median positive risk (uncertainty) shock in our full sample, and zero otherwise.

The evidences in Columns 4-9 of Table 2 show that the impact of risk and uncertainty shocks on leverage adjustment is largely symmetric. On one hand, positive risk and uncertainty shocks lead to statistically significant leverage reductions. In Columns 4-5, the coefficient estimates of positive risk and uncertainty shocks are both -0.004, with a t-statistics of -2.14 and -1.98, respectively. Firms faced by a positive risk or uncertainty shock are associated with an absolute reduction of 0.4% in leverage in the subsequent year. Given that the median firm in our sample adjust its leverage by 0.12%, the reduction in leverage after a positive risk or uncertainty shock is 3.42 times the median leverage change in the full sample. On the other hand, Columns 7-8 show that firms substantially increase leverage when risk and uncertainty resolves. The coefficient estimates of negative risk and uncertainty shocks are 0.004 with a t-statistics of 2.07, and 0.003 with a t-statistics of 1.67, respectively. The economic magnitude of the impact of negative shocks are similar to that of positive shocks, indicating that firms adjust their leverage policies symmetrically to positive and negative shocks.

Table 3 decomposes change in leverage into change in debt and change in equity, and analyzes how risk and uncertainty shocks affect these two components individually. Panel A and B report the impact of the continuous measures of shocks, and the dummy variables of positive and negative shocks, respectively. Column 1 in Panel A shows that risk shocks significantly and negatively affects subsequent changes in debt (the coefficient and t-statistics are -9.631 and -3.69, respectively). Furthermore, as indicated in Columns 1-2 of Panel B, such changes in debt are symmetric in response to positive and negative risk shocks. Similar to risk shocks, uncertainty shocks alone lead to symmetric and significant adjustments in total debt. However, when risk and uncertainty shocks are both present (Column 3 of Panel A), uncertainty shocks are largely subsumed by risk shocks. Risk and uncertainty shocks are not significantly correlated to subsequent change in equity. Collectively, Table 3 shows that firms reduce debt in a symmetric manner, but not increase equity, in response to risk and uncertainty shocks.

Insert Table 3 here

Taking together the results in Table 2 and 3, we find that firms substantially reduce debt and leverage ratio when risk and uncertainty increase, and correspondingly increase debt and leverage ratio when risk and uncertainty resolve. In the meanwhile, firms tend not to significantly change their equity level when they face risk and uncertainty shocks. Our results on risk shocks are generally consistent with the trade-off theory.

We argue that the negative relation between uncertainty shock and firm debt is likely due to the supply-side factors. Faulkender and Peterson (2006) show that supply-side factors, such as whether firms have access to the public bond markets, are important in explaining the variation in capital structure. In Section 4, we find that the negative effects of uncertainty

shocks on firm debt are most pronounced for small and non-investment grade firms, supporting the hypothesis that debt reduction is likely due to tighter credit constraints in the debt market after observing the uncertainty shocks to the borrowers.

3.2. Investment

As Bloom, Bond, and Reenen (2007) and Bloom (2009) models, when uncertainty is high, the real-option value of inaction is large. Firms thus become more cautious in responding to business conditions. In particular, when faced by an uncertainty shock, firms rapidly pause their investment and hiring, which leads to an immediate drop in aggregate output and employment. Regarding the relation between total risk and investment, the theoretical conclusions are mixed depending on the assumptions on adjustment costs, production function, and others, while empirical findings mostly point to a negative relation between total risk and investment. In this section, we intend to examine the relation between firm-level risk and uncertainty shocks and investment decisions.

Table 4 reports the results. The main dependent variable, *% dcapx*, is the percentage change in capital expenditure. The regression results on the continuous measure of risk and uncertainty shock, the dummy variables of positive risk and uncertainty shocks, and the dummy variables of negative shocks are reported in Columns 1-3, 4-6, and 7-9, separately. Columns 1, 4, and 7 reports the results on risk shocks alone. As shown in Column 1, risk shocks are negatively correlated to percentage change in capital expenditure in the subsequent year, after controlling for other investment policy factors. The coefficient of risk shock is -3.255, implying that a median level risk shock (0.03%) is followed by a reduction in capital expenditure by 0.08%. Given that a median firm in our sample adjusts their capital expenditure by 0.27%, the reduction in capital expenditure due to a median risk shock are

able to explain 30.79% of the change in capital expenditure by a median firm in our sample. In Columns 3 and 6, we further show that the economic impact of risk shocks becomes even stronger when we take into account of both risk and uncertainty shocks simultaneously.

Insert Table 4 here

Columns 4 and 7 show that the negative relation between risk shock and capital expenditure exists symmetrically for both positive and negative shocks. The coefficient estimate of positive risk shock in Column 4 is -0.060 with a t-statistics of -3.18, implying that an average firm faced by a positive risk shock is associated with a reduction in capital structure by 6%, or 6.06 million dollars. On the other hand, the coefficient estimate of negative risk shock in Column 7 is 0.069 with a t-statistics of 2.79. The similar levels of coefficients and statistical significance of positive and negative shocks suggest that the effects of risk shocks on capital investment are symmetric. Overall, using text-based risk shock measure, our results provide strong evidence on the negative relation between risk and investment supporting previous research (e.g., Chen, Wang and Zhou ,2014; Panousi and Papanikolaou, 2012). [10]

We examine the impact of uncertainty shocks in Columns 2, 5, and 8. We show that uncertainty shocks, as well as positive or negative uncertainty shocks, are not significantly correlated to subsequent change in capital expenditure. Bloom (2007) theoretically shows that uncertainty (not risk) shocks freeze investment within months. Investment tends to recover and overshoot after uncertainty shocks being resolved within a short horizon. Finding no significant impact of uncertainty shocks within the one-year horizon lends

[10] Chen, Wang and Zhou (2014) find that in cross-section, stock return volatility significantly reduces investment in a subsequent year. In addition, Panousi and Papanikolaou (2012) find that idiosyncratic stock return volatility negatively affects investment at firm level, and attribute the cause to managerial risk aversion. Our result robustizes theirs in that risk shocks from multiple resources generate consistent results.

support to his theoretical prediction. Our results highlights the importance of conceptually distinguishing risk versus uncertainty in assessing the impact of economic shock on investment policy at firm level.

Our estimation results on other firm characteristics are generally consistent with previous literature. Across all specifications, we find that large firms with more tangible assets are more likely to decrease their capital expenditure, while firms with more investment opportunities (i.e., higher Tobin's Q) and higher stock returns tend to increase their investment in the subsequent year.

3.3. Employment

Employment can be regarded as investment in human capital. We therefore investigate the role of risk and uncertainty shocks on employment decisions in Table 5. Our results show that upon experiencing risk shocks, in addition to lowering capital expenditure, firms lower their level of employment in the subsequent year. The coefficient estimate and t-statistic associated with risk shocks, as shown in Column 1, are -3.812 and -4.86, respectively. A median level of risk shock leads to a reduction in employee by 0.10%, constituting 7.25% of annual change in employment for a median firm in our sample. In Columns 4 and 7, we find that firms significantly reduce employment in the presence of a positive risk shock with the coefficient estimate of -0.014, while they correspondingly increase employment after a negative risk shock with the coefficient estimate of 0.014. The results imply that an average firm faced by a positive risk shock is associated with a reduction in employment by 1.4%, or 96 employees in the subsequent year, and vice versa. In Column 3, 6, and 9, we further show that the impact of risk shocks remain statistically significant after controlling for contemporaneous uncertainty shocks in the same regression.

Insert Table 5 here

Compared with risk shocks, uncertainty shocks have much less impact on firm employment decisions. Although uncertainty shocks are marginally negatively correlated to subsequent change in employment (Column 2), such impact is subsumed when risk shocks are also present, as reported in Column 3. In addition, we do not observe significant relation between either positive or negative uncertainty shocks and changes in employment. Overall, we do not find robust correlations between uncertainty shocks and subsequent employment decisions.

As shown in Table 5, the impact of other firm characteristics on employment is similar to that on investment. We find that larger firms with more tangible assets are more likely to reduce employment in the next period, while firms with higher Tobin's Q and higher stock return are more likely to increase employment.

3.4. Cash Holdings

Empirical research on cash holdings has generally found that firms hold cash to protect them from adverse risk shocks that might force them to forgo valuable investment opportunities (i.e., precautionary motive of cash holdings).[11] For instance, Bates, Kahle and Stulz (2009) attribute the rising cash holdings for US manufacturing firms in the last three decades to the fact that these firms' cash flows become riskier. In contrast, the role of uncertainty in corporate cash holdings is unclear.

[11] Corporations may also hold excess cash due to the agency conflicts between management and shareholders (i.e., agency-based explanations). In such context, higher firm risk may also lead to larger cash reserves due to managerial risk aversion.

Table 6 reports the regression results of change in cash holdings on risk and uncertainty shocks. Following Bates, Kahle and Stulz (2009), we define our main dependent variable, dcash, as the change in ratio of the sum of cash and short-term investments to total assets. Column 1 shows that controlling for the other cash holdings factors, risk shocks are positively correlated to changes in cash holdings in the subsequent year, significant at the 1% level. The coefficient of 1.012 implies that a median risk shock is followed by 0.03% increase in the cash-to-assets ratio, which explains almost 50% of the median annual change in cash-to-assets ratio (0.06%) in the full sample. The result echoes the previous finding (e.g., Opler et al., 1999; Bates, Kahle and Stulz, 2009) that ratio of cash to total non-cash assets is higher for firms with riskier cash flows. In contrast with risk shocks, the results in Columns 2, 5, and 8 of Table 6 show that uncertainty shocks do not significantly affect cash holding decisions.

Insert Table 6 here

Columns 4 and 7 of Table 6 show that firms hold more cash assets when risk increases, but do not reduce the cash-to-assets ratio even when risk resolve. The coefficient estimate of positive risk shock in Column 4 is 0.004 with a t-statistics of 2.09, while the coefficient estimate of negative risk shock in Column 7 is -0.002 with a t-statistics of -1.06. This result imply that an average firm faced by a positive risk shock is associated with an 0.4% increase in the cash-to-asset ratio, which is 6.67 times of the median change in the cash-to-asset ratio (0.06%) for the full sample. The asymmetric impact of risk shocks on cash holdings is consistent with the precautionary motive of cash holdings.

Similar to previous studies, we find robust evidence that large firms with more net working capital tend to increase their cash holdings in the next period. Firms with higher

stock return volatility are also associated with increases in subsequent cash holdings. In contrast, firms with higher level of cash or with large increase in cash-to-asset ratio are more likely to decrease subsequent cash holdings. We find that R&D level and dividend payout dummy do not significantly affect cash holding policy.

3.5. Dividend Policy

Empirical evidence shows that risk is an important factor explaining dividend payments (e.g., Hoberg and Prabhala, 2009; Hoberg, Phillips, and Prabhala, 2014). The field survey of financial executives by Brav, Graham, Harvey, adn Michaely (2005) also indicates that perceived stability of future earnings is an important consideration when making payout policies. The current research question centers on whether risk and uncertainty shocks have different implications on dividend policies. In this paper, we examine dividend payout policies from a variety of angles, including dividend initiations, omissions, increases and decreases.

Insert Table 7 here

Table 7 reports the results. Panel A reports the logistic regression results of using continuous measures of risk and uncertainty shocks as key independent variables. The dependent variable is dividend initiation, dividend omission, dividend increase, and dividend decrease in Columns 1-3, 4-6, 7-9, and 10-12, respectively. As shown in Column 5, risk shocks are positively and significantly correlated to the dividend omission dummy, after controlling for the other well known dividend policy factors. The coefficient estimate and t-statistic associated with risk shocks in Column 5 are 77.69 and 2.00, respectively. Our untabulated analysis of the logit model shows that increasing the risk shock by one standard deviation from the sample mean leads to a 50% increase in the likelihood of dividend

omission from 0.66% to 1%, when we hold other determinants constant at the sample mean. We also find that firms with negative earnings are more likely to terminate or decrease dividends, and less likely to initiate or increase dividends.

Column 6 of Table 7 further indicates that the impact of risk shock on dividend omission remains statistically significant at the 1% level, after controlling for uncertainty shocks in the same logistic regression. However, we do not find significant relation between risk shocks and dividend initiations, increases and decreases. Moreover, uncertainty shock has no significant influence on dividend policy adjustment. Overall, our results support the idea that risk is a significant determinant of payout policy (Hoberg and Prabhala, 2005; Hoberg, Phillips, and Prabhala, 2014). Dividend payout could signal risk shocks, so our finding also helps to explain why change in dividend payout leads to stock return variations (Kalay, 1982; Michaely, 1991).

We examine whether positive and negative shocks affect dividend policy in the same manner in Panel B and C, respectively. Our results in Panel B show that firms respond to positive risk shocks by substantially adjusting dividend policy along multiple dimensions. In particular, no-dividend firms are likely to postpone dividend initiation (Columns 1 and 3). Some dividend-paying firms may choose to moderately reduce dividend payouts (Column 10 and 12), while others dramatically terminate dividend payouts (Columns 4 and 6). Consistent with the results in Panel A, there is no evidence that firms adjust their dividend payouts to positive uncertainty shocks.

