



# Uncertainty and the value of cash holdings



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## HIGHLIGHTS

- This paper examines how firm-level uncertainty affects the value of cash holdings.
- A firm with higher firm-level uncertainty has a higher value of cash holdings.
- Uncertainty affects the value of cash through financial constraints and agency conflicts.
- The effect is also attributed to the increased value of the option of waiting and seeing.

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## ABSTRACT

We find that a firm facing higher uncertainty has a higher value of cash. This effect is attributed to the increased value of the option to wait and see as well as the aggravated financial constraints and mitigated agency conflicts.

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## 1. Introduction

The effects of uncertainty on corporate cash holdings have received growing attention from researchers in both economics and finance. A number of studies have considered firm-level uncertainty (Bates et al., 2009; Duchin, 2010; Pinkowitz et al., 2012; Gao and Grinstein, 2014) or aggregate uncertainty (Foley et al., 2007; Acharya et al., 2013) as a driver of corporate cash holdings. For example, Gao and Grinstein (2014) use stock return volatility as an uncertainty measure, decompose it into systematic and idiosyncratic components, and show that systematic components have a more significant influence over cash holdings. In addition, a rich

body of literature has shown that uncertainty reduces corporate investment by increasing the value of the option of waiting and seeing, causing a firm to wait for additional information before taking actions (Bernanke, 1983; Bloom et al., 2007). In this paper we investigate the relationship between uncertainty measured by stock return volatility, as in Gao and Grinstein (2014), Leahy and Whited (1996), and Bloom et al. (2007), and the market value of cash holdings, using the approach used in Faulkender and Wang (2006), Dittmar and Mahrt-Smith (2007), and Denis and Sibilkov (2010).

Although there have been abundant studies regarding uncertainty and the value of cash holdings separately, none of the previous studies, to the best of our knowledge, has examined the effects of uncertainty on the value of cash holdings and the channels for these effects. However, given that the nature of uncertainty and the determinants of the value of cash holdings are

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well understood, we can identify two plausible channels through which uncertainty influences the value of cash holdings. First, a firm facing higher uncertainty may have a higher value of cash holdings due to more severe financial constraints. Han and Qiu (2007) find that financially constrained firms' levels of uncertainty measured by cash flow volatilities are positively associated with their cash holdings, while Faulkender and Wang (2006) and Denis and Sibilkov (2010) show that cash holdings are more valuable for financially constrained firms. Second, a firm facing higher uncertainty could have a higher value of cash holdings due to less severe agency conflicts between managers and shareholders. One possibility is that uncertainty mitigates agency conflicts through its disciplinary role. In this case, a high-uncertainty firm may have a higher value of cash holdings, given that a firm with less agency conflicts or better corporate governance tends to have a higher value of cash holdings (Dittmar and Mahrt-Smith, 2007). However, uncertainty could aggravate agency conflicts between managers and shareholders due to more severe information asymmetry. In this case, a high-uncertainty firm may have a lower value of cash holdings (Drobotz et al., 2010).

In addition to the two channels described above, this study proposes a new channel based on real-option theories. A rich body of literature, such as Bernanke (1983), Bloom et al. (2007), and Bloom (2009), has shown that uncertainty increases the value of the option of waiting and seeing, making a firm's investment decision-making more cautious. Thus, a firm's optimal decision when faced with a high level of uncertainty would be to reduce current investments and increase cash holdings in preparation for the investments that are postponed to the next period. Even when financial constraints and agency conflicts are not matters of concern, a firm facing high uncertainty would be better off by holding more cash in the current period for the following reasons: (i) additional cash holdings will allow the firm to execute the delayed investments at the right time; (ii) shareholders are less concerned about the increase in agency conflicts as additional cash holdings are to be used to fund the delayed investments; (iii) the availability, and the timing, of cash injections from external financing sources are more uncertain in the subsequent period. Thus, the positive effects of uncertainty on the value of cash holdings through this channel are likely to be stronger for firms with more growth opportunities.

In this study we first investigate whether firm-level uncertainty and each of its three components—a macroeconomic component, a time-invariant firm-specific component, and an idiosyncratic time-varying component—affect the value of cash holdings. To measure the impact of an uncertainty measure on the value of cash holdings, we investigate the effect of the uncertainty measure on the coefficient of the change in cash holdings in a regression model in which the dependent variable is a firm's excess stock returns. We then move on to examine which channels stated above—the financial constraints channel, the agency conflicts channel, and the real options channel—are better supported by the data. To do this, we investigate if the effects of uncertainty on the value of cash holdings are larger for financially constrained firms, firms with less agency conflicts, or firms with more growth opportunities.

## 2. Data and methodology

We use Center for Research in Security Prices (CRSP) data to calculate a firm's annual stock returns and the total market value of a firm's equity. As benchmark returns, we use the returns to the  $5 \times 5$  Fama and French portfolio provided in Kenneth French's data library. In addition, we use data from Compustat North America for the period 1980–2015 to construct variables based on the information contained in financial statements. We carry out a series of data-cleaning procedures, such as excluding firms operating in

the utilities and financial services industries, excluding firms with total book assets of less than 25 million in constant 1980 dollars, dropping firm-years with non-positive total assets or cash holdings or negative capital expenditures, and restricting the sample to common shares traded in three major stock exchanges in the US (NYSE, NASDAQ, and AMEX). We then winsorize all variables at the 1st and 99th percentiles. After all these procedures, we have an unbalanced panel of 9,948 firms among 244 industries based on three-digit Standard Industrial Classification (SIC) codes over the period 1980–2015, which contains 94,568 firm-year observations with non-missing excess returns, uncertainty, and cash holding measures as defined below.

As a measure of firm-level uncertainty, we use the standard deviation of a firm's daily stock returns for each fiscal year ( $SD_{i,t}$ ) suggested by Leahy and Whited (1996) and Bloom et al. (2007). See Bloom et al. (2007) for a discussion about the advantages of this forward-looking comprehensive measure, which varies across firms and over time. Following Bloom et al. (2007), we decompose this measure into three components: a macroeconomic component, common to all firms in a particular year ( $\overline{SD}_t$ ); a time-invariant firm-specific component ( $\overline{SD}_i$ ); and an idiosyncratic time-varying component ( $\widetilde{SD}_{i,t} = SD_{i,t} - \overline{SD}_t - \overline{SD}_i$ ). We assign firms with each uncertainty measure in the top (bottom) terciles to the high (low) uncertainty group.

To examine how the market value of cash holding varies with the degree of uncertainty that a firm faces, we modify an empirical framework suggested by Faulkender and Wang (2006), Dittmar and Mahrt-Smith (2007), and Denis and Sibilkov (2010). Specifically, we investigate the effect of an uncertainty measure on the coefficient of the change in cash holdings in a regression model in which the dependent variable is a firm's excess stock returns. Our baseline model is specified as follows:

$$r_{i,t} - R_{p,t} = \beta_0 + \beta_1 \Delta Cash_{i,t} + \beta_{CONTROLS} CONTROLS + \varepsilon_{i,t}, \quad (1)$$

where the dependent variable ( $r_{i,t} - R_{p,t}$ ) is firm  $i$ 's excess stock return over the fiscal year, computed as the stock return over the fiscal year minus the return on a benchmark portfolio; the benchmark portfolios are 25 Fama–French value-weighted portfolios, constructed by independently sorting stocks on size and book-to-market ratio; and  $\Delta Cash_{i,t}$  is the change in firm  $i$ 's cash holding over the fiscal year scaled by its lagged market capitalization. As in Faulkender and Wang (2006), Dittmar and Mahrt-Smith (2007), and Denis and Sibilkov (2010),  $CONTROLS$  includes the change in book assets net of cash, change in earnings before interest and extraordinary items, change in research and development (R&D) expenses, change in interest expenses, change in dividends, lagged cash holdings, leverage, and net financing during fiscal year. All these variables except leverage are scaled by lagged market value of equity. We also include the interaction terms between cash and the change in cash, and between leverage and the change in cash, to control for the capital constraints faced by the firm. In this specification, the market value of cash holdings is measured by the regression coefficient for  $\Delta Cash_{i,t}$ , which is modeled as a linear function of the high-uncertainty dummy:  $\beta_1 = \gamma_0 + \gamma_1 D\_HighUNC_{i,t}$ , where  $D\_HighUNC_{i,t}$  is a dummy variable whose value equals one if firm  $i$  belongs to the high-uncertainty group in year  $t$  and zero if it belongs to the low-uncertainty group. The sign of  $\gamma_1$ , the coefficient for  $D\_HighUNC_{i,t} \times \Delta Cash_{i,t}$ , tells us whether firms facing higher uncertainty have a higher or lower market value of cash holdings.

## 3. Empirical results

### 3.1. Main regression results

Before we present the main regression results, we investigate if cash holdings vary with the level of uncertainty that a firm faces.

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