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Are Firms as Liquid as they Appear in Annual Reports?

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Abstract

We find that firms report significantly higher cash holdings in the fourth fiscal quarter, followed by subsequent reversal. Such a phenomenon cannot be explained by traditional determinants of cash holdings, calendar year-end effect, or the choice of fiscal-year-end quarter. We identify real and timing apparatuses that firms employ to maneuver such a cash hike within a fiscal year. Furthermore, the fourth-quarter cash hike appears to be more pronounced for informationally opaque firms requiring frequent access to external capital markets and for firms with reduced external monitoring and lower financial constraints. Our results suggest that within-year cash-holding dynamics are important in fully assessing the liquidity and credit-risk situations of firms.

Keywords: Cash Hike, Cash Holdings, Within-Year Cash Dynamics, Marginal Value of Cash

JEL classification: G32, G31, G34, R30.

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1. Introduction

Cash is a firm's lifeblood. Without adequate access to cash the staying power of the firm is jeopardized, and its future growth potential is compromised. A significant research endeavor in the accounting and finance literature is devoted to understanding the determinants of corporate cash holdings (e.g., Opler et al., 1999; Almeida et al., 2004; Han and Qiu, 2007; Bates et al., 2009) and the implications for corporate credit risk (e.g., Ohlson, 1980; Zmijewski, 1984; Shumway, 2001; Chava and Jarrow, 2004; Acharya et al., 2012). The extant empirical analyses largely rely on fiscal-year-end cash holdings reported in corporate annual financial statements. These cash holdings, however, may not fully depict a firm's liquidity and credit risk conditions because the firm could temporarily maneuver the level of year-end cash holdings by adjusting financial variables and real activities, thereby masking the true balance-sheet liquidity and creditworthiness of the firm. Furthermore, intra-year cash holding dynamics of a firm are, arguably, as important as its year-end cash holdings because investment opportunities or negative shocks to business could arrive at any time of the year.[1] Despite the importance of cash holdings for liquidity and risk management throughout the year, little is known about the dynamics of cash holdings within a fiscal year. This paper fills that void.

We first document a novel empirical phenomenon that firms systematically increase their cash holdings in the last fiscal quarter, followed by subsequent reversal. An average firm in our sample holds 3.3% more cash in the fourth fiscal quarter compared to the average over the previous three quarters; the increase is pervasive across industries and persistent over the years. We deploy standard cash-holding models (e.g., Bates et al., 2009) that control for quarterly firm characteristics

[1] For instance, the devastating 2008–2009 financial crisis erupted in mid-September of 2008 and, more recently, the World Health Organization declared the COVID-19 outbreak a public health emergency of international concern on January 30, 2020, and a global pandemic on March 11, 2020. Both negative external shocks arrived before fiscal-year-end of most U.S. public firms and left the corporate sector scrambling for immediate cash.

and activities and find that traditional models cannot explain away such a persistent hike in cash holdings in the fourth fiscal quarter. Furthermore, we show that the hike happens in firms with both December and non-December fiscal-year-end, and there appears to be no association between fourth fiscal quarter firm-level economic activities and the increase in fourth-quarter cash holdings. These findings suggest that the increase in the fourth-quarter cash holdings cannot be attributed to traditional determinants of cash holding, calendar year-end effect, seasonal economic activities, or the choice of a firm's fiscal-year-end quarter.

Next, we investigate three instruments, i.e., real, timing, and financing instruments, through which managers can steer a cash hike in the fourth fiscal quarter. Following measures in the extant literature (Allen and Saunders, 1992; Lee, 2012; Roychowdhury, 2006), we capture the real instruments by the abnormal levels of cash-flow from operations, discretionary expenses and production cost, the timing instrument by the change in a firm's cash conversion cycle and financial instrument by the debt issuance. We find that real activities such as higher abnormal cash-flow from operations and lower abnormal discretionary expenses and production costs are associated with a greater likelihood of fourth fiscal quarter cash hike. The decline in the change-in-cash-conversion-cycle (timing) is associated with a higher likelihood of fiscal-year-end cash hike. However, firms do not appear to use debt issuances to elevate year-end cash. These results indicate that the increase of cash holding in the fiscal-year-end quarter is facilitated via a combination of real and timing, but not financial apparatuses.

We then examine factors that incentivize firms to hike cash in the fiscal-year-end quarter. Reporting higher fiscal-year-end cash holdings could be beneficial for firms in many ways. First, extant evidence shows that corporate stakeholders such as shareholders, analysts, and creditors tend to put more emphasis on fiscal-year-end than on intra-year measurements (e.g., Jacob and

Jorgensen, 2007; Das et al., 2009; Givoly and Ronen, 1981; Fan et al., 2010). Second, an unbiased and independent opinion on an annual financial report at fiscal-year-end by an external auditor mandated by the Securities and Exchange Commission (SEC) makes the fourth-quarter reports unequivocally more important for external stakeholders such as shareholders, lending institutions, and regulators. Third, external rating agencies normally assess a firm's business and financial risk once a year based on new financial reports (e.g., Crouhy et al., 2001), giving the firm greater incentive to look good towards the fiscal-year-end. Finally, various open-source financial data providers such as Yahoo Finance, S&P, and Value Line almost exclusively provide annual financial data (Frankel et al., 2017), making year-end cash holding the most visible manifestation of a firm's balance-sheet liquidity position.

We analyze the incentive to increase fourth-quarter cash holdings by first estimating the marginal market value of each additional dollar of cash that the firm reports following the approach in Faulkender and Wang (2006) and Dittmar and Mahrt-Smith (2007). The idea is that to the extent that market valuation of cash holdings reflects potential benefits of cash hike, we should observe that firms with greater marginal values of cash holdings have higher incentives to increase cash holdings in the fourth quarter. Indeed, we find that firms with greater increase in fourth-quarter cash holdings witness higher marginal value of cash. For instance, the market value for each additional dollar of reported cash is 80 cents for firms with no increase in fourth-quarter cash holdings but can be as high as 90 cents for firms with an average increase in fourth-quarter cash holdings. The marginal value analysis supports the notion that firms reporting a higher increase in fourth-quarter cash holdings are associated with a greater benefit of each additional reported dollar of cash.

Clearly, increasing fourth-quarter cash holdings is not without constraint. The deployment of real and timing instruments could be costly for firms and their affiliated business partners. For example, a hike in the fourth-quarter cash holding may involve accelerating collection of or delaying supplier's payment, causing additional costs to firms' business partners. Additionally, the use of real and timing instruments will involve additional management and employee time and effort. As such, we would expect heterogeneity across firms in their fourth-quarter cash increase in that firms with greater benefits and/or lower constraints should engage more in such behavior. Furthermore, firms with higher future growth opportunities, and requiring more frequent access to external capital markets, are likely to benefit more from year-end cash hike by signaling their elevated level of liquidity. By contrast, firms with a greater degree of external monitoring and reduced financial maneuvering abilities, i.e., elevated financial constraints, face greater constraint in hiking cash and, therefore, are less likely to engage in such behavior. Indeed, we document significant variations in cash hike behavior across firms and industries over time that are consistent with the foregoing prognosis.

Our study adds to the literature on determinants of corporate cash holdings. The extant literature focuses on corporate annual financial reports and finds evidence that is consistent with precautionary, transaction cost, tax, and strategic motives for cash holdings (Opler et al., 1999; Bates et al., 2009; Duchin, 2010; Jensen, 1986; Faulkender and Wang, 2006; Han and Qiu, 2007; Liu and Mauer, 2011; Mulligan, 1997; Ozkan and Ozkan, 2004; Fresard, 2010). Different from these studies, our analysis focuses on cash holdings within a fiscal year. Our study provides the first large-sample evidence of a "looking good" motive for cash holdings, consistent with the finding of the Duke University/CFO Business Outlook survey (Ryan, 2010) that the second-most

important motivation for CFOs holding large amounts of cash is the "need to show investors and banks a healthy balance sheet."

Our study is related to literature on the relationship between cash holdings and a firm's liquidity and credit risk. For example, Acharya et al. (2012) document that firms tend to build up cash reserves as buffers against their own deteriorating credit risk. Harford et al. (2014) show that firms mitigate debt refinancing risk by increasing their cash holdings. As a going concern, a firm's intra-year cash holdings are as important as year-end cash holdings in hedging credit and refinancing risk. Our findings highlight the importance of analyzing the dynamics of intra-year cash holdings when assessing corporate liquidity and credit risk.

Our study also adds to the literature on the "periodic" manipulation of accounting variables. Different from "occasional" manipulation of accounting items around important corporate events such as initial and seasoned financial security offerings (e.g., Teoh et al., 1998a, 1998b; Erickson and Wang, 1999), "periodic" manipulation refers to the manipulation of certain accounting items in a recurring fashion. For example, Allen and Saunders (1992) show evidence for systematic upward window dressing of assets and other balance sheet accounts at quarter ends by banks. Owens and Wu (2015) document downward window dressing of quarter-end short-term borrowing by bank holding companies. Frankel et al. (2017) find that managers tend to decrease working capital levels in the fourth fiscal quarter to achieve better compensation or to meet analysts' expectation. Although a decrease in working capital could contribute to an increase in fiscal-year-end cash holdings, it is one of several tools through which managers can potentially hike year-end cash holdings. Our paper analyzes various instruments through which managers are able to achieve elevated year-end cash holdings. Specifically, we investigate the deployment of real, timing (which includes net working capital), and financing instruments through which firms could increase the

year-end cash holdings. More importantly, manipulations of net working capital and cash holdings may serve distinct purposes in firms' pursuit of "looking good". The level of net working capital (as a component of operational cash flow) is a manifestation of a firm's operational efficacy, whereas cash holdings is a crucial indicator of a firm's overall liquidity and creditworthiness. Arguably, investors and creditors may pay more attention to and closely monitor a firm's cash level compared to its level of net working capital. Moreover, since greater operational efficiency can also lead to higher cash holdings, it is possible that the managerial objective of net working capital manipulation is not limited only to improving operating efficiency but also to looking good via elevated cash holdings. As such, our results and the findings of Frankel et al. (2017) complement each other. We document that fiscal-year-end increase in cash holdings is a pervasive phenomenon in the corporate landscape, echoing the SEC's concern about firms' tendency to mask liquidity and credit risks (SEC, 2010) and suggesting that users of financial reports need to be wary that the reported fourth-quarter cash holdings might not be a complete depiction of a firm's true liquidity.

The rest of the paper is organized as follows. Section 2 describes the data and sample selection. Section 3 investigates the intra-year dynamics of cash holdings and how it is related to traditional determinants of cash holdings identified in the extant literature. Section 4 investigates the causes of the hike in fiscal-year-end cash holdings including calendar year-end effect, the choice of fiscal-year-end quarter and the deployment of real, timing, and financial instruments to maneuver quarterly cash holdings. Section 5 examines the heterogeneity among firms in the increase of fourth-quarter cash holding to shed light on the incentives and constraints to maneuver quarterly cash holdings. Section 6 concludes the study.

2. Data and sample selection

Our data are from the Compustat fundamental quarterly files. We apply the following filters to arrive at our final sample. First, since the detailed cash-flow statement data from Compustat are available only from 1988, we limit our sample to 1988Q1–2018Q4. Second, because financial and utilities firms may hold cash for regulatory reasons, we exclude all financial and utilities firms with SICs of 6000–6999 and 4900–4999. Third, we exclude all observations with missing data for cash and stock price, observations with zero or negative total assets, current assets, current liabilities, receivables, sales, and observations with positive acquisition and divestiture. Finally, we restrict our analyses to those firms with all four fiscal quarters observations within each fiscal year. Our final sample has 11,215 unique firms with 308,144 firm-quarter observations and 77,036 observations in each of the four fiscal quarters. All variables are quarterly and winsorized at the 1st and 99th percentile to remove outliers.

The primary dependent variable in our study is firm-level quarterly cash holdings. Following the extant literature, we construct several alternative measures of cash holdings: cash to total book assets; cash to net assets, where net assets is defined as total book assets minus cash and marketable securities; cash to market value of assets, where market value of assets is defined as the market value of equity plus the book value of debt; cash to book value of equity; cash to market value of equity; and net cash to book value of total assets, where net cash is defined as cash minus debt in current liabilities. The denominators of these measures (i.e., book or market value of assets, book value or market value of equity) are measured using their values at the beginning of the fiscal year to ensure that in all four fiscal quarters cash is normalized using the same value so that cash holding is comparable across fiscal quarters within a fiscal year. Definitions of all variables are provided in the Appendix.

3. The dynamics of intra-year cash holdings

Table 1 presents the mean and median of different measures of cash holdings across fiscal quarters. A consistent pattern with different measures of cash holdings is one in which both the mean and median cash holdings in the fourth quarter are significantly higher than each of the other three quarters. For example, the average (median) cash holdings (of its total book assets) are 0.237 (0.110) in the fourth fiscal quarter, while the average (median) in quarters 1, 2, and 3 are 0.209 (0.098), 0.214 (0.097), and 0.221 (0.098), respectively. Figure 1 depicts the mean and median of cash to total book assets ratio in each fiscal quarter, showing a clear pattern that firms have significantly higher cash holdings in the fourth fiscal quarter compared to other three quarters. Figure 2 depicts the time series of quarterly cash to total book assets ratio over the sample period. It shows an increase in the fourth-quarter cash holdings followed by a reversal in the following quarter together with an overall increasing trend in cash holdings over the sample period.

[Table 1, Figures 1 & 2 about here]

To gauge the extent of hike in cash holdings in the fourth quarter and the subsequent reversal, we construct the following two measures:

$$Cash\_hike_{4,it} = \left[\frac{\left(Cash_{4,it} - \overline{Cash}_{1-3,it}\right)}{\overline{Cash}_{1-3,it}}\right] \times 100 \quad (1)$$

$$Cash\_reversal_{1-3,it+1} = \left[\frac{\left(\overline{Cash}_{1-3,it+1} - Cash_{4,it}\right)}{\overline{Cash}_{1-3,it+1}}\right] \times 100 \quad (2)$$

In equation (1), $Cash\_hike_{4,it}$ refers to the percentage increase of cash holdings in the fourth fiscal quarter relative to the average cash holdings in the first three fiscal quarters for firm i in year t, $Cash_{4,it}$ is the fourth fiscal quarter cash holdings for firm i in year t, and $\overline{Cash}_{1-3,it}$ is the average cash holdings of the first three fiscal quarters for firm i in year t. In equation (2), $Cash\_reversal_{1-3,it+1}$ refers to firm i's percentage change of the average cash holdings in the

first three fiscal quarters in year $t+1$ relative to its cash holdings in fourth quarter in year t; $\overline{Cash}_{1-3,it+1}$ is the average cash holdings of the first three fiscal quarters for firm i in year $t+1$.