Panel C reports the results for negative risk and uncertainty shocks. We show that as opposed to the impact of positive shocks, the impact of negative risk shocks on dividend policy is insignificant across all dimensions. Similar to the results in Pane A and B, negative uncertainty shocks have no significant impact on dividend policy. To conclude, Table 7

shows that firms are more likely to terminate or decrease dividends and less likely to initiate dividends after risk level increases. However, they leave dividend policy unchanged when risk decreases. In addition, firms do not adjust their dividend payout policy after experiencing uncertainty shocks.

3.6. Share Repurchase

Share repurchase can be viewed as an alternative to paying cash dividends. Jagannathan, Stephens, and Weisbach (2000) and Guay and Harford (2000) find that dividend changes follow cash flow shocks with a relatively large permanent component, while repurchases will be used to distribute shocks that are primarily transient. To gain a comprehensive understanding of payout policies, we examine the role of risk and uncertainty shocks on stock repurchases in this section

Table 8 reports the logistic regression results of share repurchase on risk and uncertainty shocks. In order to focus on large stock repurchases, we define the dependent variable as an indicator that equals one if the value of net repurchase is more than 1% of total assets and zero otherwise. The main independent variables are the continuous measure of risk and uncertainty shocks, the dummy variables of positive shocks, and the dummy variables of negative shocks in Columns 1-3, 4-6, and 7-9, respectively.

Insert Table 8 here

The evidence shows that the impact of risk and uncertainty shocks on share repurchases is quite similar to their impact on dividend payout policies. To start with, risk shocks are followed by a reduction in the propensity of stock repurchases, while uncertainty shocks do not significantly affect stock repurchase policies. Column 1 shows that the coefficient and t-statistic of risk shocks are -17.92 and -1.94, respectively. Analyzing marginal effects, we

find that a one standard deviation increase in the risk shock leads to a 8.94% decrease in the probability of large stock repurchase. As shown in Columns 2-3, although uncertainty shocks themselves do not significantly affect stock repurchases, the impact of risk shocks becomes stronger if both risk and uncertainty shocks are present. The coefficient and t-statistic of risk shocks become -25.33 and -2.23, respectively, after we also control for contemporary uncertainty shocks in the logit regression. The result suggests that the uncertainty component in an economic shock can reinforce the influence of the risk component in affecting share repurchase decision.

Columns 4-9 compare firms stock repurchase policies in response to positive versus negative shocks. Similar to dividend payout policies, we find that firms' repurchase policies adjust to positive risk shocks, but are insensitive to negative risk shocks. Columns 4-6 show that a positive risk shock is followed by a significant reduction in the likelihood of stock repurchases: such effect is stronger if the risk shocks is accompanies by a contemporary uncertainty shock. More specifically, the coefficient estimate of risk shock decreases from -0.08 (Column 4) to -0.13 (Column 6), after we add the control for contemporary uncertainty shocks. In contrast with the impact of positive shocks, negative risk and uncertainty shocks do not significantly affect subsequent stock repurchases. [12]

Among the control variables, we find robust evidence that large, mature, and profitable firms are more likely to engage in stock repurchases. On the other hand, growth firms with higher stock return volatility and negative earnings are less likely to engage in stock repurchases. Overall, Table 8 shows that firms are less likely to engage in stock repurchases

[12] In untabluated results, we find that the impact of negative risk shock as a standalone variable is statistically significant at the 1% level. It only becomes insignificant after negative earnings dummy is included as a control variable, suggesting that the predictive power of negative risk shock is subsumed by realized negative earnings. The result is consistent with the notion that repurchases, as a flexible payout method, change significantly with firm profitability.

after experiencing a positive risk shock. Such effect is magnified if firms experience both a positive risk and uncertainty shock. However, firms tend not to resume stock repurchases in the subsequent year after risk shocks resolves.

2. Further Analysis

This section analyzes how the impact of risk and uncertainty shocks on corporate policies interacts with several key firm characteristics, followed by examining the duration of their impact. It then discusses the robustness of our findings.

4.1. Firm Characteristics

We employ OLS and logit regression models to examine how firm size, profitability, and credit ratings affect the impact of risk and uncertainty shocks on various corporate policies. We use the following specifications for the OLS regressions.

$$\triangle POLICY_{i,t+1} = \alpha + \beta_1 RISKSHOCK_{i,t} + \beta_2 RISKSHOCK_{i,t} \text{ x FIRM DUMMY}_{i,t} + \beta_j CONTROL_{i,j,t} + \varepsilon_{i,t} \quad (2.1)$$

$$\triangle POLICY_{i,t+1} = \alpha + \beta_1 UNCERTAINTYSHOCK_{i,t} + \beta_2 UNCERTAINTYSHOCK_{i,t} \text{ x FIRM DUMMY}_{i,t} + \beta_j CONTROL_{i,j,t} + \varepsilon_{i,t} \quad (2.2)$$

Table 9 reports the results. The dependent variables, measured at time t+1, are change in book leverage ratio in Panel A, percentage change in capital expenditure in Panel B, percentage change in employment in Panel C, change in cash-to-asset ratio in Panel D, change in dividend payout dummy variables in Panel E, and repurchase dummy variable in Panels F, respectively.

Insert Table 9 here

The independent variables of key interest are the interaction terms between risk (uncertainty) shock and firm characteristics dummy variables (i.e., *Firm Dummy*) measured at time t. The firm characteristic dummy variable, *Firm Dummy*, is an indicator that equals one if the firm's assets are larger than sample median asset level (i.e., 500 million dollars) in Columns 1 to 2, if the firm's earning (EBIT) is negative in Columns 3 to 4, and if the firm's S&P long term bond rating is higher than or equal to BBB, and zero otherwise in Columns 5 to 6. We control for related firm characteristics such as size and stock return volatility in each regression. The list of control variables is the same as in our benchmark regressions in Section 3, and therefore is not reported in the table due to the limit of space.

4.1.1. Firm Size

Column 1 in Panels A-F reports how risk shocks interact with firm size (*Large Firms Dummy)* to affect capital structure, capital expenditure, employment, cash holdings, dividend payout and stock repurchases, respectively. The results show that compared to large firms, small firms reduce leverage to a greater degree after risk shocks. As indicated in Column 1 of Panel A, the coefficient of the interaction term between risk shock and *Large Firms Dummy* is 1.915, with a t-statistics of 2.44. This indicates that the coefficient estimate of risk shock is -2.165 for small firms and -0.250 for large firms. Therefore, when faced by a median-level risk shock (0.03%), small firms are associated with an absolute reduction of 0.06% in book leverage ratio, while large firms are only associated with an 0.01% reduction in book leverage. Since a median firm in our sample adjusts its leverage by 0.12% each year, the presence of a median risk shock explains 55.61% of the median absolute change in leverage for small firms, but only 6.42% for large firms.

Smaller firms are also associated with larger reductions in employment when risk increases. The coefficient of the interaction term between risk shock and *Large Firms Dummy* in Column 1 of Panel C is 2.792, with a t-statistics of 1.80. The coefficient estimate of risk shock, therefore, is -5.297 for small firms and -2.505 for large firms. This indicates that the presence of a median risk shock explains 11.76% of the median percentage change in employment for small firms, but only 5.56% of the median percentage change in employment for large firms. We do not find significant difference between large and small firms in terms of other corporate decisions including capital expenditure, cash holdings and payout policies.

Column 2 in Panels A-F reports how uncertainty shocks interact with firm size (*Large Firms Dummy)* to affect different corporate policies. We find that upon experiencing uncertainty shocks, small firms reduce leverage to a greater degree than large firms. Column 2 of Panel A shows that the coefficient of the interaction term between uncertainty shock and *Large Firms Dummy* is 19.26, with a t-statistics of 2.21. The coefficient estimate of uncertainty shock, therefore, is -23.81 for small firms and -4.55 for large firms. This indicates that the presence of a median uncertainty shock explains 40.77% of the median change in leverage for small firms, but only 7.79% of the median change in leverage for large firms. The results in Column 2 of Panels B-F show that firms of different size do not adjust their investment, employment, cash holdings and payout policies differently upon experiencing uncertainty shocks.

Collectively, we find that smaller firms are associated with a higher reduction in book leverage after experiencing risk or uncertainty shocks. In addition, they reduce their employment to a greater degree than large firms after risk shocks.

4.1.2. Profitability

Column 3 in Panels A-F reports how risk shocks interact with firm profitability (*Negative Earning Dummy)* to affect different corporate policies, while Column 4 reports how uncertainty shocks interact with firm profitability (*Negative Earning Dummy)* to affect different corporate policies.

As shown in Columns 3-4 of Panel C, profitability plays a remarkable role in affecting employment policy after both risk and uncertainty shocks. Firms with negative earnings are more responsive to risk and uncertainty shocks with employment reduction than positive earnings firms. Column 3 of Panel C shows that the coefficient of the interaction term between risk shock and *Negative Earning Dummy* is -4.417, significant at the 1% level. The coefficient estimate of risk shock, therefore, is -6.583 for negative earnings firms and -2.166 for positive earnings firms. This indicates that the presence of a median risk shock explains 14.61% (4.81%) of the median change in leverage for negative (positive) earnings firms.

Although firms do not appear to adjust their employment policies after uncertainty shocks for the full sample, the results in Column 4 of Panel C indicate that firms with negative earnings layoff more employees than positive earnings firms upon experiencing uncertainty shocks. The coefficient estimate of the interaction term between uncertainty shock and *Negative Earning Dummy* is statistically significant at the 10% level, with a large economic impact. In particular, the coefficient estimate of uncertainty shock is -43.30 for negative earnings firms and -5.31 for positive earnings firms, indicating that the presence of a median uncertainty shock explains 74.14% (9.08%) of the median percentage change in employment for negative (positive) earnings firms.

The results on payout polices (Panels E and F) show that firms with negative earnings are more responsive to risk and uncertainty shocks through reducing dividend and repurchase payouts than firms with positive earnings. First, the coefficient of the interaction term of risk shock and *Negative Earning Dummy* is positive (154.9) and significant at the 5% level in the regression with dividend omission as dependent variable, suggesting that negative earnings firms are more likely to terminate dividend payout after experiencing risk shocks. Second, the results of the regressions with dividend increase dummy as dependent variable indicate that negative earnings firms are more likely to increase dividends after risk shocks. Third, negative earnings firms also tend to reduce dividends than positive earnings firms upon experiencing both risk and uncertainty shocks. Finally, as shown in Panel F, negative earnings firms are less likely to engage in stock repurchases after uncertainty shocks.

In summary, we show that profitability plays a significant role in affecting firms' response to risk and uncertainty shocks through employment and payout policies. Firms with negative earnings are associated with a higher amount of reduction in employment and a higher probability of dividend decreases upon experiencing risk or uncertainty shocks. Compared with positive earnings firms, they are also less likely to engage in stock repurchases after uncertainty shocks. Since profitable firms have greater financing independence and flexibility in payout policy, our results suggest that financing and external capital supply could play significant roles in shaping investment and payout policies.

4.1.3. Credit Ratings

Columns 5 and 6 of Table 9 report how risk and uncertainty shocks interact with firm credit ratings (*Investment Grade Dummy)* to affect different corporate policies. We find that

compared with investment-grade firms, non-investment grade firms respond to uncertainty shocks with a higher amount of reduction in leverage. In Column 6 of Panel A, the coefficient estimate of the interaction term between uncertainty shock and *Investment Grade Dummy* is 26.310, significant at the 1% level. The coefficient estimate of uncertainty shock, therefore, is 9.33 for investment grade firms and -16.98 for non-investment grade firms, indicating that there exists a negative relation between uncertainty shock and change in leverage solely for non-investment grade.

Credit ratings also play an important role in affecting payout policies upon experiencing risk and uncertainty shocks. Our results in Panel E and F show that firms with high credit risk (i.e., non-investment grade firms) are more likely to terminate dividends and less likely to repurchase stocks after experiencing risk shocks. In addition, uncertainty shocks lead to a lower probability of dividend increases for high credit risk firms. Overall, we find that high credit risk firms are more responsive in lowering leverage and payouts than low credit risk firms after risk and uncertainty shocks.

4.2. Duration of Impact

We compare the duration of the impact of risk and uncertainty shocks on corporate policies by including lagged terms of each type of shocks measured at time t, t-1, and t-2, while keeping the control variables observed at time t. More specifically, we use the following specifications for the OLS regressions.

$$\triangle POLICY_{i,t+1} = \alpha + \beta_1 RISKSHOCK_{i,t} + \beta_2 RISKSHOCK_{i,t-1} + \beta_3 RISKSHOCK_{i,t-2} + \beta_j CONTROL_{i,j,t} + \varepsilon_{i,t} \quad (3.1)$$

$$\triangle POLICY_{i,t+1} = \alpha + \beta_1 UNCERTAINTYSHOCKi_{,t} + \beta_2 UNCERTAINTYSHOCK_{i,t-1} + \beta_3 UNCERTAINTYSHOCK_{i,t-2} + \beta_j CONTROL_{i,j,t} + \varepsilon_{i,t} \quad (3.2)$$

Table 10 examines the duration of the impact of risk shocks. Panels A to F present the results on leverage, capital expenditure, employment, cash holdings, dividend payout and stock repurchases, separately. The evidence shows that the impact of risk shocks on leverage, capital expenditure, and dividend payout persists for two years, while the impact on employment, cash holdings and repurchase policies lasts for at least three years after the introduction of risk shocks. Our results provide firm-level evidence supporting the prediction of Bloom (2009) that first moment risk shocks have long-lasting effects on investment and hiring at the aggregate level. In the capital expenditure regression (Row 6 of Panel C), the coefficient (t-statistics) of risk shock at times t, t-1, and t-2 are -3.047 (-2.14), -2.182 (-1.79), and -1.362 (-1.69), respectively. In addition, regarding employment regression (Row 9 of Panel C), the coefficients (t-statistics) of risk shock at times t, t-1, and t-2 are -3.047 (-2.14), -2.182 (-1.79), and -1.362 (-1.69), respectively, suggesting that risk shocks have longer effect on employment than capital expenditure.

