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Does the value of cash holdings deteriorate or improve with material weaknesses in internal control over financial reporting?

Pinghsun Huang [a], Jun Guo [b], Tongshu Ma [c], Yan Zhang [c,*]

[a] National Cheng Kung University, Taiwan
[b] Rutgers University, Camden, United States
[c] SUNY, Binghamton, United States

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ABSTRACT

We find that cash holdings are more valuable for firms disclosing material weaknesses in the Sarbanes–Oxley (SOX) 404 internal control assessments. We estimate that the value spread for firms with weak controls vs. effective controls is about $0.25 for an extra dollar of cash. Our results are not driven by account-level weaknesses but by more severe, company-level weaknesses in internal control over financial reporting (ICFR). Further, the economic consequences of cash resources significantly decrease with the remediation of previously reported material weaknesses. These results suggest that the favorable (precautionary) impact induced by weak ICFR appears to more than offset the adverse (agency) effect entailed by ineffective ICFR. Overall, our results survive alternative variable specifications, sample splits, matched sample analyses, and a variety of controls.

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1. Introduction

The value implications of corporate cash reserves have been well discussed in the literature. Notably, cash and marketable securities can create value when they ameliorate underinvestment arising from the misvaluation (lemons) problem (Myers and Majluf, 1984). Alternatively, cash holdings can promote overinvestment, thereby destroying firm value (Jensen, 1986). More recently, empirical research has focused on the channels through which the value of cash is likely to vary significantly to identify the specific costs or benefits of liquidity management. For instance, Faulkender and Wang (2006) and Denis and Sibilkov (2010) find that the value of liquid assets rises with the absence of debt rating. Their evidence indicates that liquid assets are valued at a premium in firms that face great financial constraints. In contrast, Dittmar and Mahrt-Smith (2007) find that the value of cash significantly falls with antitakeover provisions. This evidence suggests that liquid assets are valued at a discount in firms with serious agency conflicts.

While recent studies provide valuable insights into the economic consequences of corporate liquidity, they often focus on the settings in which either the precautionary benefits or agency costs of financial slack are likely to be significant. As Lee and Masulis (2009) point out, credit rating agencies concentrate on the solvency of a firm, yet they are slow to incorporate new information into the monitoring of a firm's operations. Similarly, antitakeover protection is likely to be associated with agency conflicts, whereas it appears to have an immaterial bearing on the overvaluation risk faced by outside investors. Moreover, the failure to address the endogenous nature of the channel can incorrectly attribute the financial consequences of cash to the channel per se instead of the underlying firm characteristics, thus potentially clouding inferences. Consequently, it remains an empirical question of whether the gains from precautionary cash balances are more than enough to compensate for the expropriation losses resulting from cash reserves, when both the benefits and costs of liquidity management are likely to be material.

To shed light on this line of inquiry, we devote our attention to an important, but a previously unexplored, channel of the cash-value nexus: internal control over financial reporting (ICFR). To analyze the effect of ICFR on the value of cash more accurately, we tackle explicitly the potential endogeneity of internal control quality by utilizing attribute-based matching. As a whole, our study is motivated by a large body of literature arguing that the unreliability of financial reporting exacerbates not only managerial

* Corresponding author at: School of Management, State University of New York, Binghamton, NY 13902, United States. Tel.: +1 607 777 6195; fax: +1 607 777 4422.
E-mail address: yzhang@binghamton.edu (Y. Zhang).

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rent extractions but also deters a firm from securing financing due to heightened overvaluation risks faced by outside suppliers of capital (Fudenberg and Tirole, 1995; Easley and O'Hara, 2004; Karpoff et al., 2008; Lambert et al., 2007). Further, recent research (e.g., Ashbaugh-Skaife et al., 2009; Kim et al., 2011) emphasize that weak ICFR reduces remarkably the quality of financial reporting, thereby aggravating idiosyncratic and systematic risks and resulting in significantly higher costs of debt and equity. Cheng et al. (2013) add that internal control failures materially worsen the risks of both underinvestment and overinvestment arising from higher financing and agency costs.

Hence, ineffective ICFR firms are likely to have significantly stronger precautionary benefits as well as higher agency costs of cash and cash equivalents compared to effective ICFR firms. Overall, the variations in both adverse selection and moral hazard brought about by weak ICFR tend to affect the value of cash in opposite directions. On the one hand, the marginal value of cash is lower for firms with material weaknesses, because ineffective ICFR increases agency costs of cash by facilitating self-dealing transactions or outright fraud. On the other hand, an extra dollar of cash holdings is more valuable for firms with adverse internal control reports, because weak ICFR enhances the precautionary benefits of cash by increasing the probability of bypassing profitable investment projects. It is, therefore, an empirical issue of whether financial slack is more or less beneficial to weak ICFR firms.

SOX Section 404 disclosures generate a natural experiment to examine the testable implications. Under this disclosure regime, company management is required to file a report on ICFR effectiveness (404(a)), and auditors are mandated to provide their own evaluations on management's assessment of ICFR (404(b)).[1] Based on the definition in Auditing Standard No. 2, a material weakness refers to a more than remote likelihood that a material misstatement of the annual or interim financial statements will not be prevented or detected. As many studies (e.g., Kim et al., 2011; Skaife et al., 2013) indicate, SOX 404 reports are well-accepted indicators of a firm's internal control quality in financial reporting and are widely used in extant research. Given that SOX 404 opinions are directly observable, they are not subject to measurement errors inherent in estimation models. Moreover, the focus on material weaknesses in internal control enables us to identify the problems that are so acute that both overvaluation costs and rent extractions are likely to heighten.[2]

We pursue this line of inquiry by analyzing 3909 unique firms and 15,409 firm-year observations in the period of 2004 through 2010. Our results indicate that the estimated effects of SOX 404 material weaknesses on cash valuation are both economically and statistically significant. *Ceteris paribus*, the value spread for firms with weak controls vs. effective controls is about $0.25 for a dollar of cash. This evidence suggests that the favorable (precautionary) impact caused by ICFR weaknesses more than offsets the adverse (agency) effect entailed by weak ICFR.[3] Hence, the value of cash does not deteriorate but improves with material weaknesses in internal control. Our results survive alternate measures of excess returns, sample splits, unexpected changes of cash holdings, and numerous controls.

To validate and strengthen our analyses, we break down ICFR problems based on the nature of material weaknesses. This classification seems important, because company-level internal control problems are more related to the overall financial reporting process and tend to be more severe than account-specific control problems (Moody's Investors Service, 2004, 2006, 2007). This reasoning suggests that company-level material weaknesses can better induce the benefits and costs of cash. As expected, the value of cash increases substantially with company-level material weaknesses. Our inference is also reinforced by the fact that a similar relation is not genuinely extended to less severe, account-level weaknesses, which do not normally represent as serious a threat to the reliability of financial reporting. Hence, the asymmetric effects of company-level vs. account-level weaknesses on cash value confirm that our findings are not driven by less severe ICFR problems for which both adverse selection and moral hazard are less likely to be significant.

Moreover, we restrict our attention to weak ICFR firms that either remediate or do not fix their previously reported material weaknesses. Our intuition is that if the cash premium is indeed triggered by ICFR weaknesses, then we should observe significant differences in cash valuation once internal control problems are resolved. Consistent with the prior observation, our supplementary evidence suggests that the marginal value of cash is much lower for weak ICFR firms that successfully remediate their previous control problems vis-à-vis their counterparts that do not fix their internal control failures. Our results from the pre-and-post analyses of the remediation in material weaknesses also suggest that the mending of ICFR weaknesses over the fiscal year reduces the value of cash assets dramatically. Consequently, this ancillary evidence lends further credence to our inference that the precautionary advantages of cash tend to dominate its agency disadvantages for weak ICFR firms.

One potential concern is that of selection bias, because firms that report material weaknesses might not be a random sample of public firms. Equivalently, it seems plausible that the disclosure of material weaknesses in SOX 404 internal control assessments is endogenously determined with firm value. Thus, we use Heckman's (1979) framework to econometrically control for the possibility of self-selection bias. While our results indicate the presence of such bias in the data, the additional test verifies that the value of liquid assets is statistically and economically greater for weak ICFR firms. As a robustness check, we perform a matched sample analysis based on the propensity-score matching procedure (Rosenbaum and Rubin, 1983). This analysis allows us to fix the innate firm attributes and to compare the value of cash in firms suffering from material weaknesses with the worth of cash in otherwise comparable firms without internal control ineffectiveness. This alternative approach again leaves all of our main conclusions unaltered.

Our study contributes to the literature by identifying an important channel through which the sensitivity of firm value to cash holdings is likely to vary in a remarkable manner. To the best of our knowledge, the particular passage (i.e., ICFR) of the cash-value nexus discovered here has not been studied before. We also address the endogeneity issue of the channel to analyze its effect on the value of cash more precisely, an issue that has generally been overlooked in extant research. Our evidence highlights that cash and cash equivalents are valued at a premium, as opposed to a discount, in weak ICFR firms vis-à-vis effective ICFR firms. This evidence suggests that, *ceteris paribus*, the precautionary benefits are likely to outweigh the agency costs of a cash buffer for weak ICFR firms. Overall, our findings shed light on the economic consequences of liquid assets held by firms whose benefits and costs of a financial cushion are likely to be material.

The remainder of the paper proceeds as follows. In Section 2, we review the literature and develop hypothesis. We describe empirical design and variable definitions in Section 3. Section 4 discusses

[1] Previous studies indicate that auditors' assessments are virtually consistent with managers' evaluations (Costello and Wittenberg-Moerman, 2011; Cheng et al., 2013). We confirm that there is no instance of disagreement between auditors' and managers' reported internal control opinions in our sample.

[2] Control deficiencies or significant deficiencies, which do not elevate to the level of material weaknesses, are typically not disclosed in Section 404 reports.

[3] We use terms "ICFR weaknesses", "material weaknesses", "internal control weaknesses", and "internal control problems" interchangeably.

our data and their basic properties. Section 5 includes main empirical analyses. Section 6 investigates self-selection bias. Section 7 concludes the paper.

2. Extant research and hypothesis development

In the classical framework of perfect capital markets, there would be no justification for firms to hold cash and marketable securities. Accordingly, liquidity management should not be valued at a premium or at a discount. However, in the presence of market frictions, corporate cash holdings have the potential to either enhance or destroy firm value. Extant research prominently identifies two primary imperfections that can influence the marginal value of cash significantly: adverse selection and moral hazard.

On the one side, cash reserves provide precautionary benefits against the underinvestment problem. As Keynes (1936) and Myers and Majluf (1984) point out, holding liquid assets as a safety margin helps firms to better cope with adverse shocks to cash flow and investment opportunity when external funds are more costly than internal funds. Put differently, financial flexibility is most valuable for those firms in which the lemons problem increases the possibility that profitable investment ventures will be bypassed. Consistent with this prediction, Opler et al. (1999) illustrate that firms with lower credit ratings find it relatively difficult to access capital markets, thereby holding higher ratios of cash to non-cash assets as a financial cushion. Almeida et al. (2004) find that the sensitivity of cash holdings to cash flow intensifies with the gap between external and internal financing costs. Bates et al. (2009) add that the marginal benefit of cash is higher for firms with higher cash flow volatility and greater R&D spending due to a stronger need for outside funds.