Figure 3 shows the annual average $Cash\_hike_{4,it}$ and $Cash\_reversal_{1-3,it+1}$ during our sample period. The left panel shows the equally weighted yearly average and the right panel shows the market value-weighted yearly average. The equally weighted average $Cash\_hike_{4,it}$ in our sample is 22.18%, whereas the value-weighted average $Cash\_hike_{4,it}$ is 16.66%. This suggests that the fourth-quarter cash holdings (to total assets) ratio is 16.66% to 22.18% higher compared to the average of the previous three quarters.[2] Although we observe time series variation in cash hike across years, the hike in fourth-quarter cash holdings remains consistent across years and is significantly greater than zero at the 1% level. Similarly, we observe a statistically significant (at the 1% level) reversal of cash holdings across the sample.[3]

[Figure 3 about here]

A potential concern of interpreting the hike of fourth-quarter cash holdings is that the variation in quarterly cash holdings may simply be capturing quarterly variation in underlying firm characteristics that determine the cash holdings. To address the effect of firm characteristics on quarterly cash holdings, we collect firm characteristics that can potentially explain the persistent

[2] Note that the average $Cash\_hike_{4,it}$ in Figure 3 reflects the average percentage increase in Cash/TA. From Table 1, using quarterly means, one can see that the percentage increase in average Cash/TA is about 11%. Due to the nonlinearity of $Cash\_hike_{4,it}$, the average percentage increase in Cash/AT could be different from the percentage increase in average Cash/TA and the former is more sensitive to the Cash/AT of smaller firms with more volatile cash holdings. Therefore, the percentage increase in average Cash/TA (11%) is more comparable to the value-weighted average percentage increase in Cash/TA (16.7%).

[3] Figure 3 also shows that both cash-hike and cash-reversal decrease in magnitude over time. We find that the extent of the cash-hike decreases is statistically significant after the adoption of the Sarbanes–Oxley Act of 2002. Although it is difficult to draw causal conclusion given other potential confounding events that happened after 2002, it suggests that it is important to control for macro policy effects in the analysis.

increase in cash holdings in the fourth fiscal quarter, following Bates et al. (2009).[4] The summary statistics for firm- and industry-characteristic variables are reported in Table 2. The summary statistics show that the mean and median differences between the fourth quarter and the average of the first three quarters are statistically significant for many of our sampled firm characteristics. Therefore, it is important to control for such firm attributes when analyzing the dynamics of quarterly cash holdings of firms.

[Table 2 about here]

To formally assess the statistical and economical significance of a fourth-quarter cash holding hike after controlling for firm characteristics, we conduct a regression analysis using firm-fixed effect specification, which allows us to use within-firm variation to identify the quarterly difference in cash holdings. Specifically, we estimate the following regression models:

$$CASH_{q,it} = \beta_0 + \beta_1 FQTR_{4,it} + \boldsymbol{X}'_{q,it}\boldsymbol{\delta} + \mu_i + \tau_t + \varepsilon_{q,it} \quad (3)$$

$$CASH_{q,it} = \beta_0 + \sum_{k=1}^{3} \beta_k FQTR_{k,it} + \boldsymbol{X}'_{q,it}\boldsymbol{\delta} + \mu_i + \tau_t + \varepsilon_{q,it} \quad (4)$$

where $CASH_{q,it}$ refers to cash holdings (normalized by total assets) in the fiscal quarter q for firm i in year t; $FQTR_{q,it}$ is firm i's fiscal quarter q fixed effect; $\boldsymbol{X}_{q,it}$ is the set of firm and industry characteristics. We follow Bates et al. (2009) and include market-to-book ratio, firm size, cash flow, non-cash working capital, capital expenditures, leverage, dividend payout, research and development expenditures, and industry-level cash flow volatility as other explanatory variables. μ_i denotes firm fixed effects. τ_t denotes year fixed effects, controlling macro policy and other year effects. In equation (1), the coefficient β_1 captures the difference between fourth fiscal quarter on

[4] These firm characteristic variables are from the quarterly files of Standard & Poor's (S&P) Compustat database with the exception of two measures, i.e., research and development and acquisitions, which are not available through the quarterly data file. Both these measures are extrapolated using the Compustat fundamental annual data file.

cash holdings and average cash holdings of the other three quarters that cannot be attributed to the observed firm and industry characteristics as well as firm and year fixed effects; we expect that β_1 will be positive. In equation (4), the set of coefficients, i.e., $\beta_1, \beta_2,$ and β_3, captures the difference between cash holdings in the first three fiscal quarters and cash holdings in fourth fiscal quarter, respectively; we expect that $\beta_1, \beta_2,$ and β_3 will all be negative. We cluster standard errors at the firm level to account for within-firm correlation in errors.

[Table 3 about here]

Table 3 reports the regression results of equations (3) and (4). Across different specifications, the results in Table 3 show that firms hold significantly (at the 1% level) more cash in the fourth fiscal quarter compared to the other three quarters. For instance, in Column (7), where we control for observed firm and industry characteristics as well as firm- and year-fixed effects, firms hold 3.3% more cash (relative to total book assets) in the fourth quarter compared to the average of the other three quarters.

When we compare cash holdings in the first three fiscal quarters with those in the fourth fiscal quarter separately, results show that firms hold uniformly less cash in the other three fiscal quarters compared to fourth fiscal quarters and the results are statistically significant at the 1% level. For instance, Column (8) shows that the average cash holdings in first, second, and third quarters are 4.5%, 3.5%, and 2.3% lower than in the fourth quarter, respectively, and the magnitudes of the declines are statistically significant at the 1% level. The results reveal an interesting pattern in the dynamics in cash holdings of firms within a fiscal year: firms tend to hike cash holdings in the fourth quarter followed by a substantial reversal in the subsequent quarters of the following year. In sum, our analysis here shows that firms hold significantly higher cash in the fourth fiscal quarter compared to the other three quarters even after accounting for various

observed and time-invariant firm characteristics. This naturally leads us to ask how firms hike fourth-quarter cash, which we investigate in the next section.

4. How do firms hike fiscal-year-end cash holdings?

We investigate three possible means through which firms can increase their fiscal-year-end quarter cash holdings: calendar year-end effect, choice of fiscal-year-end quarter, and the use of real, timing, and financial instruments to boost fiscal-year-end cash holdings.

4.1. Calendar year-end effect

A potential reason for the increase in cash holdings during the fourth quarter is the abnormal business activity towards the calendar year-end. For example, increased sales and cash flow during the year-end holiday season, rather than some unobserved factors, are responsible for the inflated cash position in the fourth quarter. To investigate calendar year-end effect, we define two separate fourth-quarter dummies: the December fourth-quarter dummy (DEC_FQTR4) for firms with fiscal-year-end in December and the non-December fourth-quarter dummy (NONDEC_FQTR4) for firms with fiscal-year-end other than December. If the increase in cash in the fourth quarter is driven purely by the calendar year-end surge in sales and cash flows, then we should observe a positive and statistically significant effect in DEC_FQTR4 but not in NONDEC_FQTR4 indicator variable. Columns (3), (6), and (9) of Table 3 show that the coefficients on DEC_FQTR4 and NONDEC_FQTR4 are positive and statistically significant at the 1% level. Specifically, Column (9) shows that coefficients of DEC_FQTR4 and NONDEC_FQTR4 are both significant with similar magnitudes of 0.032 and 0.033, respectively, indicating that fourth-quarter cash hike behavior appears to be similar between firms with fiscal-year-end in December and those with fiscal-year-end in non-December. Our analyses, therefore, suggest that the increase in cash

holdings during the fourth quarter is not driven by the higher calendar year-end sales and cash flows.

4.2. Choice of year-end fiscal quarter

Another possible way for firms to hike fourth-quarter cash holdings is to intentionally choose the calendar quarter with highest cash-flow as the fiscal-year-end quarter. We conduct several analyses to address such a possibility. First, if fourth-quarter cash hike is merely a manifestation of high fiscal-year-end firm-level seasonal activities, one would expect a particularly strong positive association between fourth-quarter firm activities, i.e., revenues, net income, and working capital, with the fourth-quarter cash holdings. It is, therefore, important to isolate the changes in cash holdings at the turn of the year that are unrelated to seasonal variations in firms' activity levels. To this end, we follow Frankel et al. (2020) and estimate the following regression models.

$$CASH_{q,it} = \beta_0 + \beta_1 FQTR_{4,it} + \beta_2 NI_{q,it} + \sum_{l=-4}^{2} \gamma_l \Delta SALES_{q+l,it} + \sum_{l=-4}^{2} \theta_l \Delta NI_{q+l,it} + \sum_{l=-4}^{-2} \pi_l WC_{q+l,it} + \boldsymbol{X'_{q,it}\delta} + \mu_i + \tau_t + \varepsilon_{q,it} \quad (5)$$

$$CASH_{q,it} = \beta_0 + \sum_{k=1}^{3} \beta_k FQTR_{k,it} + \beta_4 NI_{q,it} + \sum_{l=-4}^{2} \gamma_l \Delta SALES_{q+l,it} + \sum_{l=-4}^{2} \theta_l \Delta NI_{q+l,it} + \sum_{l=-4}^{-2} \pi_l WC_{q+l,it} + \boldsymbol{X'_{q,it}\delta} + \mu_i + \tau_t + \varepsilon_{q,it} \quad (6)$$

where $NI_{q,it}$ stands net income in quarter q for firm i in year t, $\Delta SALES_{q+l,it}$ stands for changes in sales revenues between quarter $q+l$ and $q+l-1$ for firm i in year t, $\Delta NI_{q+l,it}$ is the changes in net income between quarter $q+l$ and $q+l-1$ for firm i in year t, and $WC_{q+l,it}$ stands for working capital and calculated as: current assets – cash – current liabilities + debt in current liabilities. If changes in seasonal firm-level activities can explain the elevated fourth-quarter cash

holdings, in addition to other firm characteristics, we should expect the coefficient on $FQTR_{4,it}$ in regression models (5) and coefficients on $FQTR_{k,it}$ in regression model (6) to render statistically indistinguishable from 0. Table 4 shows results from both regression models including quarterly firm-level characteristics, year- and firm-fixed effects. Results in Columns (1) to (4) of the table show that the elevated cash holdings in the four quarter cannot be explained by quarterly firm-level activities. In Columns (4) to (6), we also control for quarterly firm characteristics as in Bates et al. (2009) and in Columns (7) to (9) we additionally control for firm-fixed effects. Overall, the results in Table 4 demonstrate that changes in firms' activity levels (including quarterly firm characteristics, year- and firm-fixed effects) cannot explain the statistically and economically significant elevated cash holdings in the fourth fiscal quarter.

[Table 4 about here]

Second, if the higher reported cash in the fiscal-year-end quarter is due to the fact that firms choose the quarter with the highest cash flow as the fiscal-year-end quarter, we should observe a smaller increase in fiscal-year-end quarter cash holdings during economic uncertainties, such as episodes of economic recession and economic policy uncertainty, when average firms experience negative cash-flow shocks. Panel A of Figure 4 reports the annual increase in fourth-quarter cash holdings over time along with NBER-dated economic recessions. The figures show no systematic association between the increase in fourth-quarter cash holdings and economic cycles. Panel B of Figure 4 shows the association between average fourth-quarter cash hike and the economic policy uncertainty (EPU) measure of Baker et al. (2016). Once again, we do not see any systematic association between the increase in fourth-quarter cash holdings and EPU.

Finally, we examine the cash hike behaviors of old and young firms on the presumption that older firms are more likely to have chosen a fiscal-year-end that better coincides with their cash-

flow cycle than young firms that are still navigating their economic environments. By dint of this logic, we should observe that the increase in fourth-quarter cash holdings is smaller for younger than for older firms. We document in panel C of Figure 4 that both old and young firms have a similar pattern in fiscal-year-end cash hikes.

Taken together, the above analyses show no evidence that the fourth-quarter increase in cash holdings is simply a manifestation of fiscal-year-end quarter choice by firms or is driven by seasonal business activities.

[Figure 4 about here]

4.3. Real, timing, and financial instruments

Firms could deploy various real, timing, and financial instruments to achieve elevated cash holdings in the fourth fiscal quarter. However, to operationalize such instruments firms need to match the increase in cash holdings to other balance sheet items so that the cash hike eventually balances out. To this end, firms can choose items on either or both sides of the balance sheet depending on the liquidity of the instruments, transaction cost associated with adjusting the item, the regulatory disclosure requirements, and the discretionary flexibility available to firms.

The literature on cash-flow and earnings management (Teoh et al., 1998a, 1998b; Erickson and Wang, 1999; Demirtas et al., 2013; Lee, 2012; Roychowdhury, 2006) documents that firms could alter real activities and deploy timing strategies to maneuver non-cash balance sheet accounts to report higher than actual cash holdings. Based on the extant literature, we conduct analyses to address the possibility that firms increase fourth-quarter cash holdings by using real, timing, and financial instruments.