We find that the risk shocks have stronger lagged effects on cash and repurchase policies than other policies. Generally, the statistical and economic significance of risk shocks decreases over time. In contrast, regarding corporate cash holdings, the coefficient estimates (t-statistics) of risk shock at times t, t-1, and t-2 are 1.017 (1.43), 1.903 (2.53), and 1.216 (1.92), respectively. Furthermore, Row 27 of Panel E shows that the coefficients (t-statistics) of risk shock at times t, t-1, and t-2 are -32.54 (-1.76), -45.74 (-1.91), and -51.28 (-2.14), respectively, in the repurchase regression. The result indicates that the impact of risk shocks

on repurchase becomes economically and statistically more significant three years after the introduction of these shocks.

Insert Table 10 here

Table 11 reports the duration of the impact of uncertainty shocks. Panel A shows that the coefficients (t-statistics) of uncertainty shock at times t, t-1, and t-2 are -13.470 (-1.75), -6.695 (-0.81), and -6.833 (-0.81), respectively, in the leverage regression. Our results suggest that although both risk and uncertainty shocks significantly affect capital structure, the negative impact of uncertainty shocks last within one year, while the impact of risk shocks persist two years after the shocks. Similarly, regarding employment decisions, Panel C shows that uncertainty shocks at time t-1 and t-2 are not significantly correlated to change in employment at time t+1, confirming that uncertainty shocks leads to significant employment policy adjustment within one year, while risk shocks lead to employment adjustment three years after the shocks. As shown in Panels B, D, E, and F, uncertainty shocks do not affect capital expenditure, cash holdings, dividend payout, and repurchases either in the short-term (one-year horizon) or in the long-term (two-year and three-year horizon).

Insert Table 11 here

Taking together Table 10 and 11, we show that the differential impact of risk and uncertainty shocks on corporate policies exists not only in terms of scale and strength, but also in terms of duration. The impact of risk shocks is persistent as they create clear expectations on long-term business prospect. In contrast, uncertainty shocks contain vague information that is due to resolve in a relatively short period. Overall, compared with risk

shocks, the impact of uncertainty shocks on corporate decisions is limited in scale and short-run in duration.

4.3. Robustness Checks

For robustness check, we consider (1) applying alternative measures of risk and uncertainty shocks; (2) using alternative corporate decision measures, such as market leverage for capital structure, and research and development expenditures for investment; and (3) using alternative specifications such as adding controls for contemporary changes in earnings and firm fixed effects. For brevity, these results are not reported in the paper but available upon request.

Our main results are robust to alternative measures of risk and uncertainly shocks based on different sections of 10-K texts. Item 7 and 7a (Managerial Discussions & Analysis) in 10-K filings contain comprehensive managerial discussions on corporate risk profile and business prospect. Using risk and uncertainty shock measures derived from Item 7 and 7a texts, we find identical results compared to those based on the entire 10-K texts. Hoberg, Prabhala, and Phillips (2014) find that product market risk information extracted from Item 1 (Business) can predict future cash holding and payout policies. We also find that risk and uncertainty shock measures based on item 1 yield similar results as our benchmark measures. Finally, since listed companies are mandated by SEC to include Item 1a to discuss "the most significant factors that make the company speculative or risky" after 2005 December, we analyze risk information embedded in Item 1a separately. Although the subsample of

firm-year observations with Item 1a is quite limited, we derive consistent and sometimes even stronger results when we use risk shock measure solely based on item 1a texts.[13]

Our results are robust to alternative dictionaries of risk and uncertainty-related keywords. When we only include various formats of uncertainty (uncertain, uncertainty, uncertainties) as uncertainty-related words, we find consistent results with the benchmark uncertainty measure. Including only different formats of risk (risk, risks, risky, riskiness, risked, risking) in the risk dictionary generates similar but sometimes weaker results. This supports the view that the word "risk" itself is subject to the "boilerplate" concern (Kravet and Muslu, 2013), and highlights the advantage of developing a broader risk-based dictionary.

We consider the possibility that our text-based uncertainty measure may, to some extent, capture risk. Therefore, we construct alternative measures for risk and uncertainty after orthogonalization. In particular, *Orthogonalized Uncertainty Shock* is defined as the time-series change in the *residuals* estimated from regressing the text-based uncertainty level on risk level. We perform similar procedure to orthogonalize the benchmark risk measure. Our main results are robust to the orthogonalized risk and uncertainty shock measures.

We conduct extensive robustness checks using different corporate decision measures and produce similar results. Specifically, our results are robust to using market leverage and adjusted book and market leverage for capital structure, and research and development expenditure for investment. We also derive similar results when we use the absolute change in capital expenditure and employment, rather than the percentage change in these measures, as dependent variables. In addition, regarding payout policies, we also investigate the impact

[13] Our results support the finding in Campbell et al. (2014) that risk disclosure in Item 1a is firm-specific, meaningful, and relevant to different types of risks (i.e., systematic and idiosyncratic risks).

of risk and uncertainty shocks on the percentage increase or decrease in dividend and repurchase payout. We find similar results when using these continuous measures, rather than the dummy variables, regarding these policies.

To alleviate the concern that our text-based risk measure captures changes in earnings, we add controls for change in earnings (i.e., EBIT/Assets) or earnings volatility in all regressions. We find that risk shocks significantly predict changes in leverage, investment, employment, cash holdings, and dividend and repurchase payout policies after controlling for change in earnings and earnings volatility. The economic and statistical significance of our risk measure does not decrease after we include the additional controls. Furthermore, we focus on the time-series change in corporate policies by adding firm fixed-effects in all regressions. Our main results retain, indicating that the impact of risk and uncertainty shocks exist both in cross-section and time-series.

5. Conclusions

Conceptually, risk shocks and uncertainty shocks are fundamentally different in nature. Risk shocks are associated with undesirable outcomes with conceivable probability assignment, while uncertainty shocks pertain to ambiguous outlook. This paper develops a novel methodology to measure firm-level risk shocks and uncertainty shocks through analyzing the textual contents of corporate 10-K reports. It further examines how corporate policy responds to shocks to the surrounding uncertainty and risk environments.

The evidence shows that risk and uncertainty shocks have remarkably different implications on corporate policy. Risk shocks are followed by persistent and economically significant reductions in leverage, investment, employment, dividend payouts, and increase

in cash holdings. Small, unprofitable, and high credit risk firms are relatively more responsive to risk shocks compared to their counterparts. Firms respond asymmetrically to rising and resolving risks, i.e., they simultaneously adjust multiple policies after positive shocks. When the risk resolves, firms do not reverse cash holding and payout policies, possibly because managers remain concerned over the potential reappearance of the risk shock. Uncertainty shocks, in contrast, are only followed by a short-term reduction in leverage, while other corporate policies remain virtually unchanged. Moreover, uncertainty shocks substantially amplify the influence of risk shocks on corporate policies when both types of shocks occur simultaneously.

The results imply that risk shocks typically reveal reliable information that substantially alters managerial perception on operating environment, leading to broad-scale policy adjustment. Uncertainty shocks contain ambiguous information that makes managers favor waiting for their resolution. Managers at most take limited actions on selected policies for temporary solution. These findings highlight the importance of distinguishing conceptually risk shock versus uncertainty shock in corporate finance research, and the notion that firms strategically respond to these shocks with corporate policies that interact in hierarchy.

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Table 1 Summary Statistics

This table reports summary statistics for key variables. Panel A contains the summary statistics for risk and uncertainty measures. Panel B, C, and D contain the summary statistics for dependent variables, corporate control variables, and macroeconomic variables in main regressions, respectively. The definitions of all variables are provided in Appendix A.

Variable	Obs.	Mean	Median	Std. Dev.	Skewness	Kurtosis
Panel A: Risk and Uncertainty Variables						
Total Count of Words in 10K files	35,596	34,351	28,693	21,509	2.14	8.82
Risk Level	35,596	0.99%	0.95%	0.36%	0.68	3.54
Uncertainty Level	35,596	0.04%	0.04%	0.03%	0.91	3.53
Panel B: Dependent Variables						
Book Leverage	35,548	55.36%	54.88%	28.37%	0.21	2.46
Change in Book Leverage (dlev)	23,060	-0.17%	0.12%	7.81%	-0.47	8.25
Capital Expenditure (millions)	33,414	110.40	8.34	344.56	5.00	29.91
Capital Expenditure/Assets	33,413	4.35%	2.59%	5.49%	2.54	10.66
Change in Capital Expenditure (dcapx: millions)	21,892	3.39	0.00	78.94	1.08	19.06
% Change in Capital Expenditure (%dcapx)	20,720	23.68%	0.27%	110.55%	3.40	18.18
Employment (thousands)	35,002	6.90	0.89	18.52	4.71	27.58
Change in Employment (demp: thousands)	23,026	0.06	0.00	1.42	0.88	18.25
% Change in Employment (%demp)	22,685	3.76%	1.35%	21.91%	1.42	9.03
Cash (millions)	35,549	298.70	42.05	956.76	5.73	38.75
Cash/Assets	35,547	19.18%	8.55%	23.24%	1.54	4.50
Change in Cash/Assets (dcash)	23,470	0.03%	0.06%	8.08%	-0.42	6.73
Dividends (millions)	35,426	36.80	0.00	132.17	5.50	35.86
Dividend Innitiation	35,596	0.01	0.00	0.12	8.33	70.36
Dividend Omission	35,596	0.01	0.00	0.10	9.51	91.44
Dividend Increase	23,492	0.27	0.00	0.44	1.06	2.13
Dividend Decrease	23,492	0.09	0.00	0.28	2.92	9.53
Net Repurchases (millions)	20,465	119.01	0.02	1,191.76	15.93	1,755.91
Repurchase More than 1% Asset Dummy	20,465	0.36	0.00	0.48	0.59	1.35

Table 1 Summary Statistics (Continued)

Variable	Obs.	Mean	Median	Std. Dev.	Skewness	Kurtosis
Panel C: Corporate Control Variables						
Stock Return Volatility	33,613	0.58	0.48	0.35	1.41	4.98
Stock Return	33,613	0.13	0.04	0.67	1.97	9.40
Sales (millions)	35,504	1,935.71	244.24	5,473.77	4.91	29.47
Assets (millions)	35,550	3,745.25	500.76	11,755.35	5.68	38.74
Tangibility	34,219	0.21	0.12	0.23	1.31	3.78
M/B Ratio	35,513	2.61	1.76	3.63	2.92	17.87
ROA	35,184	0.01	0.05	0.22	-2.79	13.26
Effective Tax Rate	35,498	0.20	0.30	0.33	-1.99	13.98
Cash/Interest Expenses	26,031	186.11	5.11	800.02	6.38	45.92
Dividend Yield	35,588	0.01	0.00	0.03	3.09	14.45
Financial Deficit/Sales	16,328	0.47	0.00	2.47	7.00	54.49
Cash Flow/PPE	33,049	-0.54	0.32	6.03	-4.54	29.50
Tobin's Q	35,431	1.84	1.30	1.50	3.01	13.67
Net Working Capital/Assets	27,488	0.05	0.03	0.18	-0.15	4.06
R&D (millions)	35,596	27.06	0.00	106.17	6.18	43.89
R&D/Sales	35,099	22.76%	0.00%	111.88%	7.10	55.50
Firm Age (years)	19,670	7.99	7.00	5.32	0.57	2.80
Sales Growth	23,224	9.95%	5.67%	36.25%	2.81	16.78
Neg. Earn. Dummy	35,500	0.32	0.00	0.47	0.79	1.62
Retained Earnings/Assets	34,949	-0.40	0.05	1.73	-4.17	22.67
Panel D: Macroeconomic Variables						
S&P 500 Return (%)	35,596	-1.49	3.00	19.76	-0.22	2.21
Default Spread between Baa and Aaa Bonds (%)	35,596	1.24	1.03	0.68	2.49	8.04
One-Year Swap (%)	35,596	3.14	2.45	1.82	0.26	1.67
VIX (%)	35,596	22.34	22.50	8.44	0.75	3.49
Industrial Production Growth (%)	35,596	-0.61	1.70	4.58	-1.43	4.05