On the other side, the build-up of cash assets heightens agency costs, thereby aggravating the overinvestment problem or tunneling risks. Jensen (1986) asserts that executives have an incentive to build cash balances to grow their firms beyond their optimal size. Furthermore, Myers and Rajan (1998) articulate that the anonymous and transportable features of liquid assets enable management to transfer wealth directly away from minority shareholders in the fashion of embezzlement. Supporting the dark side of cash hoardings, Harford (1999) finds that cash-rich firms are more likely to overinvest in acquisitions than are other firms. Harford et al. (2008) also furnish evidence that entrenched managers tend to accumulate liquid assets and then dissipate the financial reserves quickly.

To seek a better understanding of the specific benefits or costs of liquid asset holdings, a burgeoning literature sheds light on the routes through which the sensitivity of firm value to cash resources varies widely. For example, Faulkender and Wang (2006) find that long-term bond rating or commercial paper rating reduces the precautionary benefits of cash by attenuating the cost of debt financing. Denis and Sibilkov (2010) confirm that the value of cash increases with the level of financial constraints (e.g., scarcity of internal funds), suggesting that cash holdings are a value-enhancing response to costly external financing. Their evidence is also consistent with the prediction by Acharya et al. (2007) that the precautionary benefits of cash are notably greater for financially constrained firms with high hedging needs.

By contrast, Dittmar and Mahrt-Smith (2007) point to the presence of agency costs of cash holdings. In particular, they find that antitakeover provisions have a detrimental effect on the marginal value of cash. Pinkowitz et al. (2006) find that the economic consequences of cash differ substantially with cross-country variation in corporate governance (e.g., corruption index, anti-director index). Kalcheva and Lins (2007) document that the combination of weak shareholder protection at the country-level and strong managerial entrenchment at the firm-level reduces the value of cash and marketable securities held by non-US firms. Similarly, Sun et al. (2012) find that liquid assets appear harmful to firms whose managers are likely to derive private control benefits from cash and cash equivalents by exploiting accruals to mask true firm performance. Louis et al. (2012) report that accounting conservatism helps to alleviate agency costs embedded in cash assets.

Hence, the costs and benefits of cash assets are likely to vary significantly across firms. Our focus in this paper is not to examine whether the precautionary benefits or agency costs manifest themselves in the value of cash. Rather, we attempt to provide insights into the value of liquidity for firms that face not only substantial external financing costs but also non-trivial expropriation risks. This inquiry appears interesting, because shareholders tend to weigh the material benefits against the material costs of a financial cushion. To this end, we examine the effect of internal control quality on the economic consequences of cash assets.

Our investigation is inspired by the fact that internal control problems tend to carry serious repercussions in the forms of increased adverse selection and moral hazard. In particular, ineffective internal controls in accounting books enable managers to present a misleading picture of the firm's financial status, thereby facilitating incumbency rents and other expropriation activities (Fudenberg and Tirole, 1995; U.S. Congress, 2002; Karpoff et al., 2008). This notion also has been supported by a series of high-profile corporate scandals, such as Enron's demise and the recent Citigroup case linking an executive's embezzlement to internal control problems (Dash, 2011). In addition to aggravating incentive problems, ICFR weaknesses are likely to incur higher screening costs arising from potentially misrepresented financial information (Duffie and Lando, 2001; U.S. House of Representatives, 2005; Lambert et al., 2007).

There is extensive evidence that internal control weaknesses exert a substantial bearing on the overvaluation risk facing outside investors, thereby raising the cost of capital remarkably. For example, Ashbaugh-Skaife et al. (2009) find that ineffective internal controls increase information risk that translates into a higher cost of equity by reducing the reliability of financial reporting. Similarly, Feng et al. (2009) illustrate that internal control problems lower the informativeness of management guidance significantly, which, in turn, exacerbates the adverse selection problem. Kim et al. (2011) further suggest that firms reporting material weaknesses face a higher cost of debt capital. They demonstrate that the increased lemons cost generated by ineffective internal controls results in a notably higher loan spread.

Furthermore, residual agency problems are found to be more severe for weak ICFR firms. Dhaliwal et al. (2011) suggest that weak internal control over financial reporting reduces the accuracy of financial information, thereby providing managers with opportunities to misappropriate cash flows. Cheng et al. (2013) also find that weak ICFR firms are more likely to exhibit both underinvestment and empire-building behaviors relative to their peers without material weaknesses in internal control. Skaife et al. (2013) add that weak control over financial reporting contributes to managerial rent extraction in the fashion of opportunistic insider trading.

Taken together, the presence of internal control weaknesses is inextricably linked to higher costs associated with both adverse selection and moral hazard. It follows that ineffective ICFR firms are likely to have stronger precautionary benefits and higher agency costs of cash and cash equivalents vis-à-vis effective ICFR firms. Our testable hypothesis is that if the agency costs of cash equate with the benefits from a financial buffer in ineffective ICFR firms, we should not observe a systematic relation between the worth of cash and the quality of internal control over financial

reporting. However, a negative correlation between the presence of ICFR weaknesses and cash valuation would indicate that the benefits from precautionary savings entailed by weak ICFR are more than offset by agency costs stemming from weak ICFR. Conversely, a significantly positive association would suggest that the favorable impact of the value increment from financial flexibility is likely to outweigh the adverse effect of cash assets for weak ICFR firms.

3. Empirical model and variable definition

To investigate whether internal control over financial reporting serves as an important channel through which the marginal value of cash varies significantly, we build on the model specification developed by Faulkender and Wang (2006). In particular, they show that the variation in the value of corporate cash holdings depends on the differences in corporate financial policy, such as leverage levels and prior cash positions. We augment their framework by introducing a measure of internal control quality, as disclosed in the SOX 404 internal control assessments, and its interaction with changes in cash resources as follows:

$$\begin{aligned} r_{i,t} - R_{i,t} = {} & \alpha_0 + \alpha_1 \frac{\Delta CA_{i,t}}{M_{i,t-1}} + \alpha_2 MW_{i,t} + \alpha_3 MW_{i,t} * \frac{\Delta CA_{i,t}}{M_{i,t-1}} + \alpha_4 \\ & \times \frac{\Delta ER_{i,t}}{M_{i,t-1}} + \alpha_5 \frac{\Delta NA_{i,t}}{M_{i,t-1}} + \alpha_6 \frac{\Delta RD_{i,t}}{M_{i,t-1}} + \alpha_7 \frac{\Delta IR_{i,t}}{M_{i,t-1}} + \alpha_8 \\ & \times \frac{\Delta DIV_{i,t}}{M_{i,t-1}} + \alpha_9 \frac{CA_{i,t-1}}{M_{i,t-1}} + \alpha_{10} LEV_{i,t} + \alpha_{11} \frac{NF_{i,t}}{M_{i,t-1}} + \alpha_{12} \\ & \times \frac{CA_{i,t-1}}{M_{i,t-1}} * \frac{\Delta CA_{i,t}}{M_{i,t-1}} + \alpha_{13} LEV_{i,t} * \frac{\Delta CA_{i,t}}{M_{i,t-1}} + \varepsilon_{i,t}, \end{aligned} \quad (1)$$

In the above equation, the dependent variable $(r_{i,t} - R_{i,t})$ is estimated as the difference between the actual stock return and the benchmark return, which is based on the 25 Fama and French (1993) size and book-to-market portfolios. Our main variable of interest is the interaction of $\frac{\Delta CA_{i,t}}{M_{i,t-1}}$ with $MW_{i,t}$. $\Delta CA_{i,t}$ is defined as an unexpected change in cash and marketable securities from fiscal year $t-1$ to t, and $M_{i,t-1}$ represents the lagged market value of equity. $MW_{i,t}$ is an indicator variable that equals one if the firm is identified as having material weaknesses in internal control over financial reporting in the SOX Section 404 report, and zero otherwise. Since we delineate the stock return as the spread between $M_{i,t}$ and $M_{i,t-1}$ normalized by $M_{i,t-1}$, the deflation of the regressors by $M_{i,t-1}$ enables us to interpret the estimated coefficients as the incremental values of the explanatory variables.

In essence, ICFR weaknesses raise the likelihood of over- and under-investment materially. It follows that the coefficient α_3 indicates the *net* off-setting impact of the agency costs and precautionary benefits of liquidity management on firm value. The sign of α_3 is expected to be negative when the adverse effect resulting from managerial appropriation of cash resources outweighs, on average, the favorable impact of financial flexibility in ineffective ICFR firms. A positive sign would imply the dominance of precautionary effects over agency effects of cash and cash equivalents for weak ICFR firms.

We select a spectrum of firm-specific characteristics as control variables; namely, profitability level, financing activity, and investment policy. To permit variations in corporate profitability, we account for the spread in earnings before interest and extraordinary items $(\Delta ER_{i,t})$ from fiscal year-end $t-1$ to t. We measure variations in noncash assets and R&D activity by changes in total assets net of cash $(\Delta NA_{i,t})$ and changes in R&D expenses $(\Delta RD_{i,t})$, respectively. We deem firms that do not report R&D expenses to be those without R&D outlay.

Further, we take into account financing-related factors that comprise changes in interest expense $(\Delta IR_{i,t})$, changes in common dividends $(\Delta DIV_{i,t})$, and net changes in financing $(NF_{i,t})$. To delineate $NF_{i,t}$, we exclude share repurchases and debt redemptions from the issues of debt and equity. To allow for variations in the value of cash $(\Delta CA_{i,t})$ across a variety of samples based on previous cash balances and leverage levels, we also include the prior year's cash holdings $(CA_{i,t-1})$, financial leverage $(LEV_{i,t})$, and their individual interactions with unexpected changes in cash assets $(\Delta CA_{i,t})$.

4. Sample construction and descriptive statistics

4.1. Sample selection

Our initial sample consists of all the public firms with SOX 404 reports available on Audit Analytics. We select 2004 through 2010 as the period of analysis. We exclude pre-2004 data, because Section 404 became effective for fiscal years ending on or after November 15, 2004. To attenuate the potential effects of regulation on the motives for corporate cash holdings, we remove firms in the financial services industries (SIC codes 6000 through 6999) and utility sectors (SIC codes 4900 through 4999) from our sample.

Our sample firms are also required to be covered by Compustat S&P Domestic Long Term Issuer Credit Rating dataset, to have stock return data from the Center for Research in Security Prices (CRSP), and to have annual financial statement information available from Compustat. As in Denis and Sibilkov (2010), we exclude firms with negative values for book value of equity or total book assets below $25 million. We winsorize all the continuous variables at the 1% and 99% levels in order to ameliorate the impact of extreme observations. After imposing the above criteria, we generate a sample of 3909 unique firms and 15,409 firm-year observations, among which 1261 and 14,148 are ineffective ICFR firm-years and effective ICFR observations, respectively.[4]

4.2. Summary statistics and pairwise correlations

In Table 1, we present descriptive statistics on the variables included in the baseline model specification. The distribution of an annual excess return is right-skewed with a median abnormal return of −4.2% and a mean of 3.8%. Overall, 8.2% of the firm-year observations face internal control problems that have reached a material level. On average, cash reserves have been slightly increasing over time, with $\Delta CA_t's$ upper quartile (lower quartile) standing at 4.6% (−2.5%). The mean spreads in profitability (ΔER_t) and net assets (ΔNA_t) are positive, whereas those in R&D expenditures (ΔRD_t), interest expenses (ΔIR_t), and dividends paid (ΔDIV_t) are negligible. Our prior cash variable (CA_{t-1}) averages nearly 18.5%, indicating that the previous cash balances, on average, account for almost 18.5% of their lagged market value of equity. The median ratio of total debts to the sum of total debts and market value of equity (LEV_t) is almost 14%, and the standard deviation of net capital ratios (NF_t) approaches 20%.