Real instrument: Roychowdhury (2006) identifies a set of real instruments deployed by managers to manipulate cash flow in order to avoid reporting annual losses. A natural extension

of her analyses would be to investigate whether such instruments can also be deployed for hiking fourth-quarter cash holdings. Therefore, following Roychowdhury (2006), we construct those instruments for our sample. First, managers can use price discounts to inflate sales temporarily and any such temporal increase in sales must show up in the abnormal (unexpected) components as opposed to the normal (expected) components of their operating cash flows. To this end, we predict the normal (expected) level of operating cash flows from the following regression model:

$$\frac{CFO_{q,it}}{TA_{q-1,it}} = \varphi_0 + \varphi_1\left(\frac{1}{TA_{q-1,it}}\right) + \varphi_2\left(\frac{SALES_{q,it}}{TA_{q-1,it}}\right) + \varphi_3\left(\frac{\Delta SALES_{q,it}}{TA_{q-1,it}}\right) + \varepsilon_{q,it} \quad (7)$$

where, $CFO_{q,it}$ is the cash flow from operations (CFO) in quarter q for firm i in year t, $TA_{q-1,it}$ is the total assets at the beginning of the quarter, $Sales_{q,it}$ and $\Delta Sales_{q,it}$ are the sales and change in sales during the quarter q. We estimate equation (7) cross-sectionally for each industry-quarter with at least 14 observations, where industry is defined by 2-digit SIC codes, such that the estimated coefficients vary over time and reflect the impact of industry-wide economic conditions on firms' cash flows over time. The firm-level quarterly abnormal (unexpected) cash flow from operations, $UCFO_{q,it}$, is then calculated as the actual CFO minus the "normal" CFO calculated using the estimated coefficients from the corresponding industry-quarter regression model and firm-quarter's sales and lagged assets. Finally, we calculate the within-fiscal-year change in abnormal CFO (ΔUCFO) as the difference in the fourth-quarter UCFO and the average UCFO over the first three quarters, i.e., $\Delta UCFO_{4,it} = UCFO_{4,it} - \overline{UCFO}_{1-3,it}$.[5]

Second, managers can under-invest in real discretionary expenses such as R&D, advertising, and SG&A to preserve cash for hike. Following the argument of Roychowdhury (2006), any such reductions in real discretionary activities would be rather unexpected and may not be accounted

[5] See Roychowdhury (2006) and Zang (2012) for similar abnormal cash flow from operations estimation procedures.

for by models predicting normal levels of these expenditures. We first use the following model to estimate the normal (expected) level of discretionary expenses for every industry and quarter as follows:

$$\frac{DISEXP_{q,it}}{TA_{q-1,it}} = \varphi_0 + \varphi_1\left(\frac{1}{TA_{q-1,it}}\right) + \varphi_2\left(\frac{SALES_{q,it}}{TA_{q-1,it}}\right) + \varepsilon_{q,it} \quad (8)$$

where $DISEXP_{q,it}$ is the discretionary expense in quarter q for firm i in year t. Similar to the procedure outlined above, equation (8) is estimated cross-sectionally for each industry-quarter with at least 14 observations. The firm-level abnormal (unexpected) discretionary expenses, $UDISEXP_{q,it}$, is then calculated as the actual DISEXP minus the "normal" DISEXP calculated using the estimated coefficients from the corresponding industry-quarter regression model and firm-quarter's sales and lagged assets. Finally, we calculate the within-fiscal-year changes in abnormal discretionary expenses (ΔUDISEXP) as the difference in the fourth-quarter UDISEXP and the average UDISEXP over the first three quarters, i.e., $\Delta UDISEXP_{4,it} = UDISEXP_{4,it} - \overline{UDISEXP}_{1-3,it}$.

Third, managers can also over-produce what is needed to meet expected demand in order to spread the fixed overhead cost over a large number of units, thereby lowering per-unit fixed cost and, all else equal, increasing operating revenues. Such maneuvering of production cost can inflate cash flows and may eventually be used for cash hike purposes. We use the following model to estimate the normal (expected) level of production cost for every industry and quarter:

$$\frac{PROD_{q,it}}{TA_{q-1,it}} = \varphi_0 + \varphi_1\left(\frac{1}{TA_{q-1,it}}\right) + \varphi_1\left(\frac{SALES_{q,it}}{TA_{q-1,it}}\right) + \varphi_3\left(\frac{\Delta SALES_{q,it}}{TA_{q-1,it}}\right) + \varphi_4\left(\frac{\Delta SALES_{q-1,it}}{TA_{q-1,it}}\right) + \varepsilon_{q,it} \quad (9)$$

where, $PROD_{q,it}$ is the production cost (cost of goods sold plus change in inventory) in quarter q for firm i in year t. Again, following the procedure outlined above, we first estimate equation (9) cross-sectionally for each industry-quarter with at least 14 observations and then the firm-level

abnormal (unexpected) production cost, $UPROD_{q,ijt}$, is calculated as the actual UPROD minus the "normal" UPROD calculated using the estimated coefficients from the corresponding industry-quarter regression model and firm-quarter's sales and lagged assets. Finally, we calculate the within-fiscal-year changes in abnormal production cost (ΔUPROD) as the difference in the fourth-quarter UPROD and the average UPROD over the first three quarters, i.e., $\Delta UPROD_{4,it} = UPROD_{4,it} - \overline{UPROD}_{1-3,it}$.

Timing Instrument: Lee (2012) documents that firms tend to inflate reported cash flow by shuffling items in the financial statement categories (classification strategy) and by leading receivables and lagging payables (timing strategy). While misclassification may result in violations of GAAP, Lee (2012) argues that managers tend to have more discretion over adjusting working capital to alter reported cash flow. We, therefore, focus on the timing instrument to examine whether managers deploy such an instrument to hike cash holdings. Following Lee (2012), we construct a firm's cash conversion cycle as follows:

$$CCC_{q,it} = \left(\frac{\frac{(AR_{q,it} + AR_{q-1,it})}{2}}{\frac{SALES_{q,it}}{90}}\right) + \left(\frac{\frac{(INV_{q,it} + INV_{q-1,it})}{2}}{\frac{COGS_{q,it}}{90}}\right) - \left(\frac{\frac{(AP_{q,it} + AP_{q-1,it})}{2}}{\frac{PURCHASES_{q,it}}{90}}\right) \quad (10)$$

where, $AR_{q,it}$ is accounts receivables in quarter q for firm i in year t. $INV_{q,it}$ is inventory, $AP_{q,it}$ is accounts payables, $SALES_{q,it}$ is sales, $COGS_{q,it}$ is cost of goods sold, and $PURCHASES_{q,it}$ is the change in inventory plus cost of goods sold. For each firm-year, we then calculate change in cash conversion cycle ($\Delta CCC_{4,it}$) as the difference in the fourth-quarter cash conversion cycle and the average cash conversion cycle over the first three quarters, i.e., $\Delta CCC_{4,it} = CCC_{4,it} - \overline{CCC}_{1-3,it}$. Furthermore, we use the three components of cash conversion cycle separately, i.e., receivable conversion cycle $RCC_{q,it} = \frac{\frac{(AR_{q,it}+AR_{q-1,it})}{2}}{\frac{SALES_{q,it}}{90}}$, inventory conversion cycle $ICC_{q,it} =$

$\frac{\left(AR_{q,it}+AR_{q-1,it}\right)}{\frac{SALES_{q,it}}{90}}$, and payable conversion cycle $PCC_{q,it} = \frac{\left(AP_{q,it}+AP_{q-1,it}\right)}{\frac{PURCHASES_{q,it}}{90}}$, and calculate their fourth-quarter difference from the average of the previous three quarters for a more direct and granular analyses of how various components of the timing instrument relate to the fourth-quarter cash hike phenomenon.

Using the foregoing instruments, we first conduct univariate analyses to examine the association between these instruments and hike in cash holdings. We classify sample firms into quartiles based on our cash hike (*Cash_hike*) measure. We define a firm as a "high-hike" firm if it belongs to higher (third or fourth) quartiles of *Cash_hike* measure; otherwise, we define it as a "low-hike" firm. For robustness, we further refine our classification and designate a firm as "high-hike" if it belongs to the highest (fourth) quartiles of *Cash_hike* measure; otherwise, we define it as "low-hike".[6] Table 5 compares the mean and median of real and timing instruments between high-hike and low-hike firms.

[Table 5 about here]

The univariate analysis presented in Table 5 clearly illustrates that there is a statistically significant (at the 1% level) difference across real and timing instruments of cash-flow maneuverings between high-hike and low-hike firms. High-hike firms are likely to have higher unexpected operating cash-flows (ΔUCFO), lower unexpected discretionary expenses (ΔUDISEXP) and production costs (ΔUPROD), and shorter cash conversion cycles (ΔCCC), i.e., both the mean and median differences in ΔCCC compared to low-hike firms are negative. In terms of the individual components of the cash conversion cycle, the table shows that all three components are lower for high-hike firms. The results are interesting. It shows that high-hike firms

[6] Our results are quantitatively and qualitatively similar for both classifications of high-hike firm. For the sake of brevity, we do not report results using our second classification but they are available on request.

reduce Receivable Conversion Cycle (RCC) and Inventory Conversion Cycle (ICC) compared to low-hike firms, which contribute to elevated fourth-quarter cash holdings for those high-hike firms. However, high-hike firms also appear to have reduced Payable Conversion Cycle (ΔPCC), which decreases cash holdings. The results indicate that firms tend to accelerate receivable collection and inventory turnover, while, at same time, facing a decrease in payable days. The net magnitude of combined reduction in the two ΔCCC components (ΔRCC and ΔICC) on the asset side is greater than the reduction on the ΔCCC component (ΔPCC) on the liability side, resulting in a net increase in fourth-quarter cash holdings. Our univariate results are quantitatively and qualitatively similar across both classifications of high-hike firms, suggesting that firms use a combination of real and timing channels to increase the fourth-quarter cash holdings.

Next, we analyze the association between real and timing instruments and cash hike in a multivariate setting by estimating the following equation:

$$Instrument_{4,it} = \alpha + \lambda\, High\_hike_{4,it} + \boldsymbol{X}_{it}'\boldsymbol{\delta} + \mu_i + \tau_t + \varepsilon_{it} \quad (11)$$

In equation (11), $Instrument_{4,it}$ is a measure of real or timing instruments, defined in previous equations, for firm i in industry j and in fiscal year t; $High\_hike_{it}$ is an indicator variable equal to one for high-hike firms and zero otherwise; $\boldsymbol{X_{it}}$ is a set of firm-level control variables measured at the end of the fiscal year, and μ_i and τ_t are firm and year fixed effects, respectively. We follow Lee (2012) and Roychowdhury (2006) and include firm size, market-to-book, net income, tangibility, leverage, and liquidity as firm-level controls in our estimation.

[Table 6 about here]

Table 6 reports our multivariate regression results. It shows that high-hike firms are indeed more likely to have higher unexpected cash flow from operations (ΔUCFO*)* and lower unexpected discretionary expense (ΔUDISCEXP), unexpected production cost (ΔUPROD), and greater

reduction in cash conversion cycle (ΔCCC). Furthermore, high-hike firms have greater reduction in all three components of cash conversion cycle, i.e., receivable, inventory, and payable. As discussed earlier, it appears that even in the multivariate setting, receivable and payable channels somewhat cancel each other and the inventory channel of cash conversion cycle is the primary driver of fourth-quarter cash hike via the CCC instrument. All these coefficients are statistically significant at 1% level. Consistent with the theory on cash window dressing and empirical evidence from the earnings and cash-flow management literature, our results in this section suggest that managers use real and timing mechanisms to adjust financial statement accounts to hike cash holdings in the fourth quarter.

Financial Instrument: Another simple way for firms to increase fiscal-year-end cash holdings is to engage in more borrowing in the fiscal-year-end quarter. To investigate whether the hike in fiscal-year-end cash holdings is simply due to higher debt financing in the fourth fiscal quarter of the year, we first re-estimate equations (3) and (4) using net cash (cash minus debt) to total asset ratio, which removes the effect of debt financing in the calculation of cash ratio. Results reported in Columns 1–3 of Table 7 show a consistent pattern of significantly higher net cash holdings in the fourth fiscal quarter compared to the other three quarters, similar to the ones reported in Table 3. Next, we use changes in quarterly debt issuance (normalized by firm size) as the dependent variable in Columns 4–6 of Table 7 and find that debt issuance in the fourth quarter is significantly lower compared to the other three quarters. The results indicate that the increase in cash holdings during the fourth quarter is not due to the higher fourth fiscal quarter debt financing.

[Table 7 about here]

5. Why do firms hike fiscal-year-end cash holdings?

After observing that firms make efforts to hike cash holdings in the fourth quarter, a natural question is: Why do firms hike fiscal-year-end cash holdings? We investigate the heterogeneity of the hike in fourth-quarter cash holdings to address this question.

5.1. Marginal value of cash holdings

As we discuss in the Introduction, extant evidence shows that corporate stakeholders such as shareholders, analysts, and creditors tend to put more emphasis on fiscal-year-end than on intra-year measurements (e.g., Jacob and Jorgensen, 2007; Das et al., 2009; Givoly and Ronen, 1981; Fan et al., 2010). As such, improving a firm's reported liquidity can favorably affect the market's assessment of the firm's credit risk and, therefore, lower direct and indirect cost of financial distress (Li et al., 2020). It can also enable firms to achieve certain financial condition thresholds (DeGeorge et al., 1999) that can ensure benefit from regulatory arbitrage (Cai et al., 2019) and shield the firm from stricter auditor scrutiny (Anbil and Senyuz, 2018; Fargher et al., 2019; Huang et al., 2020; Commerford et al., 2018).

These benefits, although difficult to measure directly, would be reflected in the market valuation of reported cash holdings. We thus follow Faulkender and Wang (2006) and Dittmar and Mahrt-Smith (2007) and estimate the marginal market value of each additional dollar of cash that firms report. Specifically, we estimate the following marginal value of cash model:

$$r_{it} - r_{it}^{B} = \beta_0 + \beta_1 \left(Cash\_hike_{4,it} \times \frac{\Delta C_{it}}{M_{it-1}} \right) + \beta_2 Cash\_hike_{4,it} + \beta_3 \frac{\Delta C_{it}}{M_{it-1}} + \beta_4 \frac{\Delta E_{it}}{M_{it-1}} + \beta_5 \frac{\Delta NA_{it}}{M_{it-1}} + \beta_6 \frac{\Delta RD_{it}}{M_{it-1}} + \beta_7 \frac{\Delta I_{it}}{M_{it-1}} + \beta_8 \frac{\Delta D_{it}}{M_{it-1}} + \beta_9 \frac{C_{it-1}}{M_{it-1}} + \beta_{10} L_{it} + \beta_{11} \frac{\Delta NF_{it}}{M_{it-1}} + \epsilon_{it} \quad (12)$$

where $r_{it} - r_{it}^{B}$ is the excess benchmark return for firm i in year t; for benchmark return, we use Fama–French 25 size and value portfolios as well as Fama–French 49-industry portfolios. $\frac{\Delta C_{it}}{M_{it-1}}$ is

change of year-end cash holdings from year *t-1* to year *t*, normalized by the market value of the firm. β_3, the coefficient on $\frac{\Delta C_{it}}{M_{it-1}}$, gives the marginal value of cash for firms without an increase of fourth-quarter cash. β_1, the coefficient of the interaction term, $Cash\_hike_{4,it} \times \frac{\Delta C_{it}}{M_{it-1}}$, gives the relation between marginal value of cash and the increase of fourth-quarter cash holding. Other control variables in equation (12) are the same as in Faulkender and Wang (2006) and Dittmar and Mahrt-Smith (2007) and their definitions are given in the Appendix. A higher marginal value of cash would give greater incentive for firms to hike their year-end reported cash holdings. In other words, firms with greater hikes in fourth-quarter cash holdings are expected to be associated with higher marginal values of cash; the coefficient of the interaction term, $Cash\_hike_{4,it} \times \frac{\Delta C_{it}}{M_{it-1}}$ is expected to be positive, i.e., $\beta_1 > 0$.