Table 2 Risk and uncertainty Shocks and Book Leverage Ratio Adjustment

This table reports the estimation results on the impact of risk and uncertainty shocks on book leverage ratio adjustment. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The dependent variable, $dlev_{t+1}$, denotes change in book leverage ratio from year t to t+1. The main independent variables in Columns (1) to (3), (4) to (5), and (7) to (9) are risk and uncertainty shocks, positive risk and uncertainty shocks , and negative risk and uncertainty shocks from year t-1 to t, respectively. Risk (uncertainty) shock refers to the change in percentage of total words that are risk (uncertainty) related from last year. Positive (negative) risk (uncertainty) shock is an indicator that equals one if the firm experiences a positive (negative) risk (uncertainty) shock larger than the median positive (negative) risk (uncertainty) shock in our full sample, and zero otherwise. Other controls include M/B ratio, effective tax rate, cash/interest expenses, dividend yield, financial deficit/sales, S&P 500 return, industrial production growth, industry fixed effects (industry dummies by the first two-digit SIC code), and year fixed effects (year dummies representing a year between 2001 and 2010),. The definitions of all variables are provided in Appendix A. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

	$dlev_{t+1}$								
	Shocks			Positive Shocks			Negative Shocks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Risk Shock	-1.213		-0.765	-0.004		-0.003	0.004		0.004
	(-2.87)		(-1.77)	(-2.14)		(-1.79)	(2.07)		(2.74)
Uncertainty Shock		-14.190	-9.871		-0.004	-0.003		0.003	0.002
		(-3.00)	(-1.92)		(-1.98)	(-1.43)		(1.67)	(1.01)
Log Sales	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	(7.43)	(7.38)	(7.44)	(7.39)	(7.34)	(7.40)	(7.37)	(7.35)	(7.38)
Book Leverage	-0.086	-0.087	-0.086	-0.086	-0.086	-0.086	-0.086	-0.086	-0.086
	(-11.67)	(-11.68)	(-11.68)	(-11.66)	(-11.65)	(-11.65)	(-11.68)	(-11.64)	(-11.67)
Stock Return	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	(-2.83)	(-2.79)	(-2.83)	(-2.80)	(-2.76)	(-2.80)	(-2.79)	(-2.77)	(-2.80)
ROA	0.116	0.117	0.117	0.116	0.117	0.116	0.117	0.117	0.117
	(10.27)	(10.32)	(10.30)	(10.25)	(10.29)	(10.27)	(10.31)	(10.29)	(10.30)
Tangibility	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
	(1.53)	(1.49)	(1.51)	(1.50)	(1.49)	(1.49)	(1.53)	(1.49)	(1.52)
Stock Return Volatility	-0.012	-0.012	-0.012	-0.012	-0.012	-0.012	-0.013	-0.013	-0.013
	(-2.43)	(-2.51)	(-2.43)	(-2.47)	(-2.54)	(-2.46)	(-2.56)	(-2.58)	(-2.56)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,507	8,507	8,508	8,507	8,507	8,507	8,507	8,507	8,507
Adj. R-sq	0.182	0.182	0.182	0.181	0.181	0.181	0.181	0.181	0.181

Table 3 Debt versus Equity Adjustment

This table studies the impact of risk and uncertainty shocks on debt versus equity adjustment. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The dependent variables, $\%dDebt_{t+1}$ and $\%dEquity_{t+1}$, denote the percentage change in total liabilities and common equity from year t to t+1. The main independent variables in Panel A (Panel B) are risk and uncertainty shock (positive versus negative risk and uncertainty shock) from year t-1 to t. Positive (negative) risk (uncertainty) shock is an indicator that equals one if the firm experiences a positive (negative) risk (uncertainty) shock larger than the median positive (negative) risk (uncertainty) shock in our full sample, and zero otherwise. Other controls in Panel A include M/B ratio, effective tax rate, cash/interest expenses, dividend yield, financial deficit/sales, S&P 500 return, industrial production growth, industry fixed effects (industry dummies by the first two-digit SIC code), and year fixed effects (year dummies representing a year between 2001 and 2010). Other controls in Panel B include all control variables in panel A. The definitions of all variables are provided in Appendix A. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

Panel A: The Impact of Risk and uncertainty Shocks

	%dDebt $_{t+1}$			%dEquity$_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Risk Shock	-9.631		-8.764	0.451		-1.192
	(-3.69)		(-2.98)	(0.25)		(-0.60)
Uncertainty Shock		-68.490	-19.150		29.480	36.220
		(-2.46)	(-0.61)		(1.45)	(1.64)
Log Sales	-0.001	-0.002	-0.001	-0.014	-0.014	-0.014
	(-0.35)	(-0.47)	(-0.35)	(-4.75)	(-4.77)	(-4.75)
Book Leverage	-0.395	-0.396	-0.395	0.033	0.034	0.034
	(-12.79)	(-12.76)	(-12.77)	(0.99)	(1.01)	(1.01)
Stock Return	0.031	0.032	0.031	0.025	0.025	0.025
	(2.99)	(3.1)	(3.00)	(2.44)	(2.45)	(2.44)
ROA	0.048	0.052	0.049	-0.411	-0.412	-0.413
	(0.82)	(0.89)	(0.83)	(-6.95)	(-6.97)	(-6.97)
Tangibility	0.022	0.020	0.022	0.036	0.036	0.037
	(0.67)	(0.61)	(0.66)	(1.26)	(1.26)	(1.27)
Stock Return Volatility	-0.009	-0.012	-0.009	0.095	0.094	0.095
	(-0.30)	(-0.44)	(-0.30)	(3.73)	(3.71)	(3.73)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,631	8,631	8,631	8,507	8,507	8,507
Adj. R-sq	0.082	0.081	0.081	0.144	0.144	0.144

Panel B: The Impact of Positive versus Negative Shocks

	%dDebt $_{t+1}$						%dEquity$_{t+1}$					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Positive Risk Shock	-0.023				-0.018		0.008				0.005	
	(-2.14)				(-1.68)		(0.94)				(0.55)	
Negative Risk Shock		0.040				0.036		0.008				0.012
		(3.12)				(2.76)		(0.91)				(1.28)
Positive Uncertainty Shock			-0.021		-0.016				0.011		0.009	
			(-2.04)		(-1.43)				(1.32)		(1.12)	
Negative Uncertainty Shock				0.031		-0.014				0.000		0.013
				(2.48)		(-1.29)				(-0.01)		(1.59)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,631	8,631	8,631	8,631	8,631	8,631	8,507	8,507	8,507	8,507	8,507	8,507
Adj. R-sq	0.181	0.181	0.181	0.181	0.181	0.181	0.144	0.144	0.144	0.144	0.144	0.144

Table 4 Risk and uncertainty Shocks and Capital Expenditure

This table reports the estimation results on the impact of risk and uncertainty shocks on capital expenditure. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The dependent variables, $\%dcapx_{t+1}$, denote percentage change in capital expenditure from year t to t+1. The main independent variables in Columns (1) to (3), (4) to (5), and (7) to (9) are risk and uncertainty shocks, positive risk and uncertainty shocks, and negative risk and uncertainty shocks from year t-1 to t, respectively. Risk (uncertainty) shock refers to the change in percentage of total words that are risk (uncertainty) related from last year. Positive (negative) risk shock is an indicator that equals one if the firm experiences a positive (negative) risk shock larger than the median positive (negative) risk shock in our full sample, and zero otherwise. Positive (negative) uncertainty shock is an indicator that equals one if the firm experiences a positive (negative) uncertainty shock larger than the median positive (negative) uncertainty shock in our full sample, and zero otherwise. Other controls include market leverage, cash flow/PPE, ROA, M/B ratio, industry fixed effects (industry dummies by the first two-digit SIC code), and year fixed effects (year dummies representing a year between 2001 and 2010). The definitions of all variables are provided in Appendix A. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

	$\%dcapx_{t+1}$								
	Shocks			Positive Shocks			Negative Shocks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Risk Shock	-3.255		-3.289	-0.060		-0.063	0.069		0.0656
	(-1.73)		(-1.79)	(-3.18)		(-3.13)	(2.79)		(2.56)
Uncertainty Shock		-22.600	-3.904		-0.002	0.017		0.032	0.010
		(-0.42)	(-0.06)		(-0.13)	(0.83)		(1.27)	(0.37)
Log Sales	-0.075	-0.075	-0.075	-0.061	-0.062	-0.061	-0.060	-0.062	-0.060
	(-11.88)	(-11.92)	(-11.87)	(-8.41)	(-8.48)	(-8.41)	(-8.41)	(-8.46)	(-8.07)
Tangibility	-0.512	-0.513	-0.512	-0.439	-0.439	-0.439	-0.436	-0.439	-0.424
	(-7.74)	(-7.76)	(-7.74)	(-6.17)	(-6.15)	(-6.16)	(-6.10)	(-6.16)	(-5.86)
Stock Return	0.274	0.274	0.274	0.261	0.263	0.261	0.261	0.262	0.25
	(12.87)	(12.89)	(11.87)	(11.81)	(11.75)	(11.72)	(11.72)	(11.73)	(11.05)
Tobin's Q	0.027	0.027	0.027	0.027	0.027	0.026	0.027	0.027	0.027
	(2.40)	(2.41)	(2.41)	(2.40)	(2.41)	(2.30)	(2.41)	(2.41)	(2.41)
Stock Return Volatility	-0.0743	-0.075	-0.074	-0.021	-0.0301	-0.022	-0.0281	-0.0297	-0.0205
	(-1.39)	(-1.41)	(-1.39)	(-0.33)	(-0.47)	(-0.34)	(-0.44)	(-0.46)	(-0.32)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,096	13,096	13,097	13,096	13,096	13,096	13,096	13,096	13,096
Adj. R-sq	0.076	0.076	0.077	0.076	0.076	0.076	0.076	0.076	0.076

Table 5 Risk and uncertainty Shocks and Employment

This table reports the estimation results on the impact of risk and uncertainty shocks on employment. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The dependent variables, $\%demp_{t+1}$, denote percentage change in employment from year t to t+1. The main independent variables in Columns (1) to (3), (4) to (5), and (7) to (9) are risk and uncertainty shocks, positive risk and uncertainty shocks, and negative risk and uncertainty shocks from year t-1 to t, respectively. Risk (uncertainty) shock refers to the change in percentage of total words that are risk (uncertainty) related from last year. Positive (negative) risk shock is an indicator that equals one if the firm experiences a positive (negative) risk shock larger than the median positive (negative) risk shock in our full sample, and zero otherwise. Positive (negative) uncertainty shock is an indicator that equals one if the firm experiences a positive (negative) uncertainty shock larger than the median positive (negative) uncertainty shock in our full sample, and zero otherwise. Other controls include industry fixed effects (industry dummies by the first two-digit SIC code), year fixed effects (year dummies representing a year between 2001 and 2010), market leverage, cash flow/PPE, ROA, and M/B ratio. The definitions of all variables are provided in Appendix A. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

	%demp $_{t+1}$								
	Shocks			Positive Shocks			Negative Shocks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Risk Shock	-3.812		-4.136	-0.014		-0.014	0.014		0.014
	(-4.86)		(-4.70)	(-3.68)		(-3.77)	(3.31)		(3.02)
Uncertainty Shock		-17.450	7.851		-0.002	0.003		0.006	0.001
		(-1.85)	(0.74)		(-0.52)	(0.67)		(1.37)	(0.24)
Log Sales	-0.007	-0.008	-0.007	-0.007	-0.008	-0.007	-0.008	-0.008	-0.008
	(-6.05)	(-6.15)	(-6.04)	(-6.05)	(-6.15)	(-6.05)	(-6.14)	(-6.15)	(-6.14)
Tangibility	-0.040	-0.041	-0.040	-0.041	-0.040	-0.041	-0.039	-0.041	-0.039
	(-2.82)	(-2.88)	(-2.81)	(-2.89)	(-2.88)	(-2.89)	(-2.80)	(-2.88)	(-2.80)
Stock Return	0.038	0.039	0.038	0.038	0.039	0.038	0.039	0.039	0.039
	(9.23)	(9.38)	(9.23)	(9.29)	(9.39)	(9.29)	(9.36)	(9.40)	(9.36)
Tobin's Q	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
	(6.84)	(6.85)	(6.84)	(6.82)	(6.86)	(6.82)	(6.89)	(6.86)	(6.89)
Stock Return Volatility	-0.015	-0.016	-0.015	-0.015	-0.016	-0.015	-0.017	-0.017	-0.017
	(-1.56)	(-1.73)	(-1.55)	(-1.55)	(-1.74)	(-1.55)	(-1.76)	(-1.76)	(-1.76)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,649	13,649	13,649	13,649	13,649	13,649	13,649	13,649	13,649
Adj. R-sq	0.112	0.110	0.112	0.111	0.111	0.111	0.111	0.110	0.111

Table 6 Risk and uncertainty Shocks and Cash Holdings

This table reports the estimation results on the impact of risk and uncertainty shocks on cash holdings. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The dependent variable, $dCash_{t+1}$, denote change in cash/assets from year t to t+1. The main independent variables in Columns (1) to (3), (4) to (5), and (7) to (9) are risk and uncertainty shocks, positive risk and uncertainty shocks, and negative risk and uncertainty shocks from year t-1 to t, respectively. Risk (uncertainty) shock refers to the change in percentage of total words that are risk (uncertainty) related from last year. Positive (negative) risk shock is an indicator that equals one if the firm experiences a positive (negative) risk shock larger than the median positive (negative) risk shock in our full sample, and zero otherwise. Positive (negative) uncertainty shock is an indicator that equals one if the firm experiences a positive (negative) uncertainty shock larger than the median positive (negative) uncertainty shock in our full sample, and zero otherwise. Other controls include M/B ratio, cash flow/PPE, capital expenditure/assets, book leverage, industry fixed effects (industry dummies by the first two-digit SIC code), and year fixed effects (year dummies representing a year between 2001 and 2010). The definitions of all variables are provided in Appendix A. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