In a correlation matrix (untabulated), we find that MW_t is highly correlated with $r_{i,t} - R_{i,t}$ for the entire sample with a coefficient of −0.05 ($p < 0.01$), supporting the notion that weak ICFR firms significantly underperform their effective ICFR counterparts. Among the explanatory variables, the magnitude of the highest correlation for the pair of ΔNA_t and NF_t does not exceed 0.50. Moreover, the

[4] Under Auditing Standard No. 2 (AS2), auditors were also required to audit and report on management's assessment of internal control effectiveness. AS5, which superseded AS2 in 2007, does not require auditors to express an opinion on management's internal control assessment for non-accelerated filers with market capitalization less than $75 million, although auditor-attested evaluations continue to be available for a vast majority of firms. We find that our main conclusions from the subsequent analyses are not influenced by the restriction to the subsample with auditors' ICFR reports.

Table 1
Summary statistics.

	No. of Obs.	Mean	Lower quartile	Median	Upper quartile	Standard deviation
$r_{i,t} - R_{i,t}$	15,409	0.038	−0.266	−0.042	0.228	0.514
MW_t	15,409	0.082	0.000	0.000	0.000	0.274
ΔCA_t	15,409	0.017	−0.025	0.004	0.046	0.129
ΔER_t	15,409	0.024	−0.024	0.006	0.036	0.231
ΔNA_t	15,409	0.050	−0.029	0.030	0.121	0.343
ΔRD_t	15,409	0.000	0.000	0.000	0.002	0.049
ΔIR_t	15,409	0.001	−0.001	0.000	0.002	0.015
ΔDIV_t	15,409	0.000	0.000	0.000	0.000	0.013
CA_{t-1}	15,409	0.184	0.042	0.106	0.234	0.234
LEV_t	15,409	0.199	0.014	0.137	0.308	0.212
NF_t	15,409	0.031	−0.035	0.000	0.042	0.189

This table reports summary statistics for the sample firms. $r_{i,t} - R_{i,t}$ is annual excess stock return, where $r_{i,t}$ is the annual stock raw return of firm i at time t and $R_{i,t}$ is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year t. MW_t is an indicator variable that is set to the value of one if the firm is identified as having SOX 404 material weaknesses, and zero otherwise. Δ refers to the spread from the previous year. CA_t is cash plus marketable securities scaled by the lagged market value of equity (M_{t-1}). ER_t is the ratio of earnings before extraordinary items and interest to M_{t-1}. NA_t is total assets net of cash and cash equivalents normalized by M_{t-1}. RD_t is R&D expenditures at time t deflated by the previous year's market value of equity. IR_t is interest expenses divided by M_{t-1}. DIV_t is the ratio of common dividends paid over the fiscal year to M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by the lagged market value of equity. LEV_t is total debts scaled by the sum of total debts and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by the lagged market value of equity.

absolute values of pairwise correlations are generally below 0.30. Hence, we observe no extreme correlation among the data, suggesting that multicollinearity should not pose an econometric challenge in the forthcoming regression results.

5. Main results

5.1. Full sample results

To test formally whether the value of cash balances is contingent upon internal control quality, we place emphasis on the coefficient on $MW_t * \Delta CA_t$. Considering the first model specification in Table 2, we find that the coefficient on the interaction term is 0.24 ($p < 0.01$). This indicates that cash and marketable securities are significantly more valuable for weak ICFR firms vis-à-vis effective ICFR firms. To put the magnitude of this result into perspective, we find that the value of an extra dollar of cash for the mean firm with effective ICFR is \$1.28 (=1.572–0.335 × 0.184–1.165 × 0.199). On average, the marginal value of cash does not fall below its face value but instead rises to \$1.52 for weak ICFR firms. These findings are consistent with the reasoning that the adverse impact of cash-induced agency costs on weak ICFR firms is more than offset by the favorable impact of precautionary cash.

This inference is not driven by unobserved macro factors because the results hold with year effects (column 2). They are also robust to both additions of year- and industry-effects, which are based on the Fama and French's (1997) 48-industry classification (column 3).[5] A potential criticism of the baseline regressions is that the market-to-book ratio, a key element of our benchmark return, is endogenous. This, in turn, could make the interpretation of our findings controversial. To address this possibility, we follow Masulis et al. (2009) and use an industry-adjusted return as an alternative measure of excess return. We redefine the dependent variable as the spread between the firm's raw return and the value-weighted average return for the industry-matched firms. It is interesting to note that the coefficient on $MW_t^* \Delta CA_t$ in column 4 becomes somewhat stronger, increasing by about 17%. In short, the additional tests enhance our confidence that the interconnection between the value of cash and internal control quality is not driven by the endogenous nature of market-to-book ratios or spuriously caused by the lack of controls for time and industry effects.

However, it seems also possible that the association between ineffective internal control and the value of cash assets reflects a spurious link due to the deficiency of controls for financial constraints and governance mechanisms. To address this likelihood, we, similar to Faulkender and Wang (2006), include a debt rating dummy ($BDRATE_t$), whose value is set to one if the firm has an investment grade bond rating and zero otherwise. Akin to Dittmar and Mahrt-Smith (2007), we incorporate the firm's Gompers, Ishii, and Metrick index, which is not reported each year. Given that the index is quite sticky, we, consistent with Dittmar and Mahrt-Smith (2007), use the firm's most recently available index for the year in which the firm's index is not reported. Because $GINDEX_t$ is missing for 65% of our firm-years, the inclusion of this variable reduces the vast majority of variations in the variable of primary interest (MW_t). To enhance the power of this sensitivity test, we follow Biddle et al. (2009) and Cheng et al. (2013). In particular, we assign a value of zero to the observation with missing $GINDEX_t$ and add an indicator variable ($NGINDEX_t$) to denote the missing $GINDEX_t$.

We then include the aforementioned variables and their interactions with changes in cash holdings in our analyses. In columns 1 and 2 of Table 3, the negatively significant coefficients on $BDRATE_t^* \Delta CA_t$ indicate that the marginal value of cash reserves is remarkably higher for firms without an investment bond grade rating than for their counterparts with an investment grade rating. More importantly, we find that the value of an additional dollar of cash continues to be significantly greater for ineffective ICFR firms relative to effective ICFR firms, regardless of utilizing either measure of adjusted excess returns (significant at the 1% level). Our basic conclusion in columns 3 and 4 is unaltered, when we use an alternative constraint indicator variable ($PAYOUT_t$) equal to one if the firm has a payout ratio above the sample median and zero otherwise.[6] Hence, the robustness of our inference signifi-

[5] Our sample size reduces to 15,274 when we use Fama and French 48-industry classification in columns 3 and 4. The reason is that there are 135 firm-year observations whose SIC codes are not covered by Fama and French 48 industries. We find similar results when we alternatively use 2-digit SIC codes to conduct industry groupings. The similar findings are extended to the forthcoming tables.

[6] The coefficient on *GINDEX* interacted with changes in cash is significant in Dittmar and Mahrt-Smith (2007) but not in our results. Our further analysis (untabulated) shows that the discrepancy in results is entailed by the differences inherent in the definition of *GINDEX* and in the sample construction. We replicate Dittmar and Mahrt-Smith's tests requiring final sample firms to have the Gompers et al.'s index available, discarding firms with index in the middle tercile, and coding *GINDEX* based on whether the firm's index is in the top or bottom tercile. To enhance the variation in GINDEX and thus the power of this test, we supplement the data from our shorter sample period with the data from the period of 1990–2003. When we duplicate Dittmar and Mahrt-Smith's test, we find results similar to theirs. Accordingly, the sample construction and the variable definition cause the differences in results.

Table 2
Material weaknesses in internal control and valuation of liquid asset holdings.

	(1)	(2)	(3)	(4)
MW_t	−0.089***	−0.089***	−0.091***	−0.091***
	(0.00)	(0.00)	(0.00)	(0.00)
MW_t*ΔCA_t	0.243***	0.241***	0.235***	0.275***
	(0.00)	(0.00)	(0.01)	(0.00)
ΔCA_t	1.572***	1.634***	1.637***	1.631***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔER_t	0.463***	0.485***	0.474***	0.494***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔNA_t	0.238***	0.250***	0.228***	0.205***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔRD_t	0.016	0.026	0.058	0.094
	(0.92)	(0.86)	(0.70)	(0.52)
ΔIR_t	−2.049***	−2.145***	−2.068***	−2.192***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔDIV_t	1.201***	1.122***	0.919**	1.095***
	(0.00)	(0.01)	(0.02)	(0.01)
CA_{t-1}	0.261***	0.288***	0.385***	0.419***
	(0.00)	(0.00)	(0.00)	(0.00)
LEV_t	−0.284***	−0.306***	−0.405***	−0.383***
	(0.00)	(0.00)	(0.00)	(0.00)
NF_t	−0.100**	−0.114***	−0.087*	−0.069
	(0.03)	(0.01)	(0.06)	(0.14)
CA_{t-1}*ΔCA_t	−0.335**	−0.370***	−0.347***	−0.338**
	(0.02)	(0.01)	(0.01)	(0.02)
LEV_t*ΔCA_t	−1.165***	−1.173***	−1.206***	−1.277***
	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	0.011	−0.058***	0.027	0.075***
	(0.12)	(0.00)	(0.25)	(0.00)
Year effects	No	Yes	Yes	Yes
Industry effects	No	No	Yes	Yes
No of obs.	15,409	15,409	15,274	15,274
Adjusted *R*-squared	19.26%	20.15%	22.32%	23.92%

This table reports estimates of ordinary least squares regressions relating annual abnormal returns, material weaknesses, cash reserves, and a set of firm characteristics. The dependent variable is a firm's annual excess stock return ($r_{i,t} - R_{i,t}$), where $r_{i,t}$ is the annual stock raw return of firm i at time t, and $R_{i,t}$ in columns 1–3 is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year t. In column 4, $R_{i,t}$ represents the value-weighted industry return based on the Fama–French (1997) 48-industry classification, which is also applied to the industry grouping in column 3. MW_t is an indicator variable that is set to the value of one if the firm is identified as having SOX 404 material weaknesses, and zero otherwise. Δ refers to the spread from the previous year. CA_t is cash plus marketable securities scaled by the lagged market value of equity (M_{t-1}). ER_t is the ratio of earnings before extraordinary items and interest to M_{t-1}. NA_t is total assets net of cash and cash equivalents normalized by M_{t-1}. RD_t is R&D expenditures at time t deflated by the previous year's market value of equity. IR_t is interest expenses divided by M_{t-1}. DIV_t is the ratio of common dividends paid over the fiscal year to M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by the lagged market value of equity. LEV_t is total debts scaled by the sum of total debts and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by the lagged market value of equity. p-Values, which are calculated using standard errors clustered at the firm level, are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

cantly reduces the likelihood that there are unknown factors that account for the variations in the influence of material weaknesses on cash valuation.