[Table 8 is about here]

Table 8 reports the results on the marginal value of cash regressions. Columns 1–4 use the returns of Fama–French 25 size and value portfolios as benchmarks. Column (1) replicates Faulkender and Wang (2006) and shows that the estimated coefficients are in line with their results. Column (4) reports the results of equation (11) which estimates the marginal value of cash including both year-fixed and firm-fixed effects. The result shows that the coefficient on $\frac{\Delta C_{it}}{M_{it-1}}$ equals 0.806. It suggests that for firms with a zero increase in fourth-quarter cash holdings, the marginal value of each dollar of cash is 80.6 cents. The coefficient of the interaction term $Cash\_hike_{4,it} \times \frac{\Delta C_{it}}{M_{it-1}}$ equals 0.422. It suggests that firms with a higher level of cash hike in the fourth quarter are associated with greater marginal value of cash. For firms with an average level of $Cash\_hike_{4,it}$ (22.18%), the marginal value of cash holding is 90 cents. Columns 5–8 of the

table report the results using the returns of Fama–French 49-industry portfolios as benchmark and yield similar results.

In a nutshell, the marginal value analysis suggests that firms with higher hikes in cash holdings are associated with greater marginal value of reported cash, consistent with the notion that a higher marginal value of cash gives greater incentive for firms to hike year-end reported cash holding.

5.2. Do some firms hike more than others?

Despite its benefits, increasing fiscal-year-end cash holdings is not without constraint. The extent to which a firm increases fourth-quarter cash holdings will depend on the potential benefits from such activity as well as its capacity to do so. From the benefit perspective, firms with higher growth opportunities would require frequent access to external capital markets to finance their elevated level of growth. Therefore, such firms may benefit more from higher year-end cash holdings by projecting higher balance sheet liquidity to external capital markets, which could lower their external financing premia. Furthermore, firms in need of immediate debt refinancing are more likely to hike cash holdings to look good at the end of the fiscal year because capital-market interactions are more important for these firms as opposed to firms that do not rely to such extent to external capital markets. Despite the foregoing benefits, some firms may not be able to increase year-end cash holdings due to capacity constraints. For instance, firms facing more external monitoring by stakeholders such as auditors and institutional investors are less likely to engage in fiscal-year-end cash hikes. Auditors and institutional investors tend to be concerned about the true financial conditions of companies and will be wary of the use of accounting instruments to camouflage firms' credit risk. Moreover, firms with greater financial constraints will have reduced

financing flexibility in using real or timing instruments to maneuver cash across quarters and hike their fiscal-year-end quarter cash holdings.

To test the foregoing conjectures, we develop several empirical firm attributes that capture a firm's benefit as well as capacity to hike fourth-quarter cash holdings. On the benefit side, the first measure is Tobin's Q to proxy for a firm's future growth opportunities. The second measure is the ratio of the most immediate long-term debt (maturing in 2 years) over debt in current liabilities to measure a firm's immediate refinancing need; the logic is this: if more long-term debt is maturing in year 2 than the firm can borrow on a short-term basis (less than a year), it may have to frequently roll over short-term debt to maintain its target capital structure. The third measure is net external financing, which captures the changes in net external debt and equity issuance by firms. The fourth measure is the net debt issuance activities of a firm. We define net debt issuance as follows: $\frac{\Delta \text{STD}+\Delta \text{LTD}}{.5\times(\text{STD}_t+\text{LTD}_t)+.5\times(\text{STD}_{t-1}+\text{LTD}_{t-1})}$, where STD is short-term debt and LTD is long-term debt. Finally, to capture net equity issuance activities of firms, the fifth measure is net equity issuance defined as follows: $\frac{\Delta \text{SHE}}{.5\times(\text{SHE}_t+\text{SHE}_{t-1})}$, where SHE stands for shareholders' equity.

On the capacity side, we use the indication of whether a firm is audited by any of the top four auditors and the degree of institutional ownership to gauge the extent of external monitoring of firms. We use a firm's capacity to finance its R&D and capital expenditure without relying on the external capital market as a measure of its financial slack; a firm with higher financial slack will have greater capacity to maneuver a cash hike. Finally, we use three indices of financing constraints from Hadlock and Pierce (2010), Kaplan and Zingales (1997), and Whited and Wu (2006) to measure the extent of financial constraint faced by a firm; a higher degree of financial constraint is likely to reduce financing flexibility of the firm, thereby denting its capability to alter financial statement variables. The variables definitions are given in the Appendix.

In Tables 9 and 10, we examine whether these firm attributes are associated with the degree of hike in fourth-quarter cash holdings. We follow Bates et al. (2009) and Chen et al. (2017) in controlling for firm characteristics as well as firm- and year-fixed effects. The results show positive and statistically significant relations (at the 1% level) between these firm attributes with the hike in fourth-quarter cash holding. Specifically, in Table 9, results show that informationally opaque and high-growth firms requiring frequent access to external capital markets for financing are associated with a greater hike in fourth-quarter cash holdings. In Table 10, results show that firms with stringent external capital market monitoring and lessened financial flexibility, i.e., financially constrained firms, are associated with smaller hikes in fourth-quarter cash holdings. The analysis in this section supports the notion that firms' benefits as well as capacities to manipulate financial variables are likely to determine how much they engage in fiscal-year-end hiking of cash holdings.

[Tables 9 and 10 are about here]

6. Conclusion

This paper provides novel analysis of the dynamics of corporate intra-year cash holdings. We show that firms systematically increase their cash holdings in the fourth fiscal quarter, followed by subsequent reversal. The fiscal-year-end cash hike phenomenon is pervasive across industries and persists over the sample years. This phenomenon cannot be explained by traditional determinants of cash holdings, calendar year-end effect, or the choice of fiscal-year-end quarter. It is, however, associated with the adjustments of real (operational cash flow, discretionary expenditure, and production) and timing (cash conversion cycle) activities of firms. Moreover, firms with higher future growth opportunities and need for frequent access to capital markets for financing are more likely to have higher hikes in fourth fiscal quarter cash holdings, whereas firms with elevated

external scrutiny and reduced financial flexibility are likely to have lower hikes in fourth fiscal quarter cash holdings.

Our analysis shows that fiscal-year-end cash holdings is not a complete depiction of a firm's liquidity and credit risk conditions. External stakeholders such as shareholders, banks, rating agencies, and regulators need to be wary of reported fourth-quarter cash holdings in gauging firm-specific liquidity. A full review of intra-year cash holdings is necessary to have a complete picture of a firm's liquidity condition throughout the year and to avoid any mid-year cash crunch.

References

Acharya, V., Engle, R. & Richardson, M. (2012). Capital shortfall: A new approach to ranking and regulating systemic risks. *American Economic Review*, *102*(3), 59-64.

Allen, L. & Saunders, A. (1992). Bank window dressing: Theory and evidence. *Journal of Banking and Finance, 16*(3), 585-623.

Almeida, H., Campello, M. & Weisbach, M. S. (2004). The cash flow sensitivity of cash. *Journal of Finance*, *59*(4), 1777-1804.

Anbil, S. and Senyuz, Z. (2018). The regulatory and monetary policy nexus in the repo market. *Unpublished Working Paper,* Federal Reserve Board, Washington, D.C.

Baker, S., Bloom, N., Davis, S. (2016). Measuring economic policy uncertainty. *Quarterly Journal of Economics, 131*(4), 1593-1636.

Bates, T. W., Kahle, K. M. and Stulz, R. M. (2009). Why do US firms hold so much more cash than they used to? *Journal of Finance, 64*(5), 1985-2021.

Cai, J., García-Herrero, A., Li, F. and Le, X. (2019). The regulatory arbitrage and window dressing in shadow banking: the example of Chinese wealth management product. *Economic and Political Studies*, *7*(3), 314-336.

Chava, S. and Jarrow, R. A. (2004). Bankruptcy prediction with industry effects. *Review of Finance*, *8*(4), 537-569.

Chen, J. Z., Rees, L. L. and Sivaramakrishnan, S. (2017). On the use of accounting vs. real earnings management to meet earnings expectations – A market analysis. https://ssrn.com/abstract=1070122

Commerford, B. P., Hatfield, R. C. and Houston, R. W. (2018). The effect of real earnings management on auditor scrutiny of management's other financial reporting decisions. *Accounting Review*, *93*(5), 145-163.

Crouhy, M., Galai, D. and Mark, R. (2001). Prototype risk rating system. *Journal of Banking & Finance, 25*(1), 47-95.

Das, S., Shroff, P. K. and Zhang, H. (2009). Quarterly earnings patterns and earnings management. *Contemporary Accounting Research*, *26*(3), 797-831.

DeGeorge, F., Patel, J. and Zeckhauser, R. (1999). Earnings management to exceed thresholds. *Journal of Business, 72*(1), 1-33.

Demirtas, K. O. and Cornaggia, K. R. (2013). Initial credit ratings and earnings management. *Review of Financial Economics*, *22*(4), 135-145.

Dittmar, A. and Mahrt-Smith, J. (2007). Corporate governance and the value of cash holdings. *Journal of Financial Economics, 83*(3), 599-634.

Duchin, R. (2010). Cash holdings and corporate diversification. *Journal of Finance*, *65*(3), 955-992.

Erickson, M. and Wang, S. (1999). Earnings management by acquiring firms in stock for stock mergers. *Journal of Accounting and Economics, 27*(2), 149-176.

Fama, E. F. and French, K. R. (1997). Industry costs of equity. *Journal of Financial Economics*, *43*(2), 153-193.

Fan, Y., Barua, A., Cready, W. M. and Thomas, W. B. (2010). Managing earnings using classification shifting: Evidence from quarterly special items. *Accounting Review*, *85*(4), 1303-1323.

Fargher, N. L., Hou, W. and Zhang, J. Z. (2019). Do banks audited by specialists engage in less real activities management? Evidence from repurchase agreements. *Auditing: A Journal of Practice & Theory*, *38*(1), 149-169.

Faulkender, M. and Wang, R. (2006). Corporate financial policy and the value of cash. *Journal of Finance, 61*(4), 1957-1990.

Frankel, R., Levy, H. and Shalev, R. (2017). Factors associated with the year-end decline in working capital. *Management Science*, *63*(2), 438-458.

Fresard, L. (2010). Financial strength and product market behavior: The real effects of corporate cash holdings. *Journal of Finance, 65*(3), 1097-1122.

Givoly, D. and Ronen, J. (1981). Smoothing manifestations in fourth quarter results of operations: Some empirical evidence. *Abacus*, *17*(2), 174-193.

Hadlock, C. J. and Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. *Review of Financial Studies, 23*(5), 1909-1940.

Han, S. and Qiu, J. (2007). Corporate precautionary cash holdings. *Journal of Corporate Finance*, *13*(1), 43-57.

Harford, J., Klasa, S. and Maxwell, W. F. (2014). Refinancing risk and cash holdings. *Journal of Finance*, *69*(3), 975-1012.

Huang, S., Roychowdhury, S. and Sletten, E. (2020). Does litigation deter or encourage real earnings management? *Accounting Review*, *95*(3), 251-278.

Jacob, J. and Jorgensen, B. N. (2007). Earnings management and accounting income aggregation. *Journal of Accounting and Economics*, *43*(2-3), 369-390.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, *76*(2), 323-329.

Kaplan, S. N. and Zingales, L. (1997). Do investment–cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics, 112*(1), 169-215.

Lamont, O., Polk, C. and Saá-Requejo, J. (2001). Financial constraints and stock returns. *Review of Financial Studies, 14*(2), 529-554.

Lee, L. F. (2012). Incentives to inflate reported cash from operations using classification and timing. *Accounting Review, 87*(1), 1-33.

Li, Y., Li, X., Xiang, E. and Djajadikerta, H. G. (2020). Financial distress, internal control, and earnings management: Evidence from China. *Journal of Contemporary Accounting & Economics*, *16*(3), 100210.

Liu, Y. and Mauer, D. C. (2011). Corporate cash holdings and CEO compensation incentives. *Journal of Financial Economics*, *102*(1), 183-198.

Mulligan, C. (1997). The demand for cash balances by firms. *Journal of Political Economy*, *105*, 1061-1079.

Ohlson, J. A. (1980). Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research*, *18*(1), 109-131.

Opler, T., Pinkowitz, L., Stulz, R. and Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, *52*(1), 3-46.

Owens, E. L. and Wu, J. S. (2015). Quarter-end repo borrowing dynamics and bank risk opacity. *Review of Accounting Studies, 20*, 1164–1209.

Ozkan, A. and Ozkan, N. (2004). Corporate cash holdings: An empirical investigation of UK companies. *Journal of Banking & Finance*, *28*(9), 2103-2134.

Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics, 42*(3), 335-370.

Ryan, V. (2010, Feb. 17). A license to hold excess cash. *CFO.* https://www.cfo.com/banking-capital-markets/2010/02/a-license-to-hold-excess-cash/

SEC. (2010). Short Term Borrowings Disclosure, Proposed Rule, *Federal Register,* 17 CFR Part 229 and 249.

Shumway, T. (2001). Forecasting bankruptcy more accurately: A simple hazard model. *Journal of business*, *74*(1), 101-124.

Teoh, S. H., Welch, I. and Wong, T. J. (1998a). Earnings management and the long-run market performance of initial public offerings. *Journal of Finance, 53*(6), 1935-1974.

Teoh, S. H., Welch, I. and Wong, T. J. (1998b). Earnings management and the underperformance of seasoned equity offerings. *Journal of Financial Economics, 50*(1), 63-99.

Whited, T. M. and Wu, G. (2006). Financial constraints risk. *Review of Financial Studies, 19*(2), 531-559.

Zang, A.Y. (2012). Evidence on the trade-off between real activities manipulation and accrual-based earnings management. *The Accounting Review, 87*(2), 675-703.

Zmijewski, M. E. (1984). Methodological issues related to the estimation of financial distress prediction models. *Journal of Accounting Research*, *22*(1), 59-82.

Appendix: Variable definitions

Variables	Definitions
Cash-holding measures:	
Cash/TA	The ratio of cash and short-term investment to total assets: cheq/atq
Cash/MVA	The ratio of cash and short-term investment to market value of assets: cheq/((atq-ceqq)+(prccq*cshoq))
Cash/BVE	The ratio of cash and short-term investment to book value of equity: cheq/(atq-ltq)
Cash/MVE	The ratio of cash and short-term investment to market value of equity: cheq/(prccq*cshoq)
NetCash/TA	The ratio of cash and short-term investment (net of debt in current liabilities) to total assets: (cheq-dlcq)/atq
Cash-holding regression controls:	
MTB	Market values of assets to book value of assets: ((atq-ceqq)+(prccq*cshoq))/atq
Log(Assets)	Log of real (GNP-deflator adjusted) book value of total assets: log (atq/GNP deflator)
Cashflow	Cash flow to total assets: (oibdpq-xintq-txtq-dvpsxq)/atq
NWC	Non-cash net working capital: (wcapq-cheq)/atq
Capex	Capital expenditure to total assets: capxq/atq
Leverage	Short- and long-term debt to total assets: (dlttq+dlcq)/atq
IndSigma	Industry-level cash-flow volatility calculated following the procedure suggested by Bates et al. (2009)
Dividend	Dummy variable indicating whether the firm pays any dividend: Equals 1 if dvpsxq>0 and 0 otherwise
R&D	Research and development expenditure to sales: xrdq/saleq (set to 0 if xrdq is missing)
Acquisition	Acquisitions to total assets: aqcy/atq (since aqcy is year-to-date, it was adjusted to reflect quarterly aqc)
Marginal value of cash regression:	
Industry-adjusted annual excess return	Fama–French (1997) 49-industry value weighted return
Size and M/B adjusted annual excess return	Fama–French size and book-market matched portfolio return
ΔC_t	Change in cash and short-term investment (normalized by the beginning of the year market value of equity): che
ΔE_t	Change in earnings before extraordinary items (normalized by the beginning of the year market value of equity): (ib+xint+txdi+itci)
ΔNA_t	Change in net assets (normalized by the beginning of the year market value of equity): (at-che)
$\Delta R\&D_t$	Change in research and development expenditures (normalized by the beginning of the year market value of equity): (xrd, set to 0 if missing)
ΔI_t	Change in interest payment (normalized by the beginning of the year market value of equity): xint
ΔD_t	Change in common dividend (normalized by the beginning of the year market value of equity): dvc
C_{t-1}	Lagged cash-holding (normalized by the beginning of the year market value of equity): che
L_t	The ratio of leverage to market value of assets: (dltt+dlc)/(at-ceq + prcc*csho)
NF_t	New equity issues (sstk-prstke) + net debt issues (dltis-dltr)
***Cash_hike* determinants measures:**	
Top 4 auditor	A dummy variable indicating whether a firm's lead auditor is one of the top four auditing firms.
Auditor's opinion	Compustat data on whether auditors have unqualified versus qualified opinion about a firm's financial statement.
Tobin's Q	Measure of a firm's future growth opportunity, calculated following Duchin (2010): ((csho*prcc_f) -ceq -txdb)/(.9*at + .1*(csho*prcc_f))
Financial slack	Firms' ability to finance capital and R&D expenditure without relying on the external capital market: (oancf+wcap)/(capx+xrd)
Refinancing need	The ratio of debt maturing in 2 years to debt in current liabilities: dd1/dlc
Institutional shareholdings	Fraction of outstanding shares owned by institutional investors from the 13F filings.
Analyst coverage	Number of analyst covering the firm in I/B/E/S
Dividend payment	Dummy variable indicating dividend paying firm
Short-term debt	Compustat data item: dlc
Long-term debt	Compustat data item: dltt
Shareholders' equity	Compustat data items: sstk and seq
HP Index of FC	Hadlock and Pierce (2010) index of financial constraint
KZ index of FC	Kaplan and Zingales (1997) index of financial constraints
WW index of FC	Whited and Wu (2006) index of financial constraint measured following Lamont, Polk, and Saá-Requejo (2001)
Instruments of window-dressing measures:	
UCFO	Unexpected cash flow from operations (normalized by the beginning of the quarter total assets), calculated as actual CFO (oancfq) minus the predicted CFO calculated using Model 8.
UDISCEXP	Unexpected discretionary expenses (normalized by the beginning of the quarter total assets), calculated as actual DISEXP (xrdq+xadq+xsgaq) minus the predicted DISEXP calculated using Model 9.
UPROD	Unexpected production cost (normalized by the beginning of the quarter total assets) defined as the actual PROD (cogsq+invtq-l.invtq) and predicted PROD calculated using Model 10.
CCC	Change in cash conversion cycle, calculated using Model 11.
Net income	Net Income (normalized by the beginning of the quarter total assets): ibq.
Tangibility	Tangibility, calculated as property, plant, and equipment (normalized by the total assets): ppentq.
Liquidity	Liquidity, defined as current ratio (actq/lctq).

Figure 1: Average cash holdings in four fiscal quarters 1988–2018

The left (right) panel of the figure shows the average (median) Cash/Total assets at the beginning of the year in four fiscal quarters over the sample period 1988–2018 (left). The solid lines across y-axis depict the overall sample mean and median.

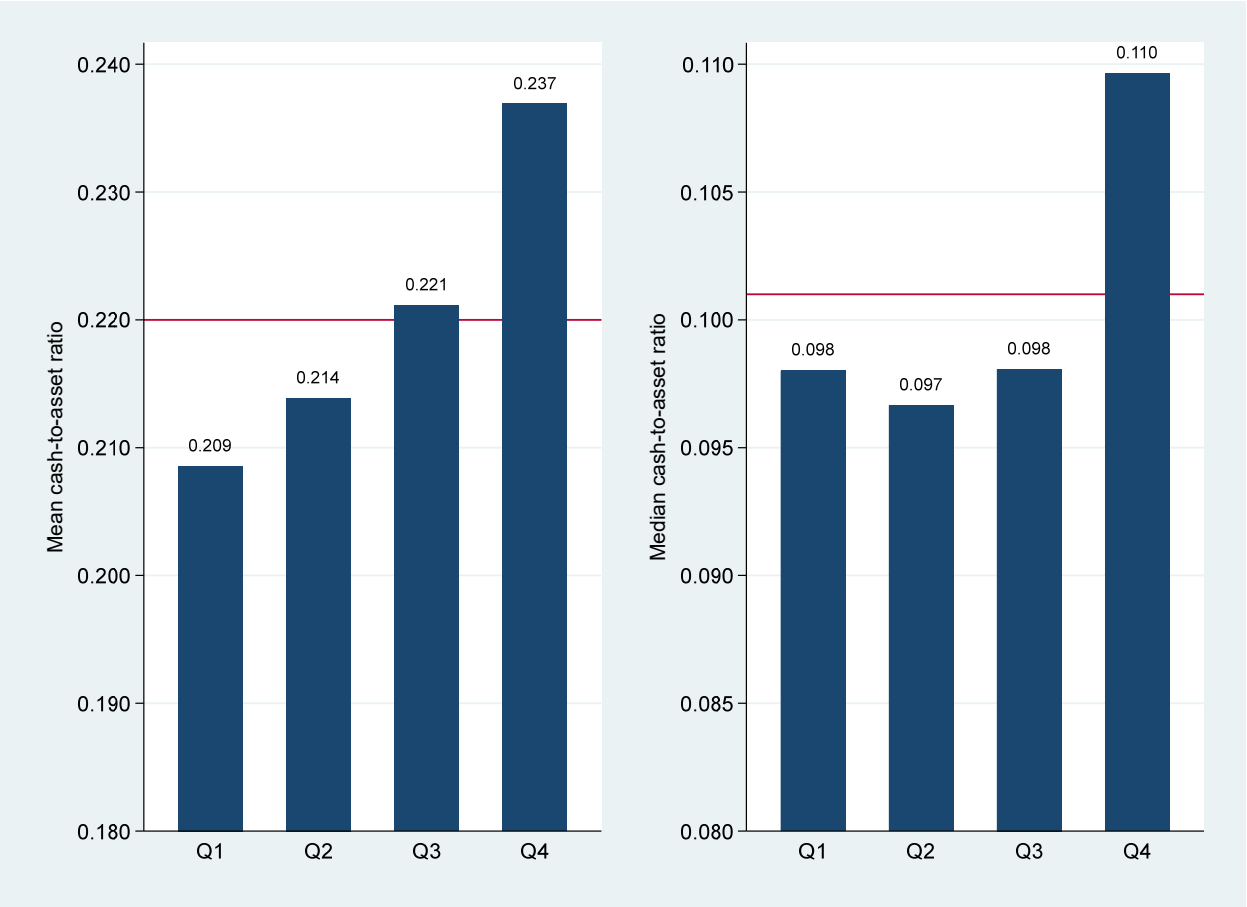

Figure 2: Quarterly cash holdings over time: 1988–2018

This figure shows the average and median Cash/Total assets ratio over the sample period along with the NBER-dated economic recessions (shaded areas) in the United States.

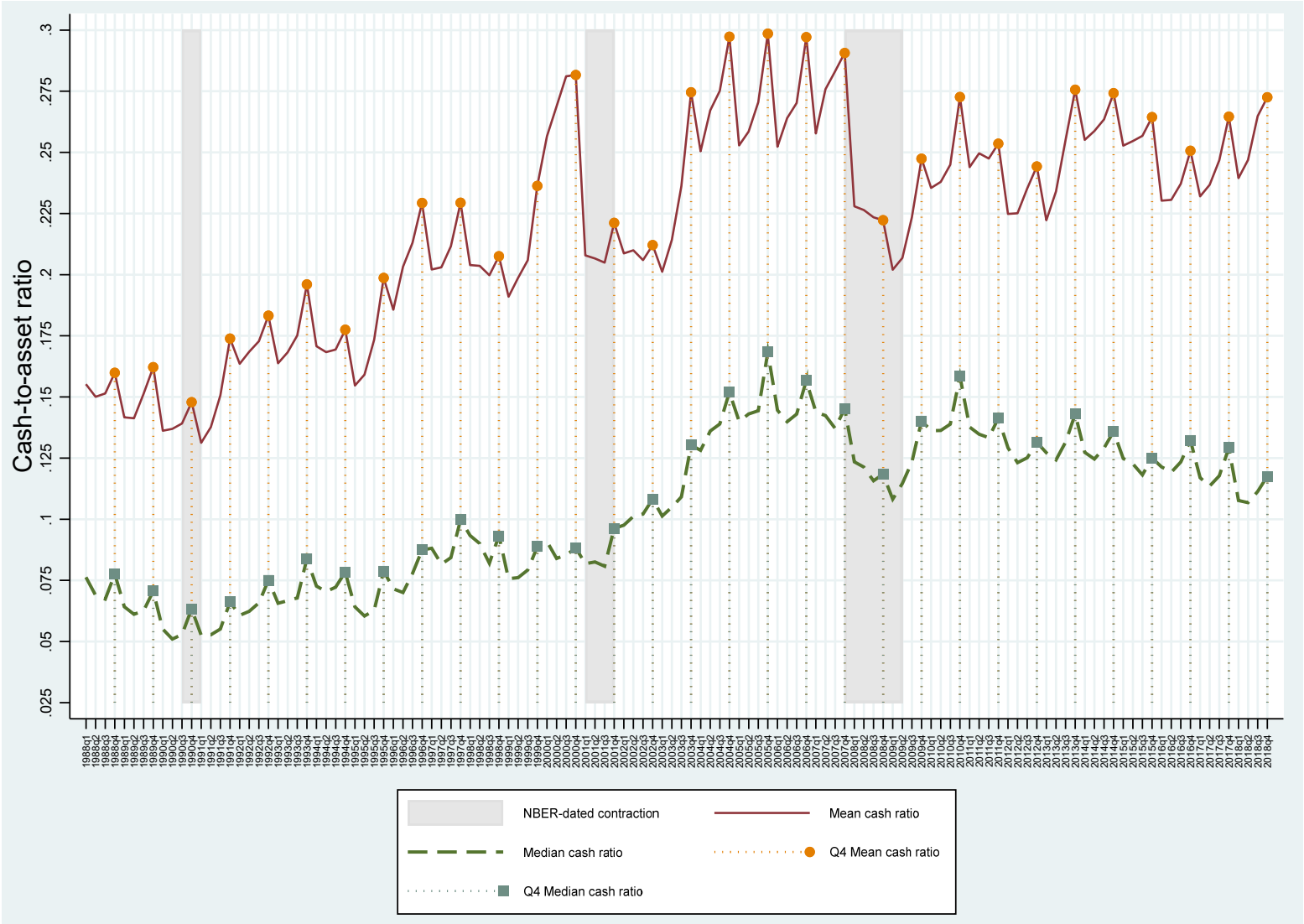

Figure 3: Hike and reversal of fourth-quarter cash holdings

This figure shows the percentage increase and reversal of fourth-quarter cash holdings in each sample year. The increase in the cash holdings in the fourth quarter is measured using the following formula:

$$Cash\_hike_{4,it} = \left[\left(Cash_{4,it} - \overline{Cash}_{1-3,it}\right)/\overline{Cash}_{1-3,it}\right] x\ 100,$$

where $Cash\_hike_{4,it}$ is the percentage hike in the fourth fiscal quarter for firm i in year t, $\overline{Cash}_{1-3,it}$ is the average cash holdings of the first three fiscal quarters for firm i in year t, and $Cash_{4,it}$ is fourth-quarter cash holdings for firm i in year t. Similarly, Reversal is calculated using the following formula:

$$Cash\_reversal_{it+1} = \left[\left(\overline{Cash}_{1-3,it+1} - Cash_{4,it}\right)/\overline{Cash}_{1-3,it+1}\right] x\ 100.$$

The mean values across firms in each year are computed and shown below. The equally weighted yearly mean is calculated using the 1/N weight for each firm in a given year. The value-weighted mean is calculated using relative market value (to market value of all firms) as weight for each firm in a given year.

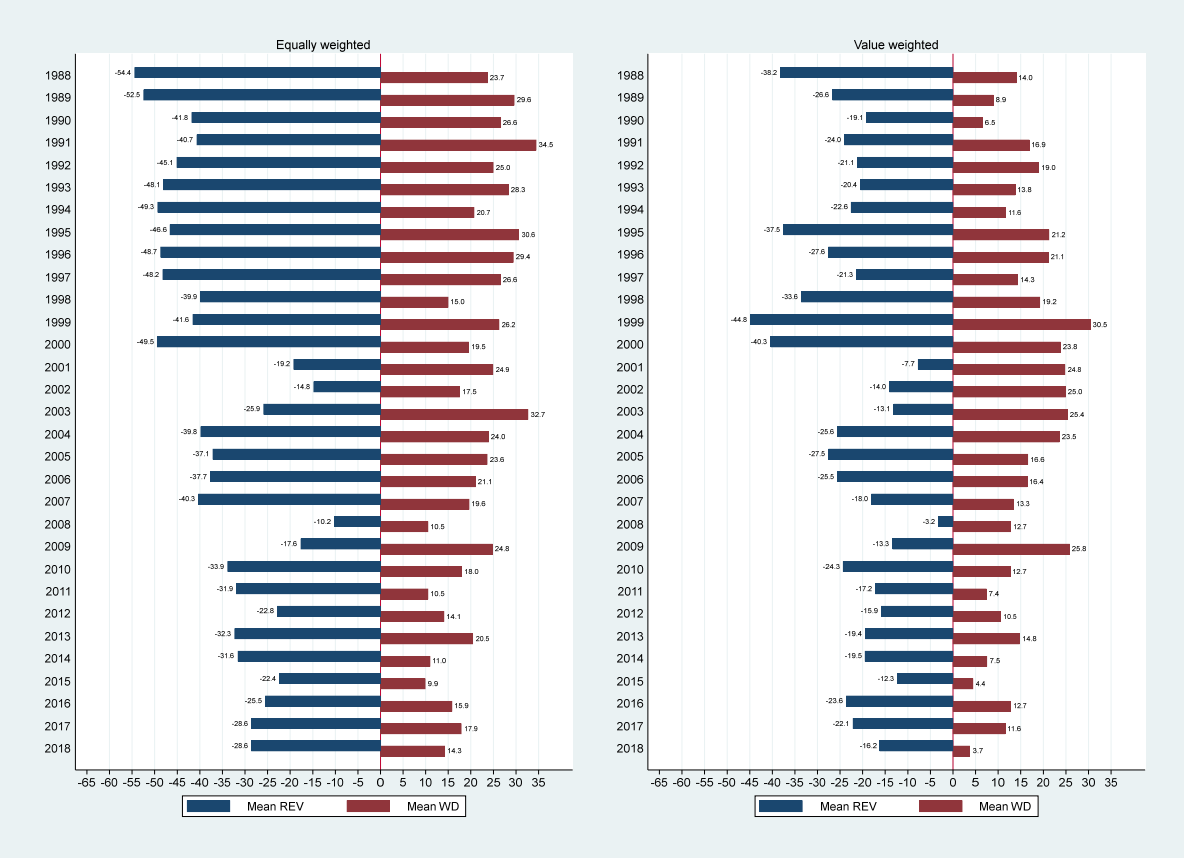

Figure 4: Fourth-quarter cash hike behavior during uncertain times and between old and young firms

This figure shows the patterns of average fourth-quarter cash hike (%) during economic recessions, economic policy uncertainty, and between old and young firms. Economic recession episodes are identified from the NBER. Economic uncertainty measure is from Baker et al. (2016). If a firm's IPO date is prior to year 2000 and the firm is still active in our sample, then the firm is defined as an old firm. By contrast, if a firm's IPO date is after year 2000 and the firm is still active in our sample, we define the firm as a young public firm

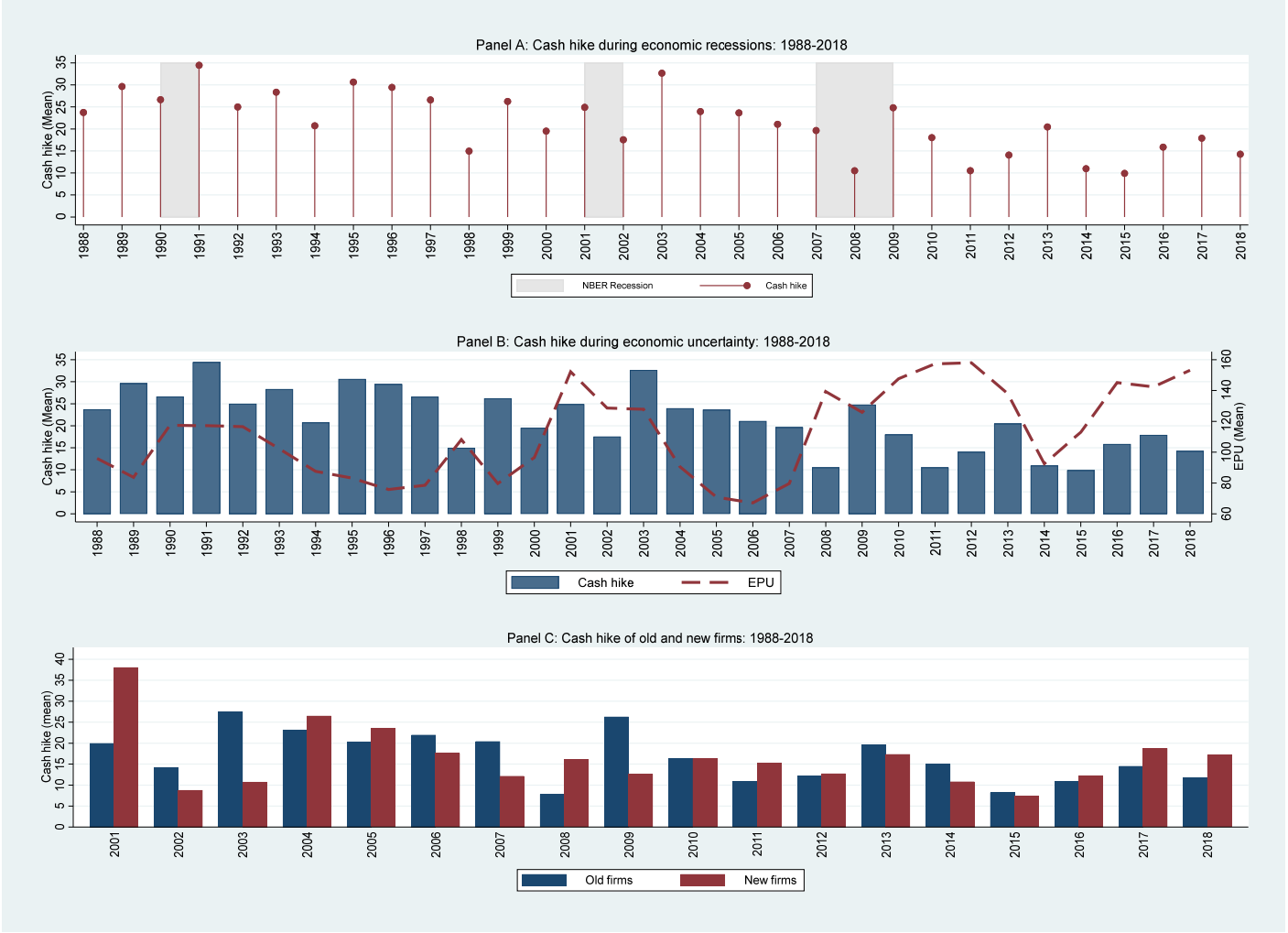

Table 1: Summary statistics of cash-holdings measures

This table shows the summary statistics of various measures of corporate cash holdings across four fiscal quarters over the sample period. The sample is obtained from the Quarterly Compustat file for the period 1988Q1 to 2018Q4. Financial firms and Utilities [SIC Codes 6000–6999 and 4900–4999] are excluded. Likewise, non-U.S. firms are excluded. The observations with missing data for cash and stock price are deleted, as are observations with zero or negative total assets, current assets, current liabilities, receivables, and negative sales. Any firm with missing observations in any fiscal quarter within a year is excluded. FQTR1, FQTR2, FQTR3, and FQTR4 refer to firm fiscal quarters 1, 2, 3, and 4, respectively. Definitions of all variables are given in the Appendix. Mean and median difference tests are used to check if fourth-quarter values are statistically different from the average of other three quarters. Note: ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

		Cash/TA	Cash/MV	Cash/BVE	Cash/MVE	NetCash/TA
FQTR1	Mean	0.209	0.105	0.339	0.198	0.130
	Median	0.098	0.056	0.191	0.092	0.061
	P25	0.026	0.016	0.043	0.030	-0.013
	P75	0.291	0.138	0.487	0.228	0.265
	SD	0.282	0.137	0.836	0.321	0.359
	N	77036	77036	77036	77036	77036
FQTR2	Mean	0.214	0.106	0.348	0.199	0.132
	Median	0.097	0.056	0.189	0.093	0.061
	P25	0.026	0.016	0.043	0.030	-0.014
	P75	0.289	0.139	0.484	0.230	0.263
	SD	0.305	0.138	0.871	0.322	0.380
	N	77036	77036	77036	77036	77036
FQTR3	Mean	0.221	0.108	0.359	0.204	0.137
	Median	0.098	0.057	0.191	0.095	0.062
	P25	0.027	0.016	0.044	0.031	-0.015
	P75	0.294	0.142	0.490	0.234	0.266
	SD	0.323	0.140	0.901	0.327	0.396
	N	77036	77036	77036	77036	77036
FQTR4	Mean	0.237	0.115	0.386	0.219	0.156
	Median	0.110	0.062	0.214	0.106	0.074
	P25	0.031	0.019	0.050	0.035	-0.006
	P75	0.310	0.152	0.521	0.254	0.282
	SD	0.345	0.145	0.938	0.340	0.412
	N	77036	77036	77036	77036	77036
Overall	Mean	0.220	0.108	0.358	0.205	0.139
	Median	0.101	0.058	0.196	0.096	0.065
	P25	0.028	0.017	0.045	0.031	-0.012
	P75	0.296	0.143	0.496	0.236	0.269
	SD	0.315	0.140	0.887	0.328	0.387
	N	308144	308144	308144	308144	308144
Mean	diff.	0.022***	0.009***	0.037***	0.018***	0.023***
Median	diff.	0.012***	0.005***	0.023***	0.012***	0.012***

Table 2: Summary statistics of firm characteristics

This table shows summary statistics of firm characteristics included in the multivariate regressions. The sample is obtained from the Quarterly Compustat file for the period 1988Q1 to 2018Q4. Financial firms and Utilities (SIC Codes 6000–6999 and 4900–4999) are excluded. Likewise, non-U.S. firms are excluded. Observations with missing data for Cash and Stock Price are deleted, as are observations with zero or negative total assets, current assets, current liabilities, receivables, and negative sales. Any firm with missing observations in any fiscal quarter within a year is excluded. Mean and median difference tests are used to check if fourth-quarter values are statistically different from the average of other three quarters. FQTR1, FQTR2, FQTR3, and FQTR4 refer to firm fiscal quarters 1, 2, 3 and 4, respectively. Definitions of all variables are given in the Appendix.

		MTB	Assets ($ Mil.)	Log(Assets)	Cash flow	NWC	Capex	Leverage	Dividend	R&D	Ind. Sigma
FQTR1	Mean	2.598	1677.606	4.798	-0.014	0.026	0.003	0.251	0.228	0.319	0.029
	Median	1.561	105.279	4.657	0.014	0.062	0.002	0.180	0.000	0.000	0.026
	P25	1.114	21.165	3.052	-0.012	-0.048	0.001	0.019	0.000	0.000	0.018
	P75	2.616	642.048	6.465	0.029	0.212	0.004	0.357	0.000	0.074	0.038
	SD	3.208	5055.280	2.435	0.104	0.405	0.005	0.308	0.420	1.384	0.015
	N	77036	77036	77036	77036	77036	77036	77036	77036	77036	77036
FQTR2	Mean	2.560	1698.060	4.813	-0.013	0.026	0.007	0.252	0.233	0.312	0.029
	Median	1.560	107.051	4.673	0.017	0.063	0.004	0.180	0.000	0.000	0.026
	P25	1.114	21.404	3.064	-0.009	-0.048	0.002	0.019	0.000	0.000	0.018
	P75	2.600	649.771	6.477	0.031	0.215	0.009	0.357	0.000	0.073	0.038
	SD	3.115	5100.893	2.435	0.108	0.407	0.009	0.311	0.423	1.370	0.015
	N	77036	77036	77036	77036	77036	77036	77036	77036	77036	77036
FQTR3	Mean	2.496	1719.416	4.829	-0.012	0.023	0.010	0.253	0.227	0.306	0.029
	Median	1.527	109.416	4.695	0.017	0.061	0.006	0.180	0.000	0.000	0.026
	P25	1.095	21.734	3.079	-0.009	-0.050	0.003	0.019	0.000	0.000	0.018
	P75	2.528	660.442	6.493	0.032	0.212	0.013	0.355	0.000	0.072	0.038
	SD	3.043	5143.204	2.437	0.107	0.410	0.012	0.312	0.419	1.360	0.015
	N	77036	77036	77036	77036	77036	77036	77036	77036	77036	77036
FQTR4	Mean	2.4933	1728.2150	4.8258	-0.0197	0.0072	0.0135	0.2551	0.2344	0.3218	0.0288
	Median	1.5340	109.4110	4.6951	0.0173	0.0504	0.0090	0.1765	0.0000	0.0000	0.0255
	P25	1.1017	21.5435	3.0701	-0.0173	-0.0581	0.0040	0.0168	0.0000	0.0000	0.0179
	P75	2.5291	665.7470	6.5009	0.0338	0.1999	0.0175	0.3545	0.0000	0.0972	0.0380
	SD	3.0324	5165.1700	2.4481	0.1234	0.4224	0.0140	0.3223	0.4236	1.3517	0.0147
	N	77036	77036	77036	77036	77036	77036	77036	77036	77036	77036
Overall	Mean	2.537	1705.824	4.816	-0.015	0.021	0.009	0.253	0.231	0.315	0.029
	Median	1.546	107.758	4.680	0.016	0.059	0.005	0.179	0.000	0.000	0.026
	P25	1.106	21.448	3.066	-0.012	-0.051	0.002	0.019	0.000	0.000	0.018
	P75	2.568	654.882	6.484	0.031	0.210	0.011	0.356	0.000	0.080	0.038
	SD	3.101	5116.322	2.439	0.111	0.411	0.011	0.313	0.421	1.366	0.015
	N	308144	308144	308144	308144	308144	308144	308144	308144	308144	308144
Mean	diff.	-0.058***	29.855	0.013	-0.007***	-0.018***	0.007***	0.003*	0.005**	0.010	0.000
Median	diff.	-0.015**	2.298	0.021	0.001***	-0.011***	0.005***	-0.004*	0.000	0.000	0.000

Table 3: The dynamics of quarterly cash holdings

This table shows the effects of fourth fiscal quarter on corporate cash-holding. The dependent variable in each regression model is Cash/TA. All variables are in quarterly frequency. FQTR1, FQTR2, FQTR3, and FQTR4 refer to firm fiscal quarters 1, 2, 3, and 4, respectively. DEC_FQTR4 equals 1 if the fourth fiscal quarter also coincides with December fiscal-year-end and 0 otherwise. NONDEC_FQTR4 equals 1 if the fourth fiscal quarter does not coincide with December year-end and 0 otherwise. All other control variables are defined in the Appendix and follow Bates et al. (2009). The clustered standard errors (at the firm level) are reported in parentheses. ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
FQTR4	0.022***			0.034***			0.033***		
	[0.001]			[0.001]			[0.001]		
FQTR1		-0.028***			-0.049***			-0.045***	
		[0.001]			[0.002]			[0.001]	
FQTR2		-0.023***			-0.036***			-0.035***	
		[0.001]			[0.001]			[0.001]	
FQTR3		-0.016***			-0.023***			-0.023***	
		[0.001]			[0.001]			[0.001]	
DEC_FQTR4			0.028***			0.040***			0.032***
			[0.002]			[0.002]			[0.001]
NONDEC_FQTR4			0.014***			0.025***			0.033***
			[0.003]			[0.003]			[0.001]
MTB				0.019***	0.019***	0.019***	0.015***	0.015***	0.015***
				[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]
Log(Assets)				-0.002*	-0.002*	-0.002**	0.032***	0.032***	0.032***
				[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Cash flow				0.275***	0.275***	0.275***	0.405***	0.403***	0.405***
				[0.020]	[0.020]	[0.020]	[0.007]	[0.007]	[0.007]
NWC				-0.095***	-0.094***	-0.095***	-0.059***	-0.058***	-0.059***
				[0.007]	[0.007]	[0.007]	[0.002]	[0.002]	[0.002]
Capex				-1.473***	-1.702***	-1.481***	-1.157***	-1.455***	-1.157***
				[0.115]	[0.122]	[0.114]	[0.048]	[0.050]	[0.048]
Leverage				-0.312***	-0.312***	-0.312***	-0.191***	-0.192***	-0.191***
				[0.008]	[0.008]	[0.008]	[0.002]	[0.002]	[0.002]
Dividend				-0.083***	-0.083***	-0.083***	-0.015***	-0.015***	-0.015***
				[0.004]	[0.004]	[0.004]	[0.002]	[0.002]	[0.002]
R&D				0.055***	0.055***	0.055***	0.018***	0.018***	0.018***
				[0.002]	[0.002]	[0.002]	[0.000]	[0.000]	[0.000]
Ind. Sigma				1.012***	1.010***	1.006***	0.245***	0.244***	0.245***
				[0.167]	[0.167]	[0.167]	[0.067]	[0.067]	[0.067]
Constant	0.133***	0.155***	0.134***	0.147***	0.181***	0.150***	0.034***	0.070***	0.034***
	[0.008]	[0.008]	[0.008]	[0.009]	[0.009]	[0.009]	[0.006]	[0.006]	[0.006]
Year-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	No	No	No	No	No	No	Yes	Yes	Yes
N	308144	308144	308144	308144	308144	308144	308144	308144	308144
R^2	0.13	0.13	0.13	0.29	0.29	0.29	0.57	0.57	0.57

Table 4: Seasonal variations and fourth-quarter cash holdings

This table shows the relationship between fourth-quarter cash holdings and seasonal variations in firms' activity levels. Odd-numbered columns report the results from regression model: $CASH_{q,it} = \beta_0 + \beta_1 FQTR_{4,it} + \beta_2 NI_{q,it} + \sum_{l=-4}^{2} \gamma_l \Delta SALES_{q+l,it} + \sum_{l=-4}^{2} \theta_l \Delta NI_{q+l,it} + \sum_{l=-4}^{-2} \pi_l WC_{q+l,it} + \boldsymbol{X}'_{q,it}\boldsymbol{\delta} + \mu_i + \tau_t + \varepsilon_{q,it}$. Even-numbered columns report results from regression model: $CASH_{q,it} = \beta_0 + \sum_{k=1}^{3} \beta_k FQTR_{k,it} + \beta_4 NI_{q,it} + \sum_{l=-4}^{2} \gamma_l \Delta SALES_{q+l,it} + \sum_{l=-4}^{2} \theta_l \Delta NI_{q+l,it} + \sum_{l=-4}^{-2} \pi_l WC_{q+l,it} + \boldsymbol{X}'_{q,it}\boldsymbol{\delta} + \mu_i + \tau_t + \varepsilon_{q,it}$. $NI_{q,it}$ stands net income in quarter q for firm i in year t, $\Delta SALES_{q+l,it}$ stands for changes in sales revenues between quarter $q+l$ and $q+l-1$ for firm i in year t, $\Delta NI_{q+l,it}$ is the changes in net income between quarter $q+l$ and $q+l-1$ for firm i in year t, and $WC_{q+l,it}$ stands for working capital and calculated as: current assets – cash – current liabilities + debt in current liabilities. The dependent variable in each regression model is Cash/TA. Definitions of other firm-level control variables are in the Appendix. The clustered standard errors (at the firm level) are reported in parentheses. ***, **, and * represent significance at 1%. 5% and 10% level, respectively.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
FQTR4	0.031***			0.043***			0.038***		
	[0.001]			[0.001]			[0.001]		
FQTR1		-0.042***			-0.062***			-0.054***	
		[0.001]			[0.002]			[0.001]	
FQTR2		-0.031***			-0.045***			-0.040***	
		[0.001]			[0.001]			[0.001]	
FQTR3		-0.021***			-0.028***			-0.026***	
		[0.001]			[0.001]			[0.001]	
DEC_FQTR4			0.033***			0.047***			0.037***
			[0.002]			[0.002]			[0.001]
NODEC_FQTR4			0.028***			0.037***			0.039***
			[0.003]			[0.003]			[0.001]
NI	-0.088***	-0.088***	-0.088***	0.071*	0.073*	0.072*	-0.160***	-0.156***	-0.160***
	[0.027]	[0.027]	[0.027]	[0.039]	[0.039]	[0.039]	[0.011]	[0.011]	[0.011]
$\Delta SALES_{q-4}$	-0.126***	-0.129***	-0.126***	-0.095***	-0.100***	-0.095***	-0.075***	-0.079***	-0.075***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.004]	[0.004]	[0.004]
$\Delta SALES_{q-3}$	-0.325***	-0.325***	-0.326***	-0.274***	-0.275***	-0.275***	-0.263***	-0.264***	-0.263***
	[0.014]	[0.014]	[0.014]	[0.013]	[0.013]	[0.013]	[0.005]	[0.005]	[0.005]
$\Delta SALES_{q-2}$	-0.424***	-0.420***	-0.424***	-0.368***	-0.364***	-0.368***	-0.365***	-0.362***	-0.365***
	[0.017]	[0.017]	[0.017]	[0.016]	[0.016]	[0.016]	[0.005]	[0.005]	[0.005]
$\Delta SALES_{q-1}$	-0.502***	-0.502***	-0.502***	-0.429***	-0.431***	-0.429***	-0.447***	-0.449***	-0.447***
	[0.019]	[0.019]	[0.019]	[0.018]	[0.018]	[0.018]	[0.005]	[0.005]	[0.005]
$\Delta SALES_{q}$	-0.508***	-0.513***	-0.508***	-0.431***	-0.439***	-0.431***	-0.473***	-0.480***	-0.473***
	[0.018]	[0.018]	[0.018]	[0.017]	[0.017]	[0.017]	[0.005]	[0.005]	[0.005]
$\Delta SALES_{q+1}$	-0.167***	-0.166***	-0.167***	-0.123***	-0.123***	-0.123***	-0.123***	-0.124***	-0.123***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.005]	[0.005]	[0.005]
$\Delta SALES_{q+2}$	-0.040***	-0.036***	-0.040***	-0.016**	-0.01	-0.016**	-0.019***	-0.014***	-0.019***
	[0.008]	[0.008]	[0.008]	[0.007]	[0.007]	[0.007]	[0.004]	[0.004]	[0.004]
ΔNI_{q-4}	0.133***	0.138***	0.133***	0.072***	0.078***	0.071***	0.067***	0.073***	0.067***
	[0.011]	[0.011]	[0.011]	[0.010]	[0.011]	[0.010]	[0.004]	[0.004]	[0.004]
ΔNI_{q-3}	0.254***	0.259***	0.254***	0.170***	0.175***	0.170***	0.191***	0.196***	0.191***
	[0.018]	[0.019]	[0.018]	[0.018]	[0.018]	[0.018]	[0.006]	[0.006]	[0.006]
ΔNI_{q-2}	0.412***	0.411***	0.412***	0.308***	0.304***	0.307***	0.347***	0.344***	0.347***
	[0.025]	[0.025]	[0.025]	[0.023]	[0.023]	[0.023]	[0.007]	[0.007]	[0.007]
ΔNI_{q-1}	0.529***	0.528***	0.529***	0.407***	0.402***	0.406***	0.466***	0.462***	0.466***
	[0.030]	[0.030]	[0.030]	[0.029]	[0.029]	[0.029]	[0.007]	[0.007]	[0.007]
ΔNI_{q}	0.532***	0.538***	0.532***	0.422***	0.428***	0.422***	0.493***	0.498***	0.493***
	[0.032]	[0.032]	[0.032]	[0.032]	[0.032]	[0.032]	[0.008]	[0.008]	[0.008]
ΔNI_{q+1}	0.128***	0.134***	0.128***	0.186***	0.195***	0.186***	0.147***	0.156***	0.147***
	[0.014]	[0.014]	[0.014]	[0.013]	[0.013]	[0.013]	[0.006]	[0.006]	[0.006]
ΔNI_{q+2}	0.021**	0.021**	0.021**	0.062***	0.061***	0.062***	0.042***	0.041***	0.042***
	[0.009]	[0.009]	[0.009]	[0.008]	[0.008]	[0.008]	[0.004]	[0.004]	[0.004]
WC_{q-4}	-0.125***	-0.128***	-0.125***	-0.098***	-0.103***	-0.098***	-0.065***	-0.068***	-0.065***
	[0.011]	[0.011]	[0.011]	[0.010]	[0.010]	[0.010]	[0.004]	[0.004]	[0.004]
WC_{q-3}	-0.043***	-0.038***	-0.043***	-0.057***	-0.050***	-0.057***	-0.040***	-0.034***	-0.040***
	[0.008]	[0.008]	[0.008]	[0.009]	[0.009]	[0.009]	[0.005]	[0.005]	[0.005]
WC_{q-2}	-0.031***	-0.032***	-0.031***	-0.119***	-0.121***	-0.119***	-0.061***	-0.062***	-0.061***
	[0.010]	[0.010]	[0.010]	[0.011]	[0.011]	[0.011]	[0.005]	[0.005]	[0.005]
Firm-level controls	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	No	No	No	No	No	No	Yes	Yes	Yes
N	294846	294846	294846	294846	294846	294846	294846	294846	294846
R2	0.21	0.21	0.21	0.36	0.36	0.36	0.61	0.61	0.61

Table 5: Real and timing instruments of cash hike: Univariate analysis

This table compares summary statistics on different instruments that could facilitate cash window dressing. Among real instrument measures, ΔUCFO is defined as the within-fiscal-year change in abnormal cash-flow from operations between fourth quarter and average of the previous three quarters; abnormal CEO is calculated as the difference between the actual CFO minus the predicted CFO as outlined in Lee (2012) and Roychowdhury (2006). Similarly, ΔUDISEXP is defined as the within-fiscal-year change in abnormal discretionary expenses between fourth quarter and average of the previous three quarters; abnormal discretionary expenses is calculated as actual DISEXP (R&D expense plus advertising and selling, general and administrative expense) minus the predicted DISEXP. Finally, ΔUPROD is defined as the within-fiscal-year change in abnormal production cost between fourth quarter and average of the previous three quarters; abnormal production cost is defined as the actual PROD (COSG plus change in inventory) and predicted PROD. The timing measure includes ΔCCC, defined as the change cash conversion cycle following Lee (2012). Three components of ΔCC include changes in receivable conversion cycle (ΔRCC), inventory conversion cycle (ΔICC), and payable conversion cycle (ΔPCC). If a firm belongs to the third and fourth quartiles of Cash_hike measure then we classify it as a high-hike firm, otherwise it is defined as a low-hike firm. ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

	All firms			High-hike firms			Low-hike firms			Difference	
	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
ΔUCFO	0.0009	-0.0014	72764	0.0099	0.0050	35801	-0.0078	-0.0066	36963	0.0177***	0.0116***
ΔUDISEEXP	-0.0005	-0.0031	65255	-0.0025	-0.0039	15546	0.0014	-0.0022	32740	-0.0039***	-0.0017***
ΔUPROD	-0.0025	-0.0019	71507	-0.0044	-0.0027	35254	-0.0006	-0.0012	36253	-0.0039***	-0.0015***
ΔCCC	-5.8032	-2.4488	72526	-7.8659	-3.5854	35756	-3.7973	-1.3496	36770	-4.0686***	-2.2358***
ΔRCC	-2.1234	-0.8272	73982	-2.5631	-1.1366	36399	-1.6976	-0.5090	37583	-0.8655***	-0.6276***
ΔICC	-7.0447	-0.1527	73696	-8.4314	-0.7615	36339	-5.6959	0.0000	37357	-2.7355***	-0.7615***
ΔPCC	-2.6432	-0.0702	73578	-2.8279	-0.0850	36273	-2.4636	-0.0543	37305	-0.3643***	-0.0307***

Table 6: Real and timing instruments of cash hike: Regression analysis

This table shows the effects of fourth-quarter cash hike on various real and timing instruments estimated from the following equation: $Instrument_{4,it} = \alpha + \lambda\, High\_hike_{4,it} + \boldsymbol{X}'_{it}\boldsymbol{\delta} + \mu_i + \tau_t + \varepsilon_{it}$ where $Instrument_{4,it}$ is a measure of real or timing instruments for firm i in fiscal year t; $High\_hike_{4,it}$ is an indicator variable equal to 1 for high-hike firms and 0 otherwise; $\boldsymbol{X}'_{it}$ is a set of firm-level control, and μ_i and τ_t are firm and year fixed effects, respectively. We follow Lee (2012) and Roychowdhury (2006) and include firm size, market-to-book, net income, tangibility, leverage, and liquidity as firm-level controls in our estimation. If a firm belongs to the third and fourth quartiles of Cash_hike measure, we classify it as a high-hike firm; otherwise, it is a low-hike firm. Among real instrument measures, ΔUCFO is defined as the within-fiscal-year change in abnormal cash-flow from operations between fourth quarter and average of the previous three quarters; abnormal CFO is calculated as the difference between the actual CFO minus the predicted CFO as outlined in Lee (2012) and Roychowdhury (2006). Similarly, ΔUDISEXP is defined as the within-fiscal-year change in abnormal discretionary expenses between fourth quarter and average of the previous three quarters; abnormal discretionary expenses is calculated as actual DISEXP (R&D expense plus advertising and selling, general, and administrative expense) minus the predicted DISEXP. Finally, ΔUPROD is defined as the within-fiscal-year change in abnormal production cost between fourth quarter and average of the previous three quarters; abnormal production cost is defined as the actual PROD (COSG plus change in inventory) and predicted PROD. The timing measure includes ΔCCC, defined as the change cash conversion cycle following Lee (2012). Three components of ΔCC include changes in receivable conversion cycle (ΔRCC), inventory conversion cycle (ΔICC), and payable conversion cycle (ΔPCC). The clustered standard errors (at the firm-quarter level) are reported in parentheses. ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

	ΔUCFO	ΔUDISEXP	ΔUPROD	ΔCCC	ΔRCC	ΔICC	ΔPCC
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
High-hike firm Dummy	0.014***	-0.002***	-0.002***	-2.284***	-0.908***	-2.335***	-1.343***
	[0.000]	[0.000]	[0.000]	[0.754]	[0.214]	[0.280]	[0.427]
Log(Assets)	-0.001***	0.001***	0.001***	2.579***	1.293***	1.383***	0.717***
	[0.000]	[0.000]	[0.000]	[0.484]	[0.137]	[0.179]	[0.274]
MTB	-0.001***	0.000	0.001***	0.652***	0.050	0.408***	-0.306**
	[0.000]	[0.000]	[0.000]	[0.216]	[0.061]	[0.080]	[0.122]
Net income	0.055***	-0.114***	-0.079***	3.300	-12.023***	28.527***	2.609
	[0.003]	[0.002]	[0.003]	[4.889]	[1.385]	[1.816]	[2.772]
Tangibility	0.011***	0.003	-0.011***	-8.306*	-3.851***	1.484	3.895
	[0.002]	[0.002]	[0.002]	[4.333]	[1.224]	[1.603]	[2.448]
Leverage	0.015***	-0.009***	-0.009***	3.742*	-0.798	-3.689***	-5.393***
	[0.001]	[0.001]	[0.001]	[2.070]	[0.586]	[0.769]	[1.175]
Liquidity	-0.000***	-0.001***	-0.000**	1.571***	0.296***	0.522***	-0.442***
	[0.000]	[0.000]	[0.000]	[0.219]	[0.062]	[0.081]	[0.124]
Constant	-0.007***	-0.005***	-0.002	-19.066***	-7.034***	-12.105***	-1.339
	[0.002]	[0.001]	[0.002]	[3.376]	[0.958]	[1.250]	[1.910]
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	71403	64304	70232	71332	72669	72354	72265
R^2	0.31	0.35	0.28	0.26	0.27	0.33	0.24

Table 7: The dynamics of quarterly cash holdings net of debt financing

This table shows the effects of fourth fiscal quarter on corporate cash-holdings net of debt and change in debt issuance. The dependent variable in columns 1–3 is the NetCash/TA. The dependent variable in columns 4–6 is the change in short- and long-term debt issuance (normalized by firm size). All variables are in quarterly frequency. FQTR1, FQTR2, FQTR3, and FQTR4 refer to fiscal quarters 1, 2, 3, and 4, respectively. DEC_FQTR4 equals 1 if the fourth fiscal quarter also coincides with December fiscal-year-end and 0 otherwise. NONDEC_FQTR4 equals 1 if the fourth fiscal quarter does not coincide with December year-end and 0 otherwise. All other control variables are defined in the Appendix and follow Bates et al. (2009). The clustered standard errors (at the firm level) are reported in parentheses. ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

	[1]	[2]	[3]	[4]	[5]	[6]
FQTR4	0.038***			-0.012***		
	[0.001]			[0.000]		
FQTR1		-0.048***			0.026***	
		[0.001]			[0.000]	
FQTR2		-0.040***			0.011***	
		[0.001]			[0.000]	
FQTR3		-0.030***			0.007***	
		[0.001]			[0.000]	
DEC_FQTR4			0.037***			-0.011***
			[0.001]			[0.000]
NONDEC_FQTR4			0.040***			-0.014***
			[0.002]			[0.001]
MTB	0.016***	0.016***	0.016***	-0.000***	-0.001***	-0.000***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Log(Assets)	0.026***	0.026***	0.026***	0.009***	0.009***	0.009***
	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]
Cash flow	0.221***	0.220***	0.221***	-0.047***	-0.045***	-0.047***
	[0.007]	[0.007]	[0.007]	[0.002]	[0.002]	[0.002]
NWC	0.244***	0.244***	0.244***	0.014***	0.013***	0.014***
	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
Capex	-1.157***	-1.401***	-1.156***	0.644***	0.878***	0.643***
	[0.052]	[0.055]	[0.052]	[0.018]	[0.019]	[0.018]
Leverage	-0.421***	-0.421***	-0.421***	0.103***	0.103***	0.103***
	[0.003]	[0.003]	[0.003]	[0.001]	[0.001]	[0.001]
Dividend	0.348***	0.347***	0.348***	0.045*	0.043*	0.044*
	[0.073]	[0.073]	[0.073]	[0.025]	[0.025]	[0.025]
R&D	-0.013***	-0.012***	-0.012***	0.008***	0.008***	0.008***
	[0.002]	[0.002]	[0.002]	[0.001]	[0.001]	[0.001]
Ind. Sigma	0.017***	0.017***	0.017***	0.000	0.000	0.000
	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.000]
Constant	0.045***	0.086***	0.045***	-0.079***	-0.095***	-0.079***
	[0.006]	[0.006]	[0.006]	[0.002]	[0.002]	[0.002]
Year-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
N	308144	308144	308144	299335	299335	299335
R^2	0.66	0.66	0.66	0.14	0.15	0.14

Table 8: Fourth-quarter hike in cash-holdings and the marginal value of cash

This table estimates the marginal value of cash window dressing following Faulkender and Wang (2006). All control variables are same as in Faulkender and Wang (2006) except for the *Cash_hike* variable, defined as $Cash\_hike_{4,it} = \left[\left(Cash_{4,it} - \overline{Cash}_{1-3,it}\right)/\overline{Cash}_{1-3,it}\right]$, where $Cash\_hike_{4,it}$ is the percentage hike in the fourth fiscal quarter for firm i in year t, $\overline{Cash}_{1-3,it}$ is the average cash holdings of the first three fiscal quarters for firm i in year t, and $Cash_{4,it}$ is fourth-quarter cash holdings for firm i in year t. Definitions of all control variables are given in the Appendix. The clustered standard errors (at the firm level) are reported in parentheses. ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

	Fama-French 25 size and value portfolios				Fama-French 49 industry portfolios			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Cash_hike × ΔC		0.461***	0.449***	0.422***		0.498***	0.477***	0.452***
		[0.043]	[0.042]	[0.021]		[0.045]	[0.044]	[0.021]
Cash_hike		0.061***	0.058***	0.053***		0.059***	0.052***	0.047***
		[0.006]	[0.006]	[0.006]		[0.006]	[0.006]	[0.006]
ΔC	0.817***	0.725***	0.709***	0.806***	0.836***	0.728***	0.708***	0.802***
	[0.023]	[0.049]	[0.049]	[0.023]	[0.024]	[0.051]	[0.051]	[0.023]
ΔE	0.257***	0.368***	0.360***	0.324***	0.258***	0.367***	0.357***	0.323***
	[0.013]	[0.021]	[0.020]	[0.009]	[0.013]	[0.021]	[0.021]	[0.009]
ΔNA	0.117***	0.164***	0.166***	0.162***	0.120***	0.167***	0.172***	0.166***
	[0.007]	[0.014]	[0.014]	[0.006]	[0.007]	[0.015]	[0.015]	[0.006]
ΔRD	1.025***	0.986***	1.130***	0.814***	0.880***	0.841***	1.120***	0.870***
	[0.164]	[0.241]	[0.238]	[0.153]	[0.169]	[0.249]	[0.242]	[0.154]
ΔI	-1.262***	-1.200***	-1.158***	-0.505***	-1.351***	-1.290***	-1.190***	-0.554***
	[0.111]	[0.197]	[0.196]	[0.091]	[0.115]	[0.204]	[0.202]	[0.091]
ΔD	1.355***	1.373***	1.570***	0.911***	1.240***	1.430***	1.647***	1.051***
	[0.187]	[0.328]	[0.325]	[0.348]	[0.188]	[0.333]	[0.330]	[0.350]
C	0.342***	0.456***	0.437***	0.717***	0.365***	0.483***	0.452***	0.726***
	[0.013]	[0.023]	[0.023]	[0.012]	[0.013]	[0.024]	[0.024]	[0.012]
L	-0.783***	-0.732***	-0.745***	-1.757***	-0.747***	-0.688***	-0.717***	-1.721***
	[0.016]	[0.024]	[0.026]	[0.036]	[0.016]	[0.024]	[0.026]	[0.036]
NF	0.616***	0.472***	0.464***	0.445***	0.617***	0.466***	0.462***	0.454***
	[0.018]	[0.034]	[0.034]	[0.016]	[0.019]	[0.035]	[0.034]	[0.016]
Constant	0.133***	0.086***	0.001	0.188	0.128***	0.076***	0.005	0.306
	[0.005]	[0.007]	[0.075]	[0.231]	[0.005]	[0.007]	[0.073]	[0.232]
Year-fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Firm-fixed effects	No	No	No	Yes	No	No	No	Yes
N	168987	66931	66931	66931	168987	66931	66931	66931
R^2	0.17	0.19	0.20	0.36	0.17	0.19	0.22	0.37

Table 9: Heterogeneity in fourth-quarter cash hike: Growth opportunities and external financing need

This table shows the effects of firms' future growth opportunities and external financing needs on their fourth-quarter cash hike behaviors. The dependent variable is *Cash_hike*, defined as $Cash\_hike_{4,it} = \left[\left(Cash_{4,it} - \overline{Cash}_{1-3,it}\right)/\overline{Cash}_{1-3,it}\right] \times 100$, where $Cash\_hike_{4,it}$ is the percentage hike in the fourth fiscal quarter for firm i in year t, $\overline{Cash}_{1-3,it}$ is the average cash holdings of the first three fiscal quarters for firm i in year t, and $Cash_{4,it}$ is fourth-quarter cash holdings for firm i in year t. The definitions of all independent variables are given in the Appendix. The clustered standard errors (at the firm level) are reported in parentheses. ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

	[1]	[2]	[3]	[4]	[5]
Growth firm (Tobin's Q)	0.064***				
	[0.004]				
St. debt refinancing		0.126***			
		[0.012]			
Net ext. financing			0.184***		
			[0.009]		
Net ext. debt financing				0.024***	
				[0.003]	
Net ext. equity financing					0.189***
					[0.007]
Log(Assets)	0.041***	0.024***	0.023***	0.015**	0.021***
	[0.005]	[0.007]	[0.005]	[0.007]	[0.005]
Leverage	-0.084***	-0.095***	-0.080***	-0.130***	-0.039***
	[0.015]	[0.019]	[0.016]	[0.018]	[0.015]
Capex	-1.466***	-1.292***	-1.458***	-1.448***	-1.405***
	[0.062]	[0.076]	[0.066]	[0.074]	[0.061]
Cash flow	0.270***	0.229***	0.303***	0.262***	0.250***
	[0.011]	[0.013]	[0.012]	[0.015]	[0.011]
NWC	-0.089***	-0.135***	-0.141***	-0.151***	-0.135***
	[0.010]	[0.012]	[0.011]	[0.013]	[0.010]
Dividend	-0.007	0.008	-0.01	-0.008	-0.012
	[0.010]	[0.013]	[0.011]	[0.012]	[0.010]
R&D	0.003	-0.006	-0.01	-0.002	-0.001
	[0.005]	[0.008]	[0.006]	[0.007]	[0.005]
Ind. Sigma	0.174*	0.096	0.197*	0.167	0.196**
	[0.098]	[0.120]	[0.104]	[0.119]	[0.097]
Constant	-0.323*	-0.049	-0.208	-0.041	-0.185
	[0.181]	[0.226]	[0.184]	[0.230]	[0.179]
Year-fixed effects	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes
N	67648	52173	60815	51505	68475
R^2	0.25	0.27	0.26	0.27	0.25

Table 10: Heterogeneity in fourth-quarter hike in cash-holdings: External scrutiny and financial constraints

This table shows the effects of various measures capturing a firm's constraints to increase fourth-quarter cash. The dependent variable is *Cash_hike*, defined as $Cash\_hike_{4,it} = \left[\left(Cash_{4,it} - \overline{Cash}_{1-3,it}\right)/\overline{Cash}_{1-3,it}\right] \times 100$, where $Cash\_hike_{4,it}$ is the percentage hike in the fourth fiscal quarter for firm i in year t,$\overline{Cash}_{1-3,it}$ is the average cash holdings of the first three fiscal quarters for firm i in year t, and $Cash_{4,it}$ is fourth-quarter cash holdings for firm i in year t. The definitions of all independent variables are given in the Appendix. All control variables follow Bates et al. (2009) and Chen et al. (2017). The clustered standard errors (at the firm level) are reported in parentheses. Note: ***, **, and * represent significance at 1%, 5%, and 10% level, respectively.

	[1]	[2]	[3]	[4]	[5]	[6]
Top 4 auditor	-0.044***					
	[0.012]					
Institutional ownership		-0.107***				
		[0.028]				
Financial slack			0.002***			
			[0.000]			
Financing constraint (HP)				-0.055***		
				[0.017]		
Financing constraint (KZ)					-0.012***	
					[0.003]	
Financing constraint (WW)						-0.566***
						[0.086]
Log(Assets)	0.024***	0.024***	0.018***	-0.019	0.023***	-0.542***
	[0.005]	[0.008]	[0.005]	[0.014]	[0.005]	[0.086]
Leverage	-0.069***	-0.119***	-0.066***	-0.075***	-0.048***	-0.073***
	[0.015]	[0.024]	[0.015]	[0.015]	[0.016]	[0.016]
Capex	-1.373***	-1.550***	-1.338***	-1.384***	-1.348***	-1.417***
	[0.061]	[0.084]	[0.061]	[0.062]	[0.062]	[0.063]
Cash flow	0.247***	0.391***	0.269***	0.244***	0.236***	0.192***
	[0.011]	[0.020]	[0.011]	[0.011]	[0.011]	[0.014]
NWC	-0.131***	-0.274***	-0.175***	-0.136***	-0.122***	-0.132***
	[0.010]	[0.018]	[0.011]	[0.010]	[0.010]	[0.010]
Dividend	0.001	-0.029**	-0.001	-0.002	-0.020*	-0.032***
	[0.010]	[0.013]	[0.010]	[0.010]	[0.011]	[0.012]
R&D	0.004	0.006	0.003	0.002	0.003	0.004
	[0.005]	[0.008]	[0.005]	[0.005]	[0.005]	[0.006]
Ind. Sigma	0.162*	0.204*	0.153	0.165*	0.191*	0.221**
	[0.096]	[0.123]	[0.096]	[0.097]	[0.098]	[0.101]
Constant	-0.133	0	-0.23	0.013	-0.248	-0.236
	[0.180]	[0.301]	[0.206]	[0.190]	[0.185]	[0.196]
Year-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	69598	43283	69057	69805	67477	66090
R^2	0.24	0.30	0.25	0.24	0.25	0.25

Michael Lee-Chin & Family Institute for Strategic Business Studies

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