	%dCash $_{t+1}$								
	Shocks			Positive Shocks			Negative Shocks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Risk Shock	1.012		0.987	0.004		0.004	-0.002		-0.001
	(2.49)		(2.14)	(2.09)		(1.97)	(-1.06)		(-0.63)
Uncertainty Shock		6.177	0.538		0.001	0.000		-0.003	-0.003
		(1.39)	(0.11)		(0.81)	(0.21)		(-1.49)	(-1.21)
Log Sales	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
	(6.49)	(6.56)	(6.49)	(6.50)	(6.57)	(6.50)	(6.56)	(6.55)	-6.540
Net Working Capital/Assets	0.058	0.059	0.058	0.059	0.059	0.059	0.059	0.059	0.059
	(9.17)	(9.24)	(9.17)	(9.22)	(9.26)	(9.22)	(9.23)	(9.21)	(9.20)
R&D/Sales	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
	(-1.45)	(-1.47)	(-1.45)	(-1.47)	(-1.47)	(-1.47)	(-1.46)	(-1.47)	(-1.47)
Dividend Dummy	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(-0.67)	(-0.61)	(-0.67)	(-0.57)	(-0.59)	(-0.57)	(-0.65)	(-0.60)	(-0.64)
dCash $_t$	-0.129	-0.128	-0.129	-0.128	-0.128	-0.128	-0.128	-0.128	-0.128
	(-9.58)	(-9.52)	(-9.58)	(-9.54)	(-9.51)	(-9.54)	(-9.52)	(-9.52)	(-9.53)
Cash	-2.060	-2.060	-2.060	-2.050	-2.060	-2.050	-2.078	-2.070	-2.070
	(-2.49)	(-2.48)	(-2.49)	(-2.46)	(-2.48)	(-2.46)	(-2.49)	(-2.48)	(-2.49)
Stock Return Volatility	0.015	0.016	0.015	0.015	0.016	0.015	0.016	0.016	0.016
	(3.50)	(3.63)	(3.50)	(3.49)	(3.63)	(3.49)	(3.64)	(3.66)	(3.66)
Other Contrrols	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,333	11,333	11,333	11,333	11,333	11,333	11,333	11,333	11,333
Adj. R-sq	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057

Table 7 Risk and uncertainty Shocks and Dividend Policy

This table reports the logistic estimation results on the impact of risk and uncertainty shocks on dividend policy. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The main dependent variables in Columns (1) to (3), (4) to (6), (7) to (9), and (10) to (12) are dividend initiation, dividend omission, dividend increase, and dividend decrease at year t+1. Dividend initiation (dividend omission) is an indicator that equals one if the company initiates (omits) dividends in a certain year. Dividend increase (dividend decrease) is an indicator that equals one if the company increases (decreases) dividends in a certain year. The main independent variables in Panel A , B and C are risk and uncertainty shock, and positive and negative risk and uncertainty shock from year t-1 to t, respectively. Other controls in Panel A include industry fixed effects (industry dummies by first two-digit SIC code), and year fixed effects (year dummies representing a year between 2001 and 2010). Other controls in Panel B and C include log sales, ROA, M/B ratio, industry fixed effects, and year fixed effects. The definitions of all variables are provided in Appendix A. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

Panel A: The Impact of Risk and uncertainty Shocks

	Dividend Initiation$_{t+1}$			Dividend Omission$_{t+1}$			Dividend Increase$_{t+1}$			Dividend Decrease$_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Risk Shock	-16.60		-7.53	77.69		68.76	23.51		15.96	28.01		29.49
	(-0.39)		(-0.16)	(2.00)		(1.84)	(1.41)		(0.84)	(1.15)		(1.03)
Uncertainty Shock		-274.2	-226		1145.1	914.8		300.20	201.0		148.90	-37.84
		(-0.50)	(-0.37)		(1.28)	(1.52)		(1.30)	(0.76)		(0.48)	(-0.10)
Log Firm Age	-0.06	-0.06	-0.06	0.15	0.15	0.15	0.10	0.10	0.10	0.13	0.13	0.13
	(-0.49)	(-0.48)	(-0.48)	(1.19)	(1.22)	(1.20)	(1.29)	(1.29)	(1.29)	(1.73)	(1.75)	(1.73)
Sales Growth	0.10	0.10	0.10	-0.96	-0.96	-0.96	-0.12	-0.12	-0.12	-0.58	-0.57	-0.58
	(0.28)	(0.27)	(0.27)	(-1.52)	(-1.52)	(-1.53)	(-0.72)	(-0.73)	(-0.72)	(-2.30)	(-2.27)	(-2.30)
Stock Return Volatility	-0.57	-0.57	-0.57	1.13	1.14	1.14	-3.17	-3.16	-3.17	0.29	0.28	0.29
	(-1.07)	(-1.06)	(-1.06)	(2.85)	(2.89)	(2.89)	(-7.52)	(-7.52)	(-7.52)	(1.13)	(1.12)	(1.13)
Neg. Earn. Dummy	-0.86	-0.88	-0.87	1.22	1.29	1.25	-1.04	-1.02	-1.04	0.73	0.77	0.73
	(-2.63)	(-2.69)	(-2.66)	(4.41)	(4.62)	(4.45)	(-6.30)	(-6.26)	(-6.26)	(-4.69)	(-4.98)	(-4.64)
R&D/Sales	-2.03	-2.02	-2.02	-0.77	-0.78	-0.77	-5.99	-6.02	-6.01	-2.57	-2.59	-2.56
	(-1.48)	(-1.47)	(-1.48)	(-0.72)	(-0.71)	(-0.71)	(-3.08)	(-3.09)	(-3.09)	(-0.76)	(-0.77)	(-0.76)
Retained	0.09	0.09	0.09	0.37	0.38	0.37	0.61	0.61	0.60	0.44	0.45	0.44
Earnings/Assets	(0.65)	(0.66)	(0.67)	(1.78)	(1.82)	(1.79)	(2.64)	(2.65)	(2.64)	(2.58)	(2.61)	(2.59)
M/B Ratio	-0.02	-0.02	-0.02	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	-0.02	-0.02
	(-0.60)	(-0.61)	(-0.61)	(-0.11)	(-0.10)	(-0.10)	(-0.05)	(-0.04)	(-0.04)	(-1.02)	(-1.02)	(-1.02)
ROA	2.08	2.09	2.09	0.65	0.71	0.70	1.93	1.91	1.92	1.47	1.47	1.47
	(1.76)	(1.77)	(1.78)	(0.55)	(0.59)	(0.59)	(2.43)	(2.42)	(2.41)	(1.92)	(1.92)	(1.91)
Log Sales	0.00	0.00	0.00	-0.03	-0.02	-0.02	0.21	0.21	0.21	0.06	0.06	0.06
	(0.02)	(0.01)	(0.02)	(-0.38)	(-0.28)	(-0.32)	(5.02)	(5.03)	(5.02)	(1.38)	(1.42)	(1.38)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,131	7,131	7,131	6,742	6,742	6,742	7,332	7,332	7,332	7,236	7,236	7,236
Pseudo R-sq	0.121	0.121	0.121	0.212	0.213	0.214	0.320	0.320	0.320	0.222	0.221	0.222

Table 7 Risk and uncertainty Shocks and Dividend Policy (Continued)

Panel B: The Impact of Positive Risk and Uncertainty Shocks

	Dividend Initiation$_{t+1}$			Dividend Omission$_{t+1}$			Dividend Increase$_{t+1}$			Dividend Decrease$_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Positive Risk Shock	-0.373		-0.423	0.227		0.125	-0.002		0.009	0.253		0.245
	(-1.77)		(-1.72)	(1.79)		(1.62)	(-0.02)		(0.09)	(2.18)		(2.01)
Positive Uncertainty Shock		0.0485	0.148		0.344	0.303		-0.04	-0.0426		0.113	0.0323
		(0.28)	(0.81)		(1.16)	(1.05)		(-0.40)	(-0.41)		(0.85)	(0.23)
Log Firm Age	-0.0554	-0.0584	-0.0578	0.147	0.146	0.143	0.0955	0.0954	0.0954	0.125	0.129	0.125
	(-0.47)	(-0.49)	(-0.49)	(1.19)	(1.18)	(1.16)	(1.29)	(1.29)	(1.29)	(1.69)	(1.74)	(1.68)
Sales Growth	0.105	0.104	0.11	-0.963	-0.98	-0.98	-0.124	-0.126	-0.126	-0.581	-0.575	-0.58
	(0.29)	(0.29)	(0.30)	(-1.50)	(-1.52)	(-1.53)	(-0.76)	(-0.77)	(-0.77)	(-2.32)	(-2.29)	(-2.32)
Stock Return Volatility	-0.56	-0.566	-0.565	1.131	1.117	1.125	-3.165	-3.164	-3.165	0.296	0.281	0.295
	(-1.06)	(-1.06)	(-1.07)	(2.87)	(2.83)	(2.85)	(-7.52)	(-7.51)	(-7.52)	(1.16)	(1.11)	(1.16)
Neg. Earn. Dummy	-0.802	-0.882	-0.794	1.252	1.3	1.268	-1.010	-1.009	-1.011	0.702	0.766	0.702
	(-2.39)	(-2.71)	(-2.37)	(4.59)	(4.67)	(4.64)	(-6.10)	(-6.23)	(-6.10)	(4.50)	(4.97)	(4.50)
R&D/Sales	-2.051	-2.027	-2.064	-0.772	-0.793	-0.786	-6.013	-5.997	-5.996	-2.585	-2.609	-2.592
	(-1.49)	(-1.48)	(-1.50)	(-0.72)	(-0.71)	(-0.71)	(-3.09)	(-3.08)	(-3.08)	(-0.77)	(-0.77)	(-0.77)
Retained Earnings/Assets	0.0874	0.0853	0.0866	0.384	0.389	0.384	0.612	0.614	0.614	0.44	0.448	0.439
	(0.67)	(0.66)	(0.66)	(1.82)	(1.82)	(1.81)	(2.66)	(2.66)	(2.66)	(2.57)	(2.60)	(2.57)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,131	7,131	7,131	6,742	6,742	6,742	7,332	7,332	7,332	7,236	7,236	7,236
Pseudo R-sq	0.122	0.121	0.123	0.210	0.212	0.212	0.320	0.320	0.320	0.222	0.221	0.222

Panel C: The Impact of Negative Risk and Uncertainty Shocks

	Dividend Initiation$_{t+1}$			Dividend Omission$_{t+1}$			Dividend Increase$_{t+1}$			Dividend Decrease$_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Negative Risk Shock	0.180		0.150	-0.416		-0.372	-0.187		-0.193	-0.020		-0.0877
	(0.98)		(0.76)	(-1.46)		(-1.26)	(-1.14)		(-1.04)	(-0.15)		(-0.62)
Negative Uncertainty Shock		0.157	0.102		-0.233	-0.108		-0.051	0.0186		0.155	0.187
		(0.78)	(0.46)		(-0.91)	(-0.41)		(-0.51)	(0.17)		(1.18)	(1.32)
Log Firm Age	-0.0605	-0.0605	-0.0619	0.159	0.156	0.16	0.100	0.096	0.100	0.131	0.128	0.129
	(-0.51)	(-0.51)	(-0.52)	(1.3)	(1.27)	(1.3)	(1.34)	(1.31)	(1.34)	(1.76)	(1.72)	(1.74)
Sales Growth	0.0955	0.0959	0.0925	-0.956	-0.952	-0.952	-0.113	-0.123	-0.113	-0.575	-0.584	-0.583
	(0.26)	(0.26)	(0.25)	(-1.49)	(-1.48)	(-1.48)	(-0.69)	(-0.75)	(-0.69)	(-2.27)	(-2.29)	(-2.29)
Stock Return Volatility	-0.578	-0.576	-0.584	1.119	1.129	1.124	-3.153	-3.164	-3.153	0.282	0.271	0.272
	(-1.08)	(-1.08)	(-1.09)	(2.86)	(2.85)	(2.85)	(-7.49)	(-7.52)	(-7.49)	(1.11)	(1.11)	(1.11)
Neg. Earn. Dummy	-0.86	-0.877	-0.861	1.284	1.306	1.284	-1.03	-1.013	-1.03	0.77	0.777	0.769
	(-2.64)	(-2.69)	(-2.65)	(4.61)	(4.68)	(4.60)	(-6.31)	(-6.23)	(-6.31)	(4.95)	(5.02)	(4.95)
R&D/Sales	-2.029	-2.04	-2.04	-0.778	-0.769	-0.772	-5.958	-6.000	-5.961	-2.582	-2.623	-2.616
	(-1.48)	(-1.48)	(-1.48)	(-0.72)	(-0.71)	(-0.71)	(-3.07)	(-3.08)	(-3.07)	(-0.77)	(-0.78)	(-0.78)
Retained Earnings/Assets	0.0908	0.0856	0.0898	0.385	0.394	0.386	0.602	0.611	0.602	0.452	0.454	0.452
	(0.70)	(0.66)	(0.69)	(1.83)	(1.84)	(1.83)	(2.63)	(2.66)	(2.63)	(2.62)	(2.64)	(2.63)
Observations	7,131	7,131	7,131	6,742	6,742	6,742	7,332	7,332	7,332	7,236	7,236	7,236
Pseudo R-sq	0.122	0.121	0.123	0.210	0.212	0.212	0.321	0.32	0.321	0.221	0.222	0.222

Table 8 Risk and uncertainty Shocks and Repurchase Policy

This table reports the logistic estimation results on the impact of risk and uncertainty shocks on repurchase policy. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The main dependent variable is Repurchase More than 1% Asset Dummy at year t+1, which equals one if the value of net repurchase is more than 1% of total assets and zero otherwise. Following Hoberg, Nagpurnanand, and Phillips (2014), the value of net repurchases is defined as purchases of common and preferred stock less the reduction in the value of preferred stocks outstanding. The main independent variables in Columns (1) to (3), (4) to (5), and (7) to (9) are risk and uncertainty shocks, positive risk and uncertainty shocks , and negative risk and uncertainty shocks from year t-1 to t, respectively. Risk (uncertainty) shock refers to the change in percentage of total words that are risk (uncertainty) related from last year. Positive (negative) risk shock is an indicator that equals one if the firm experiences a positive (negative) risk shock larger than the median positive (negative) risk shock in our full sample, and zero otherwise. Positive (negative) uncertainty shock is an indicator that equals one if the firm experiences a positive (negative) uncertainty shock larger than the median positive (negative) uncertainty shock in our full sample, and zero otherwise. Other controls include industry fixed effects (industry dummies by the first two-digit SIC code), and year fixed effects (year dummies representing a year between 2001 and 2010). The definitions of all variables are provided in Appendix A. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

	Repurchase More than 1% Asset Dummy								
	Shocks			Positive Shocks			Negative Shocks		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Risk Shock	-17.92		-25.33	-0.08		-0.13	0.05		0.03
	(-1.94)		(-2.23)	(-1.76)		(-1.86)	(0.74)		(0.37)
Uncertainty Shock		17.09	173.30		0.10	0.14		0.08	0.07
		(0.12)	(1.02)		(0.74)	(0.21)		(1.15)	(0.94)
Log Sales	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
	(5.57)	(5.54)	(5.59)	(5.58)	(5.54)	(5.60)	(5.55)	(5.54)	(5.55)
Sale Growth	-0.34	-0.34	-0.34	-0.34	-0.33	-0.34	-0.34	-0.34	-0.34
	(-2.83)	(-2.79)	(-2.83)	(-2.81)	(-2.78)	(-2.81)	(-2.82)	(-2.82)	(-2.83)
R&D/Sales	0.10	0.11	0.10	0.10	0.11	0.10	0.11	0.10	0.10
	(1.57)	(1.59)	(1.56)	(1.58)	(1.59)	(1.57)	(1.58)	(1.57)	(1.57)
Retained	0.06	0.05	0.06	0.06	0.05	0.05	0.06	0.05	0.05
Earnings/Asets	(1.32)	(1.28)	(1.31)	(1.29)	(1.24)	(1.25)	(1.3)	(1.28)	(1.29)
Log Firm Age	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
	(3.42)	(3.41)	(3.42)	(3.43)	(3.39)	(3.42)	(3.40)	(3.40)	(3.40)
M/B Ratio	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	(4.58)	(4.59)	(4.59)	(4.58)	(4.59)	(4.58)	(4.60)	(4.57)	(4.58)
ROA	1.55	1.54	1.54	1.54	1.55	1.55	1.54	1.55	1.55
	(3.56)	(3.56)	(3.56)	(3.56)	(3.56)	(3.56)	(3.56)	(3.57)	(3.57)
Stock Return Volatility	-1.36	-1.36	-1.36	-1.36	-1.37	-1.37	-1.37	-1.37	-1.37
	(-6.65)	(-6.65)	(-6.65)	(-6.64)	(-6.67)	(-6.66)	(-6.66)	(-6.66)	(-6.66)
Neg. Earn. Dummy	-0.30	-0.32	-0.30	-0.31	-0.32	-0.30	-0.32	-0.32	-0.32
	(-3.14)	(-3.37)	(-3.07)	(-3.17)	(-3.37)	(-3.07)	(-3.31)	(-3.35)	(-3.32)
Observations	6,546	6,546	6,546	6,546	6,546	6,546	6,546	6,546	6,546
pseudo R-sq	0.129	0.129	0.130	0.129	0.130	0.130	0.129	0.129	0.129

Table 9 Interaction Effects of Risk and uncertainty Shocks and Firm Characteristics

This table examines the interaction effects of risk and uncertainty shocks and firm characteristics on a variety of corporate decisions. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The dependent variables are change in book leverage ratio in Panel A, percentage change in capital expenditure and employment in Panel B and C, change in cash/total assets ratio in Panel D, and change in dividend and repurchase policy in Panel E and F, all measured from year t to t+1. The key independent variable is the interaction term between risk (uncertainty) shock and firm dummy from year t-1 to t. Firm dummy is an indicator that equals one if the firm's asset is larger than sample median asset level in Columns (1) to (2), if the firm's earning (EBIT) is negative in Columns (3) to (4), and if the firm's S&P long term bond rating is higher than or equal to BBB, and zero otherwise in Columns (5) to (6). The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

	Large Firms		Negative Earning		Investment Grade	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Leverage Adjustment ($dlev_{t+1}$)					
Risk Shock	-2.165		-1.628		0.346	
	(-3.12)		(-3.10)		(0.52)	
Risk Shock *Firm Dummy	1.915		0.966		-0.178	
	(2.44)		(1.18)		(-0.18)	
Uncertainty Shock		-23.810		-9.649		-16.980
		(-3.19)		(-1.84)		(-1.96)
Uncertainty Shock *Firm Dummy		19.26		-14.230		26.310
		(2.21)		(-1.35)		(2.11)
	Panel B: Capital Expenditure ($\%dcapx_{t+1}$)					
Risk Shock	-10.120		-0.264		-9.556	
	(-1.39)		(-0.05)		(-1.15)	
Risk Shock *Firm Dummy	13.430		-7.428		1.183	
	(1.52)		(-0.83)		(0.11)	
Uncertainty Shock		-66.090		26.340		5.939
		(-0.76)		(0.45)		(0.07)
Uncertainty Shock *Firm Dummy		93.36		-150.80		-107.30
		(0.96)		(-1.32)		(-1.00)
	Panel C: Employment ($\%demp_{t+1}$)					
Risk Shock	-5.297		-2.166		-0.713	
	(-3.98)		(-2.32)		(-0.44)	
Risk Shock *Firm Dummy	2.792		-4.417		-0.599	
	(1.80)		(-2.68)		(-0.29)	
Uncertainty Shock		-26.390		-5.305		12.270
		(-1.87)		(-0.50)		(0.57)
Uncertainty Shock *Firm Dummy		19.010		-37.990		3.799
		(1.07)		(-1.77)		(0.15)
	Panel D: Cash Holdings ($dCash_{t+1}$)					
Risk Shock	1.182		0.631		0.211	
	(1.93)		(1.3)		(0.31)	
Risk Shock *Firm Dummy	-0.40		0.85		0.49	
	(-0.53)		(1.06)		(0.49)	
Uncertainty Shock		9.126		3.182		-5.278
		(1.37)		(0.66)		(0.61)
Uncertainty Shock *Firm Dummy		-6.74		8.78		-1.43
		(-0.83)		(0.89)		(-0.13)

Table 9 Interaction Effects of Risk and uncertainty Shocks and Firm Characteristics (Continued)

	Large Firms		Negative Earning		Investment Grade	
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel E: Dividend Policy					
	Dependent Variable: Dividend Initiation $_{t+1}$ (Logistic Model)					
Risk Shock	25.290		-11.840		-182.500	
	(0.47)		(-0.25)		(-1.95)	
Risk Shock *Firm Dummy	-78.37		-32.370		67.320	
	(-1.00)		(-0.29)		(0.40)	
Uncertainty Shock		128.400		-141.5		121.200
		(0.17)		(-0.24)		(0.07)
Uncertainty Shock *Firm Dummy		-867.700		-1088.900		-5104.600
		(-0.82)		(-0.73)		(-1.08)
	Dependent Variable: Dividend Omission $_{t+1}$ (Logistic Model)					
Risk Shock	-31.390		-20.440		164.400	
	(-0.50)		(-0.38)		(1.77)	
Risk Shock *Firm Dummy	191.700		154.900		-254.100	
	(1.53)		(2.06)		(-1.97)	
Uncertainty Shock		389.200		793.900		2324.200
		(0.51)		(1.07)		(1.83)
Uncertainty Shock *Firm Dummy		1604.900		647.400		29.210
		(1.38)		(0.66)		(0.02)
	Dependent Variable: Dividend Increase $_{t+1}$ (Logistic Model)					
Risk Shock	11.250		-32.530		-63.280	
	(0.34)		(1.87)		(-1.48)	
Risk Shock *Firm Dummy	16.58		-95.59		62.91	
	(0.45)		(-1.74)		(0.96)	
Uncertainty Shock		-443.3		-407.5		-1255.5
		(-1.10)		(1.70)		(-2.21)
Uncertainty Shock *Firm Dummy		1148		-1565.7		2706.1
		(2.36)		(-1.59)		(3.05)
	Dependent Variable: Dividend Decrease $_{t+1}$ (Logistic Model)					
Risk Shock	-15.91		-3.717		77.48	
	(-0.35)		(-0.12)		(-1.48)	
Risk Shock *Firm Dummy	64.07		91.33		-103.9	
	(1.22)		(1.88)		(-0.94)	
Uncertainty Shock		208.9		-240.7		1400.9
		(0.43)		(-0.62)		(1.92)
Uncertainty Shock *Firm Dummy		-107.6		1237.6		-833.1
		(-0.18)		(1.93)		(-0.62)
	Panel F: Repurchase Policy					
	Dependent Variable: Repurchase More than 1% Asset Dummy $_{t+1}$ (Logistic Model)					
Risk Shock	-1.759		-9.352		-75.080	
	(-0.09)		(-0.66)		(-1.91)	
Risk Shock *Firm Dummy	-30.800		-27.330		140.900	
	(-1.27)		(-0.99)		(1.87)	
Uncertainty Shock		-63.59		264.0		128.8
		(-0.32)		(1.60)		(0.22)
Uncertainty Shock *Firm Dummy		178.3		-931.0		874.8
		(0.62)		(-2.65)		(0.81)

Table 10 Duration of the Impact of Risk Shocks

This table examines the duration of the impact of risk shocks on a variety of corporate decisions. The dependent variables are change in book leverage ratio in Panel A, percentage change in capital expenditure and employment in Panel B and C, change in cash/total assets ratio in Panel D, and change in dividend and repurchase policy in Panel E and F, all measured from year t to t+1.. The key independent variables include risk shock from year t-1 to t, risk shock from year t-2 to t-1, and risk shock from year t-3 to t-2. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

Row	Risk Shock(t)	Risk Shock(t-1)	Risk Shock(t-2)	Controls	Observations/Adjusted R-sq or Pseudo R-sq
			Panel A: Leverage Adjustment		
			Dependent Variable: $dlev_{t+1}$		
(1)	-1.213			Yes	8,507
	(-2.87)				0.182
(2)	-1.228	-0.704		Yes	5,438
	(-2.25)	(-1.80)			0.180
(3)	-1.412	-1.052	-0.649	Yes	3,163
	(-1.97)	(-1.89)	(-1.00)		0.218
			Panel B: Capital Expenditure		
			Dependent Variable: $\%dcapx_{t+1}$		
(4)	-3.255			Yes	13,096
	(-1.73)				0.076
(5)	-1.803	-4.765		Yes	8,258
	(-2.31)	(-2.77)			0.072
(6)	-5.323	-2.050	-1.210	Yes	4,804
	(-1.68)	(-1.62)	(-0.99)		0.080
			Panel C: Employment		
			Dependent Variable: $\%demp_{t+1}$		
(7)	-3.812			Yes	13,649
	(-4.86)				0.112
(8)	-3.089	-2.480		Yes	8,583
	(-3.08)	(-2.42)			0.115
(9)	-3.047	-2.182	-1.362	Yes	4,852
	(-2.14)	(-1.79)	(-1.69)		0.124
			Panel D: Cash Holdings		
			Dependent Variable: $dcash_{t+1}$		
(10)	1.012			Yes	11,333
	(2.49)				0.057
(11)	0.526	1.053		Yes	7,073
	(0.99)	(2.00)			0.068
(12)	1.017	1.903	1.216	Yes	4,056
	(1.43)	(2.53)	(1.92)		0.078

Table 10 Duration of the Impact of Risk Shocks (Continued)

Row	Risk Shock(t)	Risk Shock(t-1)	Risk Shock(t-2)	Controls	Observations/Adjusted R-sq or Pseudo R-sq
			Panel E: Dividend Policy		
			Dependent Variable: Dividend Initiation $_{t+1}$ (Logistic Model)		
(13)	-16.600			Yes	7,131
	(-0.39)				0.121
(14)	-71.090	-29.150		Yes	4,129
	(-1.37)	(-0.57)			0.146
(15)	-59.600	-24.870	-13.160	Yes	1,709
	(-0.70)	(-0.28)	(-0.16)		0.173
			Dependent Variable: Dividend Omission $_{t+1}$ (Logistic Model)		
(16)	77.690			Yes	6,742
	(2.00)				0.212
(17)	94.110	102.4		Yes	3,831
	(1.79)	(1.84)			0.259
(18)	135.400	109.700	-40.650	Yes	1,751
	(1.73)	(1.41)	(-0.56)		0.318
			Dependent Variable: Dividend Increase $_{t+1}$ (Logistic Model)		
(19)	23.510			Yes	7,332
	(1.41)				0.320
(20)	7.798	22.510		Yes	4,305
	(0.36)	(1.07)			0.297
(21)	34.490	81.850	49.950	Yes	2,223
	(1.10)	(0.44)	(0.61)		0.319
			Dependent Variable: Dividend Decrease $_{t+1}$ (Logistic Model)		
(22)	28.010			Yes	7,236
	(1.15)				0.222
(23)	42.520	75.030		Yes	4,237
	(1.25)	(2.49)			0.247
(24)	67.980	53.000	-12.980	Yes	2,103
	(1.56)	(1.20)	(-0.31)		0.255
			Panel F: Repurchase Policy		
			Dependent Variable: Repurchase More than 1% Asset Dummy $_{t+1}$ (Logistic Model)		
(25)	-17.920			Yes	6,546
	(-1.94)				0.129
(26)	-20.660	-22.600		Yes	3,909
	(-1.84)	(-1.39)			0.138
(27)	-32.540	-45.740	-51.280	Yes	2,099
	(-1.76)	(-1.91)	(-2.14)		0.168

Table 11 Duration of the Impact of Uncertainty shocks

This table examines the duration of the impact of uncertainty shocks on a variety of corporate decisions. The dependent variables are change in book leverage ratio in Panel A, percentage change in capital expenditure and employment in Panel B and C, change in cash/total assets ratio in Panel D, and change in dividend and repurchase policy in Panel E and F, all measured from year t to t+1. The key independent variables include uncertainty shock from year t-1 to t, uncertainty shock from year t-2 to t-1, and uncertainty shock from year t-3 to t-2. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. The numbers in parentheses are t-statistics with robust standard errors clustered at the firm level.

Row	Uncertainty Shock(t)	Uncertainty Shock(t-1)	Uncertainty Shock(t-2)	Controls	Observations/Adjusted R-sq or Pseudo R-sq
		Panel A: Leverage Adjustment			
		Dependent Variable: $dlev_{t+1}$			
(1)	-14.190			Yes	8,507
	(-3.00)				0.182
(2)	-16.400	-2.566		Yes	5,438
	(-2.79)	(-0.41)			0.180
(3)	-13.470	-6.695	-6.833	Yes	3,163
	(-1.75)	(-0.81)	(-0.81)		0.207
		Panel B: Capital Expenditure			
		Dependent Variable: $\%dcapx_{t+1}$			
(4)	-22.600			Yes	13,096
	(-0.42)				0.076
(5)	8.562	-64.890		Yes	8,258
	(0.13)	(-0.96)			0.072
(6)	38.930	-78.310	-130.100	Yes	4,804
	(0.44)	(-0.93)	(-1.41)		0.081
		Panel C: Employment			
		Dependent Variable: $\%demp_{t+1}$			
(7)	-17.45			Yes	13,649
	(-1.85)				0.110
(8)	-12.680	-18.22		Yes	8,583
	(-1.09)	(-1.29)			0.114
(9)	-17.980	-10.950	-19.110	Yes	4,852
	(-1.18)	(-0.64)	(-1.14)		0.123
		Panel D: Cash Holdings			
		Dependent Variable: $dcash_{t+1}$			
(10)	6.177			Yes	11,333
	(1.39)				0.057
(11)	5.107	10.740		Yes	7,073
	(0.92)	(1.04)			0.068
(12)	5.217	18.500	13.650	Yes	4,056
	(0.72)	(1.09)	(0.94)		0.078

Table 11 Duration of the Impact of Uncertainty shocks (Continued)

Row	Uncertainty Shock(t)	Uncertainty Shock(t-1)	Uncertainty Shock(t-2)	Controls	Observations/Adjusted R-sq or Pseudo R-sq
			Panel E: Dividend Policy		
			Dependent Variable: Dividend Initiation $_{t+1}$ *(Logistic Model)*		
(13)	-274.200			Yes	7,131
	(-0.50)				0.121
(14)	-1028.300	-314.300		Yes	4,129
	(-1.50)	(-0.51)			0.146
(15)	-1419.500	277.500	-350.200	Yes	1,709
	(-1.25)	(0.24)	(-0.35)		0.179
			Dependent Variable: Dividend Omission $_{t+1}$ *(Logistic Model)*		
(16)	1145.100			Yes	6,742
	(1.28)				0.213
(17)	1200.700	318.100		Yes	3,831
	(1.06)	(0.45)			0.258
(18)	1106.500	-620.700	-449.800	Yes	1,751
	(1.32)	(-0.68)	(-0.46)		0.314
			Dependent Variable: Dividend Increase $_{t+1}$ *(Logistic Model)*		
(19)	300.200			Yes	7,332
	(1.30)				0.320
(20)	134.100	458.100		Yes	4,305
	(0.45)	(1.51)			0.297
(21)	-346.500	347.100	56.670	Yes	2,223
	(-0.83)	(0.73)	(0.11)		0.317
			Dependent Variable: Dividend Decrease $_{t+1}$ *(Logistic Model)*		
(22)	148.900			Yes	7,236
	(0.48)				0.221
(23)	-218.700	46.800		Yes	4,237
	(-0.54)	(-0.10)			0.244
(24)	-167.500	-635.700	-66.360	Yes	2,103
	(-0.31)	(-1.06)	(-0.12)		0.253
			Panel F: Repurchase Policy		
			Dependent Variable: Repurchase More than 1% Asset Dummy $_{t+1}$ *(Logistic Model)*		
(25)	17.090			Yes	6,546
	(0.12)				0.129
(26)	161.600	86.590		Yes	3,909
	(0.78)	(0.39)			0.138
(27)	33.760	-20.530	-312.500	Yes	2,099
	(0.11)	(-0.06)	(-0.98)		0.166

Appendix A: Variable Definitions

Appendix A: Variable Definitions

Variable	Definition
Risk and Uncertainty Variables	
Total Count of Words in 10K	Total number of words in the entire 10k file.
Risk Level	The frequencies of keywords for managerial risk perception (shown in Appendix B) divided by Total Count of Words in 10K files.
Uncertainty Level	Frequencies of keywords for managerial uncertainty perception (shown in Appendix B) divided by Total Count of Words in 10K files.
Risk Shock	The change in percentage of total words that are risk (uncertainty) related from last year.
Positive Risk Shock	A dummy variable that equals one if the firm experiences a positive risk shock larger than the median positive risk shock in our full sample, and
Negative Risk Shock	A dummy variable that equals one if the firm experiences a negative risk shock larger than the median negative risk shock in our full sample, and zero otherwise.
Uncertainty Shock	The change in percentage of total words that are uncertainty related from last year.
Positive Uncertainty Shock	A dummy variable that equals one if the firm experience a positive uncertainty shock larger than the median negative uncertainty shock in our full sample, and zero otherwise.
Negative Uncertainty Shock	A dummy variable that equals one if the firm experience a negative uncertainty shock larger than the median negative uncertainty shock in our full sample, and zero otherwise.
Dependent Variables	
Book Leverage	Total liabilities/total assets.
Change in Book Leverage (dbca)	Following Chen et al (2013), we compute the active change in book leverage ratio at time t as total liabilities(t)/(total assets(t)-(increase in retained earnings from t-1 to t))- total liabilities(t-1)/total assets(t-1).
% Change in Debt (%dDebt)	Percentage change in total liabilities from last year.
% Change in Equity (%dEquity)	The increase in stockholders' equity minus increase in retained earnings from last year/stockholders' equity last year.
Capital Expenditure	Capital expenditure in the cash flow statement. The unit is million
Capital Expenditure/Assets	Capital expenditure divided by total assets.
Change in Capital Expenditure (dcapx)	The increase in capital expenditure from last year. The unit is million dollars.
% Change in Capital Expenditure (%dcapx)	Percentage change in Capital Expenditure from last year.
Employment	Number of employees. The unit is thousands.
Change in Employment	The increase in employment from last year. The unit is thousands.
% Change in Employment	Percentage change in Employment from last year.
Cash	Cash and short term investments.
Cash/Assets	Cash and short term investments divided by total assets.
Change in Cash/Assets (dcash)	The increase in Cash/Assets from last year. The unit is million dollars.
Dividends (millions)	Dividends declared on common equities. The unit is million dollars.
Dividend Initiation	A dummy variable that equals one if the company didn't pay dividiend last year but paid dividiend this year, and zero otherwise.
Dividend Omission	A dummy variable that equals one if the company paid dividiend last year but stopped paying dividend this year, and zero otherwise.
Dividend Decrease	A dummy variable that equals one if common dividends paid this year were less than those of last year, and zero otherwise.
Dividend Increase	A dummy variable that equals one if common dividends paid this year were more than those of last year, and zero otherwise.
Net Repurchases	Following Hoberg, Nagpurnanand, and Phillips (2014), the value of net repurchases is defined as purchases of common and preferred stock (prstkc) less the reduction in the value of preferred stocks outstanding

Appendix A: Variable Definitions (Cont.)

Variable	Definition
Corporate Control Variables	
Assets	Total assets in the balance sheet. The unit is million dollars.
Cash Flow/PPE	As in Li (2011), it is earnings before extraordinary items plus depreciation normalized by the amount of property, plant, and equipment ((ib+dp)/ppent).
Cash/Interest Expenses	As in Chen et al (2013), we compute cash ratio as cash and short term investments divided by interest expense (che/xint).
Credit Rating	A categorical variable for S&P Domestic Long Term Issuer Credit Rating. It ranges from 2 (for "AAA" rating) to 29 (for "SD" rating) .
Dividend Yield	Dividends per share divided by fiscal year end stock market price (dvpsx_f/prcc_f).
Effective Tax Rate	Income tax divided by pretax income (txt/pi).
Financial Deficit/Sales	We follow Chen et al (2013) to compute financial deficit as the difference between cash outflow and internally generated cash flow. Cash outflow includes investment in PPE and intangible assets and increase in net working capital. Internally generated cash flow includes net income plus depreciation and amortization and deferred tax minus dividends.
Firm Age	Number of years since date of IPO.
Market Leverage	(total assets - stockholders' equity)/(total assets - stockholders' equity + market value of equity).
M/B Ratio	Market value of equity divided by book value of equity (prcc_f*csho/seq).
Neg. Earn. Dummy	A dummy variable that equals one if net income is negative, and zero otherwise.
Net Working Capital/Assets	Net working capital divided by total assets((wcap - che)/at).
R&D/Sales	R&D divided by net sales.
Retained Earnings/Assets	Retained earnings divided by total assets.
ROA	EBIT divided by total assets.
Sales	Net sales from the income statement. The unit is million dollars.
Sales Growth	Percentage of change in net sales since last year.
Stock Return	Annualized daily stock return in the fiscal year.
Stock Return Volatility	Annualized daily stock return volatility including dividend.
Tangibility	Net property, plants and equipments divided by total assets (e.g., ppent/at).
Tobin's Q	The sum of total liabilities and market value of equities divided by book value of assets((prcc_f*csho + lt)/at).
Macroeconomic Variables	
Default Spread between Baa and Aaa Bonds	Default Spread between Baa and Aaa rated Bonds. The unit is %.
Industrial Production Growth	Industry production growth from 1 year ago. The unit is %.
One-Year Swap	One year swap rate. The unit is %.
S&P 500 Return (%)	Annual return of S&P 500.
VIX	CBOT option-implied annaulized volatility. The unit is %.

Appendix B: List of Keywords

Panel A and B of this table present the list of key word stem and corresponding key words for constructing risk and uncertainty measures, respectively. * denotes that suffixes are allowed.

Panel A. List of Keywords for Managerial Risk Perception	
Key Word Stem	Key Words
accid*	accident accidents
advers*	adverse adversely adversity adversities
compet*	compete competent competing competes competencies competence competency competed
competi*	competition competitions
competit*	competitive competitiveness competitively
competitor*	competitors competitor
crisis*	crisis
difficult*	difficult
difficulti*	difficulties difficulty
downgrad*	downgrade downgraded downgrades downgrading
downturn*	downturn downturns
downward*	downward
fail*	fail fails failed failing
failur*	failure failures
impair*	impairment impaired impair impairments impairing impairs
inconsist*	inconsistent inconsistency inconsistencies inconsistently
lose*	lose losing loses
loss*	loss losses
lost*	lost
neg*	negative negatively negatives
nonperform*	nonperforming nonperformance
pressur*	pressure pressures pressured pressurized pressurization pressuring pressurizer pressurize
risk*	risk risks risked risking
riski*	risky riskiness
slowdown*	slowdown slowdowns
unabl*	unable
weaken*	weakening weakened weaken weakens
weaker*	weaker
weak*	weaknesses weakness
Panel B. List of Keywords for Managerial Uncertainty Perception	
Key Word Stem	Key Words
unanticipated*	unanticipated
uncertain*	uncertain
uncertainti*	uncertainties uncertainty
unclear*	unclear
unexpect*	unexpected
unexpectedli*	unexpectedly
unforeseen*	unforeseen
unpredict*	unpredictable unpredictability unpredictably unpredicted

Appendix C: Examples of Sentences in 10-K filings with Risk and uncertainty Keywords

Panel A. Sentences with Keywords for Managerial Risk Perception

Key Word Stem	Sentences
accid*	While we believe that we are currently in compliance with all material rules and regulations governing the use of hazardous materials and, to date, we have not had any adverse experiences, in the event of an **accident** or environmental discharge, we may be held liable for any resulting damages, which may exceed our financial resources and may materially harm our business, financial condition and results of operations.(AVALON PHARMACEUTICALS INC, 2008/03/31)
advers*	We cannot assure you that future compliance with these regulations, future environmental liabilities, the cost of defending environmental claims, conducting any environmental remediation or generally resolving liabilities caused by us or related third parties will not have a material **adverse** effect on our business, financial condition or results of operations. (AMERCO, 2006/06/13)
compet*	Our inability to **compete** effectively against these companies or to maintain our relationships with the various automobile dealers through whom we offer consumer loans could limit the growth of our consumer loan business. Economic and credit market downturns could reduce the ability of our customers to repay loans, which could cause our consumer loan portfolio losses to increase.(FRANKLIN RESOURCES INC, 2002/12/18)
competi*	Our profitability is therefore affected by the prices of lumber which may fluctuate based on a number of factors beyond our control, including, among others, changes in supply and demand, general economic conditions, labor costs, **competition** and, in some cases, government regulation.(WII Components, Inc., 2007/03/28)
competit*	Changes in industry conditions and the **competitive** environment may impact the accuracy of the Company's projections.(ALPINE GROUP INC, 2002/04/04)
competitor*	The determination as to when in the product development cycle technological feasibility has been established, and the expected product life, require judgments and estimates by management and can be affected by technological developments, innovations by **competitors** and changes in market conditions affecting demand.(HURCO COMPANIES INC, 2005/01/21)
crisis*	The current credit **crisis** may also have a potential impact on our need to obtain additional financing in the future and may impact the determination of fair values, financial instrument classification, or require impairments in the future.(IDM PHARMA, INC., 2009/03/31)
difficult*	Although the acquisition of Carlisle Power Transmission was accretive in 2001, earnings in this segment fell due to extremely **difficult** market conditions and much lower production levels. Also contributing to the lower earnings was intense competitive pressure requiring price concessions to maintain market share.(CARLISLE COMPANIES INC, 2002/03/21)
difficulti*	Thus, our chances of financial and operational success should be evaluated in light of the risks, uncertainties, expenses, delays and **difficulties** associated with operating a business in a relatively new and unproven market or a new business in an existing market, many of which may be beyond our control.(GLOBAL SPORTS INC, 2002/04/04)
downgrad*	If uncertainties in these markets continue, these markets deteriorate further or the Company experiences any additional ratings **downgrades** on any investments in its portfolio (including on ARS), the Company may incur additional impairments to its investment portfolio, which could negatively affect the Company's financial condition, cash flow and reported earnings.(BRISTOL MYERS SQUIBB CO, 2008/02/22)
downturn*	Furthermore, customers who benefit from shorter lead times may defer some purchases to future periods, which could affect our demand and revenues for the short term. As a result, we may experience **downturns** or fluctuations in demand in the future and experience adverse effects on our operating results and financial condition.(LSI LOGIC CORP, 0000703360, 20001231, 20010308)

Appendix C: Examples of Sentences in 10-K filings with Risk and uncertainty Keywords (Continued)

downward*	As a result of the Company's high debt to equity ratio, the Company is required to devote significant cash to debt service. This limits the Company's future operating flexibility and could make the Company more vulnerable to a **downturn** in its operating performance or decline in general economic conditions.(BANCTEC INC, 0000318378, 20051231, 20060417)
fail*	If we **fail** to obtain additional capital, we may be required to significantly reduce, or refocus, our operations and our business, results of operations and financial condition could be materially and adversely effected.(ANDREA ELECTRONICS CORP, 2001/03/30)
failur*	A **failure** of the Company to improve its accounts receivable collections from the State of California could have a material adverse effect on the Company's business, financial condition and operating results.(CURATIVE HEALTH SERVICES INC, 2006/04/11)
impair*	Our investment in DISC common stock at October 31, 2009 is recorded at fair value of approximately $198,000 including a write-down of approximately $124,000 as a result of an other than temporary **impairment**, and has exposure to price risk.(COPYTELE INC, 0000715446, 2010/01/29)
inconsist*	Therefore, these investments may, under certain circumstances, involve risks such as the possibility that the co-venturer in an investment might become bankrupt, or have economic or business interests or goals that are **inconsistent** with our business interests or goals, or be in a position to take action contrary to our instructions or requests or our policies or objectives.(CATELLUS DEVELOPMENT CORP,2004/03/12)
lose*	Qualifying a new contract manufacturer and commencing volume production can be expensive and time consuming. If we are required to change or choose to change contract manufacturers, we may **lose** revenue and damage our customer relationships.(MCDATA CORP, 2001/03/02)
loss*	Notwithstanding this, inflation can directly affect the value of loan collateral, in particular real estate. Sharp decreases in real estate prices have, in past years, resulted in significant loan **losses** and **losses** on real estate acquired. Inflation, or disinflation, could significantly affect NewMil's earnings in future periods.(NEWMIL BANCORP INC, 2002/03/29)
lost	We have experienced delays in the introduction of new products due to various factors, resulting in **lost** revenue.(NOVELL INC, 2007/05/25)
neg*	As a result of the activities of the FDA, the CDC and the Secretary's Advisory Committee on Genetic Testing, it is possible that our existing and future assays may be subject to a regulatory approval similar to the pre-marketing approval process which the FDA applies to drugs and medical devices, or may be subject to other increased regulatory standards, which could have a **negative** effect on our business.(SPECIALTY LABORATORIES, 2001/03/30)
nonperform*	Sotheby's counterparties to these sharing arrangements are typically international art dealers or prominent art collectors. Sotheby's could be exposed to losses in the event of **nonperformance** by these counterparties.(SOTHEBYS, 2009/02/27)
pressur*	These competitive **pressures** could result in increased pricing **pressures** on a number of our products and services, particularly as competitors seek to win market share, and may harm our ability to maintain or increase our profitability.(HARTFORD LIFE INSURANCE CO, 2007/02/23)
risk*	Because we market products to the public, we face an inherent business **risk** of financial exposure to product liability claims. As a publisher of online content, we face potential liability for defamation, negligence, copyright, patent or trademark infringement, or other claims based on the nature and content of materials that we publish or distribute.(SCIENTIFIC LEARNING CORP, 2002/03/29)
riski*	If we acquire additional businesses, these acquisitions will involve financial uncertainties as well as personnel contingencies, and may be **risky** and difficult to integrate.(PARLEX CORP, 2003/10/14)
slowdown*	The current economic **slowdown** has been more profound in the telecommunications market resulting in a significant reduction in capital expenditures for products such as our DWDMs and our fiber optic components. It is impossible to predict how long the **slowdown** will last.(APA OPTICS INC, 2003/07/01)

Appendix C: Examples of Sentences in 10-K filings with Risk and uncertainty Keywords (Continued)

unabl*	If the Company loses the services of key personnel or if it is **unable** to attract additional qualified personnel, the Company's business and the price of its Common Stock could be materially and adversely affected.(CT COMMUNICATIONS INC, 2007/03/07)
weaken*	In fiscal 2001, **weakening** local currencies negatively impacted translated revenue compared to the prior year. Revenue in the region would have increased 6% if foreign exchange rates were constant with those of the prior year.(MICROSOFT CORP, 2001/09/18)
weaker	For example, higher gasoline prices in 2007 contributed to **weaker** demand in North America for certain vehicles for which we supply products, especially full-size SUVs and pick-up trucks. If gasoline prices remain high or continue to rise, the demand for such vehicles could weaken further and the recent shift in consumer interest to passenger cars and CUVs, in preference to SUVs and pick-up trucks, could be accelerated.(DANA HOLDING CORP, 2008/03/14)
weak*	As a result, our financial results could be significantly affected by factors such as changes in foreign currency exchange rates or **weak** economic conditions in the foreign markets in which we distribute our products.(INTERFACE INC, 2010/03/16)

Panel B. Sentences with Keywords for Managerial Uncertainty Perception

Key Word Stem	Sentences
unanticipate*	Acquisitions, joint ventures and other business combinations involve various inherent risks, such as assessing the value, strengths, weaknesses, contingent and other liabilities and potential profitability of acquisition or other transaction candidates; the potential loss of key personnel of an acquired business; our ability to achieve identified financial and operating synergies anticipated to result from an acquisition or other transaction; and **unanticipated** changes in business and economic conditions affecting an acquisition or other transaction.(EQUITABLE RESOURCES INC, 2006/02/24)
uncertain*	The balance of revenues in 1999 and 2000, generally subscriber fees from our pilot program for high-speed Internet service and co-hosting revenues from the use of our Data Center, have not been material and future revenues from this and our mobile wireless business are **uncertain**. (SPEEDUS COM INC, 2001/04/02)
uncertainti*	The Company's management believes that the liability for IBNR Claims reflected in the balance sheets at February 1, 2003 and February 2, 2002 included in the Consolidated Financial Statements contained in this Report were fairly stated in all material respects subject to the **uncertainties** of litigation and the risk of greater than anticipated inflation in medical costs. (UNITED RETAIL GROUP INC, 2003/04/03)
unclear*	Rules governing the various regional power markets may also change from time to time which could affect our costs or revenues. Because it remains **unclear** which companies will be participating in the various regional power markets, or how RTOs will develop or what regions they will cover, we are unable to assess fully the impact that these uncertainties may have on our business.(DYNEGY HOLDINGS INC, 2006/03/29)
unexpect*	The majority of this unrecognized loss stems from the **unexpected** recent decline in the performance of U.S. financial markets coupled with historic lows in interest rates.(SPX CORP, 2003/03/17)
unexpectedli*	As a result of these factors, we cannot predict the actual expenses that we will incur with respect to trials for any of our potential products, and we expect that our expense levels will fluctuate **unexpectedly** in the future.(PROTEIN DESIGN LABS INC, 2003/03/31)
unforeseen*	We cannot assure you that such conditions will not recur, that other **unforeseen** negative political or social conditions will not arise or that such conditions will not have a material adverse effect on our financial condition and results of operations.(SOUTHERN COPPER CORP, 2007/03/01)
unpredict*	Our technology licensing activities have resulted in unpredictable streams of revenue recognition, in part, due to the **unpredictable** timing of executing new license agreements.(NCT GROUP INC, 2003/04/04)

Appendix D: Correlation Matrix

This table presents pairwise correlation coefficients between key variables. Definitions of key variables are provided in Appendix A. The sample consists of U.S. listed companies that filed 10-K reports over the time period of 2001 and 2010. All continuous variables are winsorized at the 1% and 99% level. P-values are reported in parentheses.

	1	2	3	4	5	6	7	8	9	10	11	12
1 Risk Shock$_t$	1.000											
2 Uncertainty Shock$_t$	0.275	1.000										
	(0.00)											
3 Stock Return Volatility$_t$	0.089	-0.057	1.000									
	(0.00)	(0.00)										
4 dlev $_{t+1}$	-0.046	-0.004	-0.234	1.000								
	(0.00)	(0.10)	(0.00)									
5 %dcapx $_{t+1}$	-0.045	0.001	-0.050	0.077	1.000							
	(0.00)	(0.87)	(0.00)	(0.00)								
6 %demp $_{t+1}$	-0.083	-0.013	-0.121	0.218	0.255	1.000						
	(0.00)	(0.12)	(0.00)	(0.00)	(0.00)							
7 dCash $_{t+1}$	0.047	-0.004	0.049	-0.162	-0.114	-0.222	1.000					
	(0.00)	(0.64)	(0.00)	(0.00)	(0.00)	(0.00)						
8 Dividend Innitiation$_{t+1}$	-0.0141	-0.0091	-0.0285	0.0352	0.0317	0.0054	-0.0056	1.0000				
	(0.08)	(0.26)	(0.00)	(0.00)	(0.00)	(0.42)	(0.39)					
9 Dividend Omission$_{t+1}$	0.0578	0.0080	0.0787	-0.0329	-0.0421	-0.0590	0.0195	-0.0188	1.0000			
	(0.00)	(0.32)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)				
10 Dividend Increase $_{t+1}$	-0.0331	-0.0041	-0.3843	0.1113	0.0062	0.0208	0.0009	0.2433	-0.0772	1.0000		
	(0.00)	(0.62)	(0.00)	(0.00)	(0.37)	(0.00)	(0.89)	(0.00)	(0.00)			
11 Dividend Decrease $_{t+1}$	0.0400	-0.0175	-0.0326	-0.0187	-0.0475	-0.0621	0.0204	-0.0453	0.4148	-0.1861	1.0000	
	(0.00)	(0.23)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)		
than 1% Asset Dummy	-0.0484	0.0325	-0.2346	0.1488	-0.0148	-0.0035	-0.0343	0.0130	-0.0467	0.1984	-0.0186	1.0000
$_{t+1}$	(0.00)	(0.70)	(0.00)	(0.00)	0.0412	(0.62)	(0.00)	(0.06)	(0.00)	(0.00)	(0.01)	