5.2. Sample splits

Thus far, our full sample analysis has illustrated that the favorable (precautionary) impact induced by weak ICFR appears to more than offset the adverse (agency) effect entailed by ineffective ICFR. To provide more direct evidence on this issue, we repeat the analysis presented in Table 2 for several subsamples of the data. The underlying logic is that if the favorable effect genuinely outweighs the adverse agency effect from financial flexibility, the net benefit

Table 3
Material weaknesses, financial constraints, antitakeover provisions, and valuation of cash holdings.

	(1)	(2)	(3)	(4)
MW_t	−0.091***	−0.091***	−0.091***	−0.090***
	(0.00)	(0.00)	(0.00)	(0.00)
MW_t*ΔCA_t	0.233***	0.267***	0.235***	0.270***
	(0.01)	(0.00)	(0.01)	(0.00)
ΔCA_t	1.402***	1.389***	1.465***	1.476***
	(0.00)	(0.00)	(0.00)	(0.00)
$BDRATE_t$	0.022***	0.011		
	(0.01)	(0.19)		
$BDRATE_t$*ΔCA_t	−0.265*	−0.433***		
	(0.06)	(0.00)		
$PAYOUT_t$			0.018**	0.018**
			(0.03)	(0.04)
$PAYOUT_t$*ΔCA_t			−0.162	−0.197*
			(0.11)	(0.06)
$GINDEX_t$	0.003*	0.003*	0.004**	0.003*
	(0.07)	(0.07)	(0.03)	(0.06)
$GINDEX_t$*ΔCA_t	0.032	0.026	0.028	0.019
	(0.28)	(0.37)	(0.33)	(0.50)
$NGINDEX_t$	0.052***	0.041**	0.056***	0.045**
	(0.00)	(0.02)	(0.00)	(0.02)
$NGINDEX_t$*ΔCA_t	0.238	0.286	0.208	0.236
	(0.38)	(0.29)	(0.44)	(0.37)
ΔER_t	0.474***	0.493***	0.473***	0.492***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔNA_t	0.227***	0.204***	0.225***	0.200***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔRD_t	0.056	0.089	0.059	0.093
	(0.71)	(0.55)	(0.69)	(0.52)
ΔIR_t	−2.034***	−2.153***	−2.055***	−2.181***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔDIV_t	0.887**	1.079***	0.837**	1.022**
	(0.03)	(0.01)	(0.04)	(0.01)
CA_{t-1}	0.386***	0.419***	0.390***	0.424***
	(0.00)	(0.00)	(0.00)	(0.00)
LEV_t	−0.404***	−0.383***	−0.401***	−0.380***
	(0.00)	(0.00)	(0.00)	(0.00)
NF_t	−0.092**	−0.075	−0.088*	−0.070
	(0.05)	(0.11)	(0.06)	(0.14)
CA_{t-1}*ΔCA_t	−0.357***	−0.372***	−0.370***	−0.383***
	(0.01)	(0.01)	(0.01)	(0.01)
LEV_t*ΔCA_t	−1.196***	−1.248***	−1.193***	−1.246***
	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	−0.024	0.0355	−0.036	0.022
	(0.41)	(0.23)	(0.23)	(0.71)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
No of obs.	15,274	15,274	15,274	15,274
Adjusted *R*-squared	22.40%	24.27%	22.41%	24.28%

The dependent variable is a firm's annual excess stock return ($r_{i,t} - R_{i,t}$), where $r_{i,t}$ is the annual stock raw return of firm i at time t, and $R_{i,t}$ in column 1 and 3 is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year t. In column 2 and 4, $R_{i,t}$ represents the value-weighted industry return based on the Fama–French (1997) 48-industry classification. MW_t is an indicator variable that is set to the value of one if the firm is identified as having SOX 404 material weaknesses, and zero otherwise. Δ refers to the spread from the previous year. CA_t is cash plus marketable securities scaled by the lagged market value of equity (M_{t-1}). $BDRATE_t$ is an indicator variable that takes a value of one if the firm has an investment grade debt rating and zero otherwise. $PAYOUT_t$ is an indicator variable whose value is set to one if the firm's payout ratio is greater than the sample median and zero otherwise. $GINDEX_t$ represents the firm's Gompers, Ishii, and Metrick index. $NGINDEX_t$ is an indicator variable equal one if the Gompers, Ishii, and Metrick index is missing and zero otherwise. ER_t is the ratio of earnings before extraordinary items and interest to M_{t-1}. NA_t is total assets net of cash and cash equivalents normalized by M_{t-1}. RD_t is R&D expenditures at time t deflated by the previous year's market value of equity. IR_t is interest expenses divided by M_{t-1}.DIV_t is the ratio of common dividends paid over the fiscal year to M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by the lagged market value of equity. LEV_t is total debts scaled by the sum of total debts and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by the lagged market value of equity. p-Values, which are calculated using standard errors clustered at the firm level, are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

Table 4
Internal control weaknesses and valuation of liquid asset holdings: sample splits.

	Stratified by cash flow volatility		Stratified by sales growth		Stratified by cash flow volatility and sale growth	
	Above median	Below median	Above median	Below median	Above median	Below median
MW_t	−0.086***	−0.074***	−0.089***	−0.099***	−0.054	−0.094***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.26)	(0.01)
$MW_t{}^*\Delta CA_t$	0.372***	0.104	0.276***	0.104	0.496***	0.132
	(0.00)	(0.43)	(0.00)	(0.53)	(0.00)	(0.69)
ΔCA_t	1.543***	1.818***	1.831***	1.394***	1.628***	1.498***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ΔER_t	0.374***	0.588***	0.450***	0.469***	0.405***	0.581***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ΔNA_t	0.167***	0.253***	0.292***	0.179***	0.148***	0.140***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
ΔRD_t	−0.115	0.259	−0.066	0.154	0.800	0.067
	(0.85)	(0.28)	(0.64)	(0.56)	(0.30)	(0.86)
ΔIR_t	−0.522	−3.262***	−0.827	−2.297***	0.862	−4.053***
	(0.48)	(0.00)	(0.26)	(0.00)	(0.44)	(0.00)
ΔDIV_t	0.551	1.705***	2.057***	0.297	2.458**	1.327**
	(0.40)	(0.00)	(0.00)	(0.51)	(0.02)	(0.03)
CA_{t-1}	0.431***	0.308***	0.439***	0.352***	0.445***	0.286***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
LEV_t	−0.452***	−0.407***	−0.624***	−0.278***	−0.627***	−0.301***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
NF_t	−0.181**	−0.042	−0.029	−0.205***	−0.054	−0.063
	(0.02)	(0.60)	(0.66)	(0.01)	(0.62)	(0.58)
$CA_{t-1}{}^*\Delta CA_t$	−0.223	−0.757***	−0.255	−0.395**	−0.211	−0.477*
	(0.38)	(0.00)	(0.30)	(0.02)	(0.61)	(0.08)
$LEV_t{}^*\Delta CA_t$	−0.972***	−1.917***	−1.970***	−0.512**	−1.853***	−1.687***
	(0.01)	(0.00)	(0.00)	(0.04)	(0.00)	(0.00)
Intercept	0.081***	0.001	0.044	0.014	0.174***	0.046
	(0.01)	(0.98)	(0.29)	(0.56)	(0.00)	(0.33)
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes
No of Obs.	6005	6005	7546	7546	2966	2966
Adjusted R-squared	21.33%	23.64%	25.24%	21.82%	23.42%	24.10%
p-Value of difference in the coefficients on $MW_t{}^*\Delta CA_t$	0.002		0.025		0.016	

This table reports estimates of stratified ordinary least squares regressions relating annual abnormal returns, material weaknesses, cash reserves, and a set of firm characteristics. The analyses are stratified by cash flow volatility, sales growth, and the intersection of cash flow volatility and sales growth. Cash flow volatility is the standard deviation of quarterly cash flow per share, which we compute by adding depreciation per share to earnings per share, for the previous three years. Sales growth is the average of annual sales growths over the past three years. The dependent variable is a firm's annual excess stock return ($r_{i,t} - R_{i,t}$), where $r_{i,t}$ is the annual stock raw return of firm i at time t and $R_{i,t}$ is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year t. MW_t is an indicator variable that is set to the value of one if the firm is identified as having SOX 404 material weaknesses, and zero otherwise. Δ refers to the spread from the previous year. CA_t is cash plus marketable securities scaled by lagged market value of equity (M_{t-1}). ER_t is the ratio of earnings before extraordinary items and interest to M_{t-1}. NA_t is total assets net of cash and cash equivalents normalized by M_{t-1}. RD_t is R&D expenditures at time t deflated by the previous year's market value of equity. IR_t is interest expenses divided by M_{t-1}. DIV_t is the ratio of common dividends paid over the fiscal year to M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by lagged market value of equity. LEV_t is total debts scaled by the sum of total debt and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by lagged market value of equity. p-Values, which are calculated using standard errors clustered at the firm level, are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels, respectively. p-Values are also reported for the differences in the coefficients on $MW_t{}^*\Delta CA_t$ between the split samples.

of cash reserves should concentrate in some types of weak ICFR firms. For example, a financial cushion is expected to be drastically more beneficial to ineffective ICFR firms with riskier cash flows, because greater idiosyncratic risk, as mirrored by volatility of cash flows, can significantly enhance the value of precautionary cash (Opler et al., 1999; Bates et al., 2009).

Accordingly, we perform additional regression analyses that allow for different intercepts and slopes across partitions of the sample, based on the sample median of firms' cash flow volatilities. In the spirit of Irvine and Pontiff (2008), we measure cash flow volatility as the standard deviation of quarterly cash flow per share, which we compute by adding depreciation per share to earnings per share, for the previous three years.[7] As expected, we find in Table 4 that the coefficient of 0.372 on $MW_t^*\Delta CA_t$ is statistically and economically significant for the group with cash flow volatility above the sample median. Interestingly, the corresponding coefficient for the bottom group in cash flow volatility becomes much smaller in magnitude and is not significant at conventional levels. Moreover, the difference in the coefficients of $MW_t * \Delta CA_t$ between the top and bottom groups of cash flow volatility is significant at the 1% level. Hence, our findings suggest that liquid asset holdings matter more to weak ICFR firms that need a cash buffer against shocks to internally generated cash flow.

We next examine whether the value of cash assets is related to growth potential and whether the link between weak internal control and cash valuation is stronger for those firms that have more investment opportunities. Our intuition is that cash and cash equivalents should enable high-growth firms that experience material weaknesses in internal control and thus external financial

[7] Our sample size reduces to 12,010 firm-year observations because we remove the observations for which we lack data on any quarterly cash flow per share over the past three years to compute cash flow volatility. We apply a similar criterion to the subsequent construction of the subsamples based on sales growth.

constraints to reduce underinvestment costs.[8] Consistent with Martin (1996), we use the average of annual growth rates in sales over the past three years to proxy for a firm's growth opportunities. Not surprisingly, we uncover evidence that the value of cash resources is far greater for weak ICFR firms whose sales growth is above the sample median vis-à-vis their inadequate ICFR peers whose sales growth is below the sample median (significant at the 5% level). Accordingly, our results are consistent with the argument that cash and marketable securities are valued at a premium especially in those weak ICFR firms with high growth potential.

It seems plausible that cash assets are particularly valuable for weak ICFR firms whose idiosyncratic cash flow volatility is likely to aggravate their underinvestment problem. To provide ancillary evidence on this issue, we restrict our attention to only two extreme groups whose cash flow volatility and sales growth are either above or below the respective median values. As anticipated, we find that the coefficient on $MW_t^*\Delta CA_t$ is not statistically reliable for the bottom subsample whose values in cash flow riskiness and sales growth are below the respective medians of the full sample. We discover that the corresponding coefficient (0.496) for the top subsample in both cash volatility and sales growth is statistically distinguishable from zero and becomes much larger in magnitude. The coefficient difference between the two groups is also statistically significant at conventional levels.[9] Consistent with Acharya et al. (2007), this evidence suggests that cash assets are particularly valuable for ineffective ICFR firms that are likely to encounter a mismatch between internally generated cash flow and investment opportunity. As a whole, our findings from stratified analyses verify that the favorable effect of cash tends to dominate its adverse effect in weak ICFR firms, especially when the demand for precautionary cash is strong.

5.3. Types of material weaknesses and cash valuation

To this point, our analyses indicate that the worth of cash is remarkably higher for weak ICFR firms compared to their effective ICFR counterparts. However, these results are based on the assumption that all internal control problems have the same nature and therefore share a similar level of severity. If some of the reported weaknesses have an immaterial effect on the accuracy of financial reporting, our inferences could be plagued by measurement errors. Intuitively, our prior measure can potentially capture some minor issues in ICFR rather than serious threats to the reliability of financial reporting.

To address this concern, we classify internal control problems based on the nature of material weaknesses. As Moody's Investors Service (2004, 2006, 2007) indicates, account-level problems (Category A) are related to specific account balances or transaction-level processes, whereas company-level issues (Category B) pertain to the control environment or financial reporting process. Moody's suggests that, in contrast to Category B's, Category A's are auditable through substantive testing and are easily corrected through adjusting entries. Therefore, company-level ICFR weaknesses are likely to be more severe and tend to represent as serious a threat to the reliability of financial reporting. As in Doyle et al. (2007a,b), we consider company-level material weaknesses to be the problems pertaining to ineffective control environment or override by senior management. In the spirit of their classification scheme, we acknowledge that firms with more than three account-specific control problems have a severity level of ICFR weaknesses similar to that in firms with company-level material weaknesses.

Consequently, we define a company-level indicator variable (CMW_t) as one if the firm has company-wide material weaknesses or more than three account-specific control problems, and zero otherwise. When we incorporate this more stringent condition into the classification scheme, we effectively reduce the number of weak ICFR firm-year observations from 1261 to 596. As shown in Table 5, it is unsurprising that the estimates in columns 1 and 2 are very similar to the ones demonstrated before regardless of utilizing either measure of adjusted excess returns. More interestingly, when we focus on more severe, entity-wide control problems, the value spread in cash between weak ICFR firms and effective ICFR firms becomes much wider. It emerges from our comparison of column 1 in Table 5 with column 3 in Table 2 that the spread increment is nearly 40%.

As a sensitivity check, we single out a set of 665 firm-years with account-specific internal control problems from the sample of 1261 weak ICFR observations. We insert an account-specific indicator variable (AMW_t) and its interaction with ΔCA_t to further examine whether the value of cash varies with account-level material weaknesses, which are easier to "audit around". As AMW_t and CMW_t are mutually exclusive, AMW_t takes a value of one if a weak ICFR firm does not fall in the *CMW* category, and zero if a firm is part of the *CMW* group or belongs to the class of effective ICFR firms.

In column 3, we observe the asymmetric effects of company-level versus account-level material weaknesses on cash valuation. While the coefficient on $CMW_t^*\Delta CA_t$ continues to be positive at the 1% level, the coefficient on $AMW_t^*\Delta CA_t$ is statistically indistinguishable from zero at conventional levels. In column 4, we confirm that a statistically positive coefficient exists merely on the interaction of ΔCA_t with CMW_t when we use the industry-adjusted return as an alternative proxy for the abnormal return. Accordingly, these findings alleviate the concern that the variation in cash valuation is attributable to the situation under which internal control problems are less severe and the costs of both adverse selection and moral hazard are less likely to be significant.

5.4. Remediation of material weaknesses and value of liquid assets

Given that the remediation of a previously reported material weakness has a potentially reversible effect on misrepresented financial information, we supplement our previous analyses by exploring whether the economic consequences of cash indeed differ with the repairing of ICFR problems (Skaife et al., 2013). To the extent that the adverse agency effect dominates the favorable effect from financial flexibility, the value of cash should improve once the problem is dealt with. Conversely, the marginal value of cash should decrease with the remediation of internal control problems, if the precautionary benefits outweigh the agency costs.

[8] As a large body of literature indicates, asymmetric information between managers and outside investors plays a significant role in the costs of issuing securities, thereby creating a disincentive for the firm with poor information quality to issue securities to raise external capital (Dann and Mikkelson, 1984; Eckbo, 1986; Mayers, 1998; Spiess and Affleck-Graves, 1995, 1999; Baker and Wurgler, 2000; Lee and Masulis, 2009). To the extent that the cost of outside financing is significantly higher for firms with internal control breakdowns than for firms without a similar failure, the former group of firms is less likely to engage in security offerings to fund real investment than is the latter group. As anticipated, we find that the mean financing measure, defined as the ratio of the amount of funds received from issuance of long-term debt and common & preferred stocks to total assets, is significantly smaller for ineffective ICFR firms (0.263) vis-à-vis effective ICFR firms (0.286) ($p < 0.01$). This evidence is consistent with Kim et al. (2011) and Ashbaugh-Skaife et al. (2009) that firms that disclose material weaknesses in internal control face a significantly higher cost of external capital than their peers without internal control failures.

[9] Analogous to the spirit of Lang et al. (1996) and Denis and Sibilkov (2010), we alternatively gauge investment opportunities by net investment, defined as the average of annual capital expenditures net of depreciation over the preceding three years. We find that our inference is robust to this alternative measure of a firm's investment opportunities. While the coefficient on the interaction of *MW* with changes in cash holdings is significant for the bottom subsample, we find that the corresponding coefficient is significantly greater for the top group than for the bottom group at conventional levels.

Table 5
Company-level vs. account-level material weaknesses and valuation of liquid asset holdings.

	(1)	(2)	(3)	(4)
CMW_t	−0.097 ***	−0.092***	−0.101***	−0.097***
	(0.00)	(0.00)	(0.00)	(0.00)
AMW_t			−0.074***	−0.078***
			(0.00)	(0.00)
$CMW_t{}^*\Delta CA_t$	0.325 ***	0.364***	0.320 ***	0.360
	(0.00)	(0.01)	(0.00)	(0.01)
$AMW_t{}^*\Delta CA_t$			−0.195	−0.126
			(0.37)	(0.56)
ΔCA_t	1.631 ***	1.625***	1.642***	1.633***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔER_t	0.484***	0.505***	0.482***	0.503***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔNA_t	0.224***	0.200***	0.223***	0.198***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔRD_t	0.804**	1.018***	0.799**	1.015***
	(0.02)	(0.00)	(0.02)	(0.00)
ΔIR_t	−2.086***	−2.205***	−2.072***	−2.190***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔDIV_t	0.931**	1.111***	0.927**	1.105***
	(0.02)	(0.01)	(0.02)	(0.01)
CA_{t-1}	0.387***	0.422***	0.391***	0.426***
	(0.00)	(0.00)	(0.00)	(0.00)
LEV_t	−0.408***	−0.387***	−0.405***	−0.384***
	(0.00)	(0.00)	(0.00)	(0.00)
NF_t	−0.086*	−0.067	−0.084*	−0.065
	(0.06)	(0.15)	(0.07)	(0.16)
$CA_{t-1}{}^*\Delta CA_t$	−0.342***	−0.333**	−***	−0.329**
	(0.01)	(0.02)	0.337(0.01)	(0.02)
$LEV_t{}^*\Delta CA_t$	−1.201***	−1.270***	−***	−1.271***
	(0.00)	(0.00)	1.202(0.00)	(0.00)
Intercept	0.026	0.073***	0.025	0.073***
	(0.26)	(0.00)	(0.28)	(0.00)
No of obs.	15,274	15,274	15,274	15,274
Adjusted *R*-squared	22.36%	24.26%	22.46%	24.3%

This table reports estimates of ordinary least squares regressions relating annual abnormal returns, material weakness types, cash reserves, and a set of firm characteristics. The dependent variable is a firm's annual excess stock return ($r_{i,t} - R_{i,t}$), where $r_{i,t}$ is the annual stock raw return of firm i at time t, and $R_{i,t}$ in column 1 and 3 is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year t. In column 2 and 4, $R_{i,t}$ represents the value-weighted industry return based on the Fama–French (1997) 48-industry classification. CMW_t is an indicator variable that equals one if the firm has company-level material weaknesses or more than three account-specific control problems, and zero otherwise. AMW_t is an indicator variable that is set to the value of one if a weak ICFR firm does not fall in the *CMW* category, and zero if a firm is part of the *CMW* group or belongs to the class of effective ICFR firms. Δ refers to the spread from the previous year. CA_t is cash plus marketable securities scaled by the lagged market value of equity (M_{t-1}). ER_t is the ratio of earnings before extraordinary items and interest to M_{t-1}. NA_t is total assets net of cash and cash equivalents normalized by M_{t-1}. RD_t is R&D expenditures at time t deflated by the previous year's market value of equity. IR_t is interest expenses divided by M_{t-1}. DIV_t is the ratio of common dividends paid over the fiscal year to M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by the lagged market value of equity. LEV_t is total debts scaled by the sum of total debts and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by the lagged market value of equity. Year and industry effects are included. *p*-Values, which are calculated using standard errors clustered at the firm level, are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

Table 6
Remediation of material weaknesses in internal control and valuation of liquid asset holdings.

	(1)	(2)	(3)	(4)
FIX_t	0.080***	0.069***		
	(0.00)	(0.00)		
$FIX_t{}^*\Delta CA_t$	−0.493**	−0.615***		
	(0.02)	(0.01)		
$AFTER_t$			0.034***	0.027*
			(0.00)	(0.07)
$AFTER_t{}^*\Delta CA_t$			−0.265**	−0.360***
			(0.02)	(0.00)
ΔCA_t	2.098***	2.117***	2.018***	2.043***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔER_t	0.201*	0.234**	0.317**	0.351***
	(0.06)	(0.03)	(0.03)	(0.00)
ΔNA_t	0.130	0.104	0.335***	0.305***
	(0.23)	(0.39)	(0.00)	(0.03)
ΔRD_t	−0.046	−0.053	−0.800*	−0.934**
	(0.95)	(0.93)	(0.07)	(0.03)
ΔIR_t	−1.002	−1.712	−1.606	−1.604
	(0.28)	(0.14)	(0.16)	(0.11)
ΔDIV_t	−1.186	−2.707	−1.657	−2.526**
	(0.62)	(0.20)	(0.16)	(0.02)
CA_{t-1}	0.393***	0.435***	0.492***	0.499**
	(0.00)	(0.00)	(0.01)	(0.02)
LEV_t	−0.403***	−0.404***	−0.381***	−0.390***
	(0.00)	(0.00)	(0.00)	(0.00)
NF_t	−0.012	0.044	−0.163**	−0.143*
	(0.92)	(0.62)	(0.04)	(0.07)
$CA_{t-1}{}^*\Delta CA_t$	−1.066**	−1.043***	−0.451	−0.539
	(0.02)	(0.01)	(0.24)	(0.17)
$LEV_t{}^*\Delta CA_t$	−0.509	−0.615	−2.153***	−2.028***
	(0.44)	(0.37)	(0.00)	(0.00)
Intercept	0.026	0.120**	0.101	0.019
	(0.81)	(0.05)	(0.58)	(0.91)
No of obs.	1033	1033	1232	1232
Adjusted *R*-squared	25.29%	26.80%	27.00%	28.80%

This table reports estimates of ordinary least squares regressions relating annual abnormal returns, remediation of material weaknesses in internal control, cash reserves, and a set of firm characteristics for a sample of weak ICFR firms with SOX 404 material weaknesses in year $t-1$. The dependent variable is a firm's annual excess stock return ($r_{i,t} - R_{i,t}$), where $r_{i,t}$ is the annual stock raw return of firm i at time t, and $R_{i,t}$ in column 1 and 3 is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year t. In column 2 and 4, $R_{i,t}$ represents the value-weighted industry return based on the Fama–French (1997) 48-industry classification. FIX_t is an indicator variable that is set to the value of one if a weak ICFR firm no longer reports SOX 404 material weaknesses in the following year t, and zero otherwise. $AFTER_t$ is an indicator variable that is set to the value of one after a weak ICFR firm fixes its weaknesses, and zero before it fixes its material weaknesses. Δ refers to the spread from the previous year. CA_t is cash plus marketable securities scaled by the lagged market value of equity (M_{t-1}). ER_t is the ratio of earnings before extraordinary items and interest to M_{t-1}. NA_t is total assets net of cash and cash equivalents normalized by M_{t-1}. RD_t is R&D expenditures at time t deflated by the previous year's market value of equity. IR_t is interest expenses divided by M_{t-1}. DIV_t is the ratio of common dividends paid over the fiscal year to M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by the lagged market value of equity. LEV_t is total debts scaled by the sum of total debts and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by the lagged market value of equity. Year and industry effects are included. *p*-Values, which are calculated using standard errors clustered at the firm level, are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

Hence, we compare the values of cash between weak ICFR firm that fix their previous problems and their counterparts that do not resolve previously reported material weaknesses. To this end, we restrict our attention to the observations that are identified as having material weaknesses in internal control in year $t-1$, and use a binary variable to reflect the remediation in the subsequent year t. Specifically, we delineate FIX_t as one if the weak ICFR firm no longer discloses internal control problems in the following SOX 404 report as of fiscal-year end t, and zero otherwise. This yields a sample of 680 firm-years that mend their internal control weaknesses next year and 353 observations that do not resolve their previous control problems.

Paralleling our prior results, we report in column 1 of Table 6 that the coefficient on $\Delta CA_t{}^*FIX_t$ is −0.493 at conventional levels. This coefficient suggests that an additional dollar of cash is worth \$0.493 less when the firm that remediates its internal control problems is compared with an otherwise comparable firm that does not fix its material weaknesses. Equivalently, the cash premium is likely to be triggered by the presence of SOX 404 material weaknesses, which restrict a firm's ability to access external capital.

We find a qualitatively similar result in column 2 when we alternatively use the industry-adjusted return as the response variable. As a result, this ancillary evidence is an interesting corroboration of the premise that the precautionary effect, on average, is likely to be more significant than the agency effect in cash valuation, when both adverse selection and moral hazard are strong.

To reinforce the interpretation of our results, we further investigate whether the value of cash significantly changes after the firm mends its weakness in ICFR. While we have a sample of 680 firm-years that mend their internal control weaknesses, we have only 616 corresponding pairs (1232 observations) in this pre-and-post remediation analysis.[10] As expected, the coefficient of −0.265 on $AFTER^{*}\Delta CA_t$ is statistically distinguishable from zero (p-value = 0.02). We find a similar result when we alternatively use the industry-adjusted return as the response variable. Hence, this supplementary evidence lends further credence to the premise that the favorable impact of the value increment from financial flexibility is likely to exceed the unfavorable effect of cash reserves for weak ICFR firms.

5.5. Alternative proxies for cash and number of material weaknesses

Hitherto, we have observed that the sensitivity of firm value to cash balances intensifies with internal control weaknesses. In this subsection, we ascertain whether our results are robust to alternative models of estimating unexpected changes of cash and cash equivalents. This analysis is important because our prior econometric specification is based on the presumption that the anticipated cash ratio at the end of the current year is identical to the cash ratio at the end of the past year. However, if the series of cash ratios does not follow a random walk, our model using the first difference to measure the unexpected change of cash and marketable securities could be misspecified. In this instance, the interpretation of the previous results is likely to be controversial.

To address this potential problem, we follow Almeida et al. (ACW, 2004) and use two fundamental-based models to distinguish between realized and unexpected changes in cash balances. In the first of two alternative specifications, we define expected changes in cash as follows:

$$\frac{\Delta CA_{it}}{M_{it-1}} = \theta_0 + \theta_1 \frac{CF_{it-1}}{M_{it-1}} + \theta_2 MB_{it-1} + \theta_3 SIZE_{it-1} + \eta_{it} \quad (2)$$

where $\Delta CA_{i,t}$ denotes changes in cash and cash equivalents over year t, $M_{i,t-1}$ is the market value of equity as of $t-1$ fiscal-year end, CF_{it-1} refers to the lagged cash flow, MB_{it-1} is defined as the market value deflated by the book value of assets, and $SIZE_{it-1}$ is the natural logarithm of book assets. We delineate $ACW(1)$ as total changes in cash assets, excluding the expected component of changes from equation (2).

In the second model, we allow for additional controls and specify expected changes in liquid asset holdings as follows:

$$\frac{\Delta CA_{it}}{M_{it-1}} = \theta_0 + \theta_1 \frac{CF_{it-1}}{M_{it-1}} + \theta_2 MB_{it-1} + \theta_3 SIZE_{it-1} + \theta_4 \frac{EXP_{it-1}}{M_{it-1}} + \theta_5 \times \frac{ACQ_{it-1}}{M_{it-1}} + \theta_6 \frac{\Delta NWC_{it-1}}{M_{it-1}} + \theta_7 \frac{\Delta SD_{it-1}}{M_{it-1}} + \eta_{it} \quad (3)$$

where EXP_{it-1} and ACQ_{it-1} are delineated as lagged capital expenditures and acquisitions, and $\Delta NWC_{i,t-1}$ and $\Delta SD_{i,t-1}$ represent changes in net working capital and short-term debt over the past year, and the other variables are as defined as those in equation (2). To define $ACW(2)$, we subtract expected changes in cash and marketable securities, as estimated by Eq. (3), from total changes as unexpected variations in cash.

Using these alternative proxies for unexpected changes in cash, we find results similar to those in our baseline regressions. In columns 1 and 2 of Table 7, we find positive coefficients on the interactions of MW_t with $ACW(1)$ and $ACW(2)$ at conventional significance levels or better. While we find that the value of cash increases with the incidence of ICFR weaknesses, it is possible that the overall severity of internal control problems depends on the count of SOX 404 material weaknesses (Lawrence et al., 2010). To test the validity of our main findings, we therefore substitute the number of material weaknesses (NMW_t) for MW_t as a sensitivity check. In columns 3–5, we verify that the greater the number of reported material weaknesses is, the higher is the value of cash regardless of employing ΔCA_{it} or the ACW measures for changes in cash assets. To summarize, our findings suggest that the observed relation between the value of cash and internal control quality holds up with the number of reported material weaknesses and alternative measures of changes in cash.

6. Sensitivity analyses

This section describes additional tests and results which establish the robustness of our main results. In particular, we address the endogeneity concern of the ICFR decision in two ways. In Section 6.1, we set up an endogenous self-selection model and use the Heckman inverse-Mills-ratio (IMR) method to control for the self-selection bias induced by the firm's choice of internal control quality. In Section 6.2, we apply the propensity score matching (PSM) framework to tackle the endogenous matching of firms inherent in observational studies and estimate the average treatment effect on the treated (ATT).

6.1. Self-selection model

Thus far, our findings have indicated that liquid assets are more valuable for weak ICFR firms than for effective ICFR firms. Given that approximately eight percent of our sample firm-years are identified as having material weaknesses in internal control, it seems plausible that corporate status as having ICFR weaknesses is not randomly determined. Put differently, unobservable factors that influence a firm's decision to implement weak control over financial reporting could be systematically correlated with firm value. The absence of control for the selection bias, which is one form of the endogeneity problem, can therefore lead to inconsistent estimates of parameters and then inappropriate inferences about treatment effects (Greene, 2003).

Consequently, we utilize the Heckman's (1979) two-stage estimation procedure to test and correct the potential selection bias due to unobservables. In the first-step estimation, we construct the binary choice model as follows:

$$MW_{it}^{*} = \delta' \prod_{it} + \mu_{it}$$
$$MW_{it} = 1 \text{ if } MW_{it}^{*} > 0, \text{ and 0 otherwise} \quad (4)$$

where MW_{it}^{*} is an unobserved latent variable for ICFR weaknesses, $\prod_{it}$ is a set of firm characteristics that are expected to affect the decision to implement weak control over financial reporting, δ' is a vector of parameters to be estimated, and μ_{it} is an error term.

Consistent with recent research (e.g., Cheng et al., 2013; Skaife et al., 2013), the vector $\prod_{it}$ in Eq. (4) contains corporate traits that pertain to firm size, growth potential, profitability/loss, organizational structure, and auditor reputation. Specifically, large firms are expected to be equipped with effective internal controls, because of an economy of scale in developing and executing internal control systems. Greater financial and human resources

[10] We lose 64 pairs because we impose the data criteria that, prior to the mending of material weaknesses in internal control, all the sample firms also must have necessary accounting data from COMPUSTAT and return data from CRSP as required by Faulkender and Wang's model specification.

Table 7
ICFR weaknesses and liquidity value: alternative proxies for cash and count of material weaknesses.

	(1)	(2)	(3)	(4)	(5)
MW_t	−0.085***	−0.082***			
	(0.00)	(0.00)			
MW_t*$ACW(1)$	0.307**				
	(0.03)				
MW_t*$ACW(2)$		0.272***			
		(0.00)			
NMW_t			−0.027***	−0.025***	−0.024***
			(0.00)	(0.00)	(0.00)
NMW_t*ΔCA_t			0.060*		
			(0.09)		
ΔCA_t			1.640***		
			(0.00)		
$ACW(1)$	1.539***			1.543***	
	(0.00)			(0.00)	
$ACW(2)$		1.612***			1.614***
		(0.00)			(0.00)
NMW_t*$ACW(1)$				0.082**	
				(0.02)	
NMW_t*$ACW(2)$					0.084**
					(0.02)
ΔER_t	0.519***	0.500***	0.472***	0.516***	0.498***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ΔNA_t	0.201***	0.211***	0.229***	0.202***	0.212***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ΔRD_t	0.068	0.071	0.067	0.076	0.075
	(0.64)	(0.63)	(0.66)	(0.60)	(0.61)
ΔIR_t	−2.096***	−1.724***	−2.059***	−2.077***	−1.707***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ΔDIV_t	0.812***	0.900**	0.944**	0.842**	0.931**
	(0.04)	(0.03)	(0.02)	(0.04)	(0.03)
CA_{t-1}	0.356***	0.360***	0.384***	0.357***	0.360***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
LEV_t	−0.448***	−0.453***	−0.407***	−0.449***	−0.455***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
NF_t	−0.018	−0.054	−0.088**	−0.020	−0.056
	(0.68)	(0.24)	(0.05)	(0.67)	(0.23)
CA_{t-1}*ΔCA_t			−0.328**		
			(0.02)		
LEV_t*ΔCA_t			−1.193***		
			(0.00)		
CA_{t-1}*$ACW(1)$	−0.331**			−0.308**	
	(0.02)			(0.03)	
LEV_t*$ACW(1)$	−1.377***			−1.358***	
	(0.00)			(0.00)	
CA_{t-1}*$ACW(2)$		−0.345**			−0.323**
		(0.02)			(0.03)
LEV_t*$ACW(2)$		−1.421***			−1.409***
		(0.00)			(0.00)
Intercept	0.072***	0.075***	0.024	0.068***	0.072***
	(0.00)	(0.00)	(0.30)	(0.00)	(0.00)
No of Obs.	15,267	14,367	15,274	15,267	14,367
Adjusted R-squared	21.63%	21.56%	22.22%	21.49%	21.58%

This table reports estimates of ordinary least squares regressions relating annual abnormal returns, internal control weaknesses, cash reserves, and a set of firm characteristics with alternative definitions of unexpected changes in liquid asset holdings and the count of material weaknesses. The dependent variable is a firm's annual excess stock return ($r_{i,t} - R_{i,t}$), where $r_{i,t}$ is the annual stock raw return of firm i at time t and $R_{i,t}$ is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year t. We use the Fama–French (1997) 48-industry classification to capture industry effects. MW_t is an indicator variable that is set to the value of one if the firm is identified as having SOX 404 material weaknesses, and zero otherwise. Analogous to the spirit of Almeida et al. (2004), we construct $ACW(1)$ and $ACW(2)$ as alternative measures of unexpected changes in cash reserves. NMW_t is the number of SOX 404 material weaknesses in year t. Δ refers to the spread from the previous year. CA_t is cash plus marketable securities scaled by the lagged market value of equity (M_{t-1}). ER_t is the ratio of earnings before extraordinary items and interest to the lagged market value of equity (M_{t-1}). NA_t is total assets net of cash and cash equivalents normalized by M_{t-1}. RD_t is R&D expenditures at time t deflated by the previous year's market value of equity. IR_t is interest expenses divided by M_{t-1}. DIV_t is the ratio of common dividends paid over the fiscal year to M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by the lagged market value of equity. LEV_t is total debts scaled by the sum of total debts and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by the lagged market value of equity. Year and industry effects are included. p-Values, which are calculated using standard errors clustered at the firm level, are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

can also aid larger firms in the generation of proper financial reporting processes and procedures. Thus, we include the natural logarithm of market value of equity (*MCAP*) to capture firm scale. To control for the possibility that accumulated experience can assist firms with ironing out the kinks in their internal control procedures, we add *AGE* and define it as the natural logarithm of the number of years since the firm has gone public.

To the extent that maintaining internal consistency and consolidating financial information across divisions pose managerial challenges, the ability to establish adequate internal controls could be complicated by geographic and business diversifications. Hence, we account for the existence of multinational operations by *FTRANS*, which equals one if the firm has a non-zero foreign currency translation in the year, and zero otherwise. We also include

Table 8
Determinants of material weaknesses in internal control: probit analysis.

Dependent Variable	Predicted sign	(1)		(2)	
		MW		CMW	
		Coefficient estimates	Marginal effect	Coefficient estimates	Marginal effect
Intercept		−1.101***		−1.499***	
		(0.00)		(0.00)	
$MCAP_t$	−	−0.110***	−0.015	−0.076***	−0.006
		(0.00)		(0.00)	
AGE_t	−	−0.063***	−0.009	−0.082***	−0.007
		(0.00)		(0.00)	
$FTRANS_t$	+	0.064*	0.009	0.058	0.005
		(0.06)		(0.17)	
$RCHARGE_t$	+	0.062*	0.009	0.024	0.002
		(0.08)		(0.58)	
$ALOSS_t$	+	0.355***	0.050	0.289***	0.023
		(0.00)		(0.00)	
ACQ_t	+	0.018	0.003	0.025	0.002
		(0.65)		(0.63)	
$SGROW_t$	+	0.004**	0.001	0.001	0.000
		(0.02)		(0.63)	
SEG_t	+	0.183***	0.026	0.160***	0.013
		(0.00)		(0.00)	
*BIG*4	−	−0.148***	−0.021	−0.183***	−0.015
		(0.00)		(0.00)	
No of obs.		14,880		14,880	
Log Likelihood		−3917		−2327	
Likelihood Ratio		524.3		233.2	
Likelihood Index		0.06		0.05	

This table reports coefficient estimates and marginal effects of probit regressions relating the likelihood of reporting SOX 404 material weaknesses to a set of firm characteristics. In model 1, the dependent variable (MW_t) equals one if the firm has SOX 404 material weaknesses, and zero otherwise. In model 2, we assign the value of one to the dependent variable (CMW_t) if the firm has company-level material weakness or more than three account-specific control problems, and zero otherwise. $MCAP_t$ is the natural logarithm of share price times the number of shares outstanding in fiscal year t. AGE_t is the natural logarithm of years since the firm has been covered by the CRSP. $FTRANS_t$ is an indicator variable that equals one if the firm has a non-zero foreign currency translation in year t, and zero otherwise. $RCHARGE_t$ denotes an indicator variable that is set to one if the firm reports a non-zero value in Compustat data items, including rca, rcd, rcep, or rcp, and zero otherwise. $ALOSS_t$ is assigned a value of one if the sum of earnings before extraordinary items over the current and prior years is negative, and zero otherwise. ACQ_t is defined as one if the firm engages in acquisitions in the given year t, and zero otherwise. $SGROW_t$ is the percentage change in sales from year $t-1$ to year t. SEG_t is the natural logarithm of the combined number of operating and geographic segments in year t. We delineate *BIG*4 as one if the firm employs a Big 4 accounting firm, and zero otherwise. Year and industry effects are included. p-Values are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

the natural logarithm of the total number of business and geographic segments (*SEG*) as a determinant of internal control problems. ICFR weaknesses are expected to prevail for firms that record restructuring charges, because restructuring can create a mismatch between the new organizational structure and the internal control system. To measure this potential effect, we assign the value of one to *RCHARGE* if the firm reports a non-zero balance in restructuring items, and zero otherwise.

Moreover, we add to the determinant vector an indicator variable (*ALOSS*), which takes the value of one if the sum of earnings before extraordinary items in years t and $t-1$ is negative, and zero otherwise. The intuition is that poorly performing firms might lack experienced personnel and financial resources that are required to ensure the success of the internal monitoring system of financial reporting. Similarly, a quickly growing firm can outgrow its internal monitoring processes and procedures, thus making its existing control systems obsolete. Rapid growth can also cause an improper implementation of uniform controls over acquired operations and entities. To address these possibilities, we include the annual change in sales (*SGROW*) and an acquisition indicator (*ACQ*), which is set to one if the firm engages in acquisition during the fiscal year, and zero otherwise. To consider the likelihood that ICFR weaknesses are tied to audit quality or auditor reputation, we separate Big 4 from non-Big 4 accounting firms by adding a Big 4 indicator variable (*BIG*4).

Our second-stage outcome equation is based on Eq. (1). We assume that the error terms (ε_{it} and μ_{it}) from Eqs. (1) and (4) follow a bivariate normal distribution with zero means, standard deviations of σ_ε and 1, and correlation ρ. This assumption allows us to obtain statistical models that apply to the observations in our sample as follows:

$$\begin{aligned} E[r_{it}-R_{it}|MW_{it}=1] &= \alpha_0+\alpha_1'X_{it}+\alpha_2+\alpha_3\Delta CA_{it}+\rho\sigma_\varepsilon\lambda_1 \\ E[r_{it}-R_{it}|MW_{it}=0] &= \alpha_0+\alpha_1'X_{it}+\rho\sigma_\varepsilon\lambda_0 \\ E[r_{it}-R_{it}|MW_{it}=1]-E[r_{it}-R_{it}|MW_{it}=0] & \\ =\alpha_2+\alpha_3\Delta CA_{it}+\rho\sigma_\varepsilon\frac{\phi(\delta'\prod_{it})}{\Phi(\delta'\prod_{it})[1-\Phi(\delta'\prod_{it})]} & \end{aligned} \tag{5}$$

where $\lambda_1=\frac{\phi(\delta'\prod_{it})}{\Phi(\delta'\prod_{it})}$, $\lambda_0=\frac{-\phi(\delta'\prod_{it})}{1-\Phi(\delta'\prod_{it})}$, X_{it} is a vector of control variables unrelated to MW_{it}, and $\phi(.)$ and $\Phi(.)$ denote the standard normal density and the cumulative normal distribution function, respectively. When the correction for self-selection is excluded from the least squares regression, the value differential between MW and non-MW firms hinges only on the OLS estimates of α_2 and α_3, as well as on annual changes in liquid assets. In this case, our results from the ordinary least squares regression can suffer from a specification error due to selection bias.

As in Heckman's procedure, we first use the probit model and estimate Eq. (4) by maximum likelihood to obtain estimates of δ', denoted by $\hat{\delta}'$, and then $\hat{\lambda}_1$ and $\hat{\lambda}_0$. In the second step, we add the selectivity correction (i.e., $\hat{\lambda}$ or inverse Mills ratio) to Eq. (1) to achieve estimators of the individual parameters, including $\alpha_\lambda(=\rho\sigma_\varepsilon)$. When α_λ is statistically distinguishable from zero, a correction for the selection bias becomes crucial. In particular, we modify equation (1), noting that X_{it} is a vector of control variables unassociated with MW_{it}, as follows:

$$r_{it} - R_{i,t} = \alpha_0 + \alpha_1' X_{it} + \alpha_2 MW_{it} + \alpha_3 \Delta CA_{it} \times MW_{it} + \alpha_\lambda[\hat{\lambda}_1 \times MW_{it} + \hat{\lambda}_0 \times (1 - MW_{it})] + \varepsilon_{it} = \alpha_0 + \alpha_1' X_{it} + \alpha_2 MW_{it} + \alpha_3 \Delta CA_{it} \times MW_{it} + \alpha_\lambda \hat{\lambda} + \varepsilon_{it} \quad (6)$$

Table 8 reports the maximum likelihood estimates of the probit coefficients and their marginal effects. In model 1, we characterize a firm's decision to impose weak control over financial reporting (*MW*). Alternatively, model 2 has the choice variable (*CMW*) that equals one if a firm has company-oriented material weaknesses, and zero otherwise. Because this exercise imposes additional data requirements, the analysis yields a somewhat smaller sample of 14,880 firm-years. We find that the likelihood of maintaining effective internal control increases with firm size (*MCAP*) ($p < 0.01$). This evidence suggests that large firms are more likely to devote sufficient resources to ensure the quality of internal control than are small firms. As anticipated, the coefficient on *AGE* is negative and significant ($p < 0.01$). It appears that managerial experience helps to iron out the kinks in the firm's internal control processes and procedures. There is slightly weaker evidence that firms with foreign currency translation (*FTRANS*) or restructuring items (*RCHARGE*) tend to have severe control problems.

We find that poor financial performance, as captured by aggregate losses (*ALOSS*), raises the probability of reporting material weaknesses in internal control ($p < 0.01$). This evidence is consistent with the perspective that financial resources significantly influence a firm's ability to establish and implement proper internal control mechanisms. We discover that firms with rapid growth (*SGROW*) have a greater propensity to encounter the circumstance under which personnel, processes, and technology are not yet upgraded to match the internal control systems with corporate growth ($p < 0.05$ in model 1). The coefficient on *SEG* is statistically positive ($p < 0.01$), lending support to the argument that complexity induced by multiple business divisions is a contributing factor to severe problems in internal controls. Finally, we document that internal control weaknesses are likely to be mitigated by reputable agents, as measured by the employment of a Big 4 auditor ($p < 0.01$).

We report the second-stage regression results in Table 9. The coefficient on *LAMBDA* is positively significant ($p < 0.01$), regardless of using MW_t or CMW_t as the choice variable. While this evidence indicates the prevalence of selection bias, our main conclusion is not altered by a correction for the selectivity bias. Specifically, the coefficients on the interaction of MW_{it} with ΔCA_{it} in models 1 and 2 continue to be positive and significant at the 5% level. When we focus on company-level material weaknesses in columns 3 and 4, we confirm that the value gap in cash for firms with weak controls vs. effective controls widens from about \$0.20 to greater than \$0.30. Therefore, our findings in favor of the dominance of precautionary benefits over agency costs do not appear to be driven by self-selection bias.[11]

Table 9
Material weaknesses in internal control and valuation of liquid assets: self-selection control.

	(1)	(2)	(3)	(4)
MW_t	−0.060***	−0.061***		
	(0.00)	(0.00)		
$MW_t{}^*\Delta CA_t$	0.199**	0.224**		
	(0.03)	(0.02)		
CMW_t			−0.069***	−0.067***
			(0.00)	(0.00)
$CMW_t{}^*\Delta CA_t$			0.303***	0.320**
			(0.01)	(0.02)
$LAMBDA_t$	0.186***	0.187***	0.176***	0.179***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔCA_t	1.649***	1.640***	1.654***	1.647***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔER_t	0.497***	0.517***	0.495***	0.515***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔNA_t	0.201***	0.177***	0.211***	0.187***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔRD_t	0.075	0.112	0.056	0.093
	(0.63)	(0.47)	(0.72)	(0.61)
ΔIR_t	−2.182***	−2.300***	−2.196***	−2.315***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔDIV_t	0.806**	1.008***	0.853**	1.055***
	(0.03)	(0.01)	(0.02)	(0.01)
CA_{t-1}	0.435***	0.470***	0.420***	0.455***
	(0.00)	(0.00)	(0.00)	(0.00)
LEV_t	−0.369***	−0.348***	−0.381***	−0.360***
	(0.00)	(0.00)	(0.00)	(0.00)
NF_t	−0.046	−0.026	−0.057	−0.037
	(0.31)	(0.57)	(0.21)	(0.42)
$CA_{t-1}{}^*\Delta CA_t$	−0.420***	−0.400***	−0.409***	−0.388***
	(0.00)	(0.01)	(0.00)	(0.01)
$LEV_t{}^*\Delta CA_t$	−1.184***	−1.262***	−1.184***	−1.261***
	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	−0.479***	−0.490***	−0.361***	−0.391***
	(0.00)	(0.00)	(0.00)	(0.00)
No of obs.	14,880	14,880	14,880	14,880
Adjusted *R*-squared	23.44%	25.17%	23.13%	24.86%

This table reports estimates of ordinary least squares regressions relating annual abnormal returns, internal control weaknesses, cash reserves, and a set of firm characteristics with a correction for self-selection bias. The dependent variable is a firm's annual excess stock return ($r_{i,t} - R_{i,t}$), where $r_{i,t}$ is the annual stock raw return of firm *i* at time *t*, and $R_{i,t}$ in column 1 and 3 is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year *t*. In column 2 and 4, $R_{i,t}$ represents the value-weighted industry return based on the Fama–French (1997) 48-industry classification. MW_t is an indicator variable that is set to one if the firm is identified as having SOX 404 material weaknesses, and zero otherwise. CMW_t is an indicator variable that equals one if the firm has company-level material weaknesses or more than three account-specific control problems, and zero otherwise. Δ refers to the spread from the previous year. $LAMBDA_t$ derives from the self-selection model. CA_t is cash plus marketable securities scaled by the lagged market value of equity (M_{t-1}). ER_t is the ratio of earnings before extraordinary items and interest to M_{t-1}. NA_t is total assets net of cash and cash equivalents normalized by M_{t-1}. RD_t is R&D expenditures at time *t* deflated by the previous year's market value of equity. IR_t is interest expenses divided by M_{t-1}. DIV_t is the ratio of common dividends paid over the fiscal year to M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by the lagged market value of equity. LEV_t is total debts scaled by the sum of total debts and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by the lagged market value of equity. Year and industry effects are included. *p*-Values, which are calculated using standard errors clustered at the firm level, are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

6.2. Propensity score matching

To gauge the robustness of the results estimated from our self-selection model, we alternatively perform a matched sample analysis. The ultimate goal of this approach is to find a control group (effective ICFR firms) that resembles the treated group (weak ICFR firms) on all the observable characteristics except for the quality of internal control over financial reporting. When such resemblance

[11] As a robustness check, we estimate the fitted probability of reporting material weaknesses in internal control based on all the variables at the beginning of the year. This approach enables us to further address the likelihood that the contemporaneous measure of ICFR quality can be endogenous and the concern that a material weakness is revealed after the fiscal year-end. Paralleling our prior observation, we validate that the coefficient on the fitted probability interacted with changes in cash is 1.849 (*p*-value = 0.002). This new evidence indicates that the value of cash holdings increases by 0.078 (=1.849*0.042) when the expected probability of disclosing material weaknesses increases by one standard deviation. Similarly, we find a coefficient of 2.049 on the corresponding variable (*p*-value = 0.000) when we use the industry-adjusted return as an alternative dependent variable. This result suggests that the marginal value of cash increases by 0.086 (=2.049*0.042) for a one standard deviation increase in the expected likelihood of disclosing material weaknesses in internal control.

Table 10
Covariate balance between the treatment and matched samples: matched sample analysis.

	Mean treatment	Mean control	Median treatment	Median control	*t*-Test difference *p*-value	Wilcoxon difference *p*-value
$MCAP_t$	5.81	5.0	5.73	5.75	0.94	0.82
AGE_t	2.39	2.37	2.40	2.40	0.57	0.82
$FTRANS_t$	0.38	0.39	0.00	0.00	0.65	0.65
$RCHARGE_t$	0.33	0.34	0.00	0.00	0.97	0.93
$ALOSS_t$	0.69	0.68	1.00	1.00	0.97	0.97
ACQ_t	0.18	0.18	0.00	0.00	0.87	0.87
$SGROW_t$	0.91	0.19	0.09	0.10	0.11	0.65
SEG_t	2.30	2.29	2.48	2.48	0.75	0.48
*BIG*4	0.71	0.72	1.00	1.00	0.65	0.65
No. of Obs.	1203	1203	1203	1203		

The treated (weak ICFR firms) observations are matched with their untreated (effective ICFR firms) counterparts, based on the propensity scores derived from the probit model for the likelihood of reporting an internal control weakness. $MCAP_t$ is the natural logarithm of share price times the number of shares outstanding in fiscal year *t*. AGE_t is the natural logarithm of years since the firm has been covered by the CRSP. $FTRANS_t$ is an indicator variable that equals one if the firm has a non-zero foreign currency translation in year *t*, and zero otherwise. $RCHARGE_t$ denotes an indicator variable that is set to one if the firm reports a non-zero value in Compustat data items, including rca, rcd, rcep, or rcp, and zero otherwise. $ALOSS_t$ is an indicator variable that is assigned a value of one if the sum of earnings before extraordinary items over the current and prior years is negative, and zero otherwise. ACQ_t is defined as one if the firm engages in acquisitions in the given year *t*, and zero otherwise. $SGROW_t$ is the percentage change in sales from year $t-1$ to year *t*. SEG_t is the natural logarithm of the combined number of operating and geographic segments in year *t*. We delineate *BIG*4 as one if the firm employs a Big 4 accounting firm, and zero otherwise. Because sample firms are matched to control firms on a one-to-one basis, we use the paired *t*-test to examine the differences in means and the Wilcoxon signed rank test to assess the differences in medians.

is satisfactory, the outcome observed for the untreated or controlled group approximates the counterfactual. Consequently, this framework enables us to verify whether the variation of cash valuation is attributable to ICFR weaknesses by estimating the difference between the average outcomes of the two groups.

As the number of observable covariates rises, it is increasingly challenging to form matched pairs that are similar to weak ICFR firms along all dimensions. Analogous to the spirit of Rosenbaum and Rubin (1983) and Huang and Zhang (2012), we use the propensity score matching (PSM) to address the dimensionality problem and then estimate the average treatment effect on the treated (ATT). In particular, we estimate Eq. (4) and compute a balancing score as a function of observable covariates. In essence, the PSM approach reduces the attribute-based matching from a multi-dimensional problem to a one-dimensional problem by aggregating all covariates into one score using a likelihood function. We then select the pairs based on the nearest neighbor matching without replacement.

Our matching algorithm yields a matched sample of 2406 firm-years with an equal number of observations for firms with weak controls and effective controls, respectively. We conduct paired *t* tests to assess covariate balance between the two groups. In Table 10, we report that none of the *t*-tests for the pair differences in firms' innate characteristics is statistically distinguishable from zero at conventional levels, indicating that our matching procedure has been successful in achieving balance for all observable covariates. This conclusion is not sensitive to applying the Wilcoxon signed rank test of the median difference between the two groups. Thus, the differences in the observed covariates appear unlikely to confound our estimated effect of internal control weaknesses on the value of cash.

In Table 11, we replicate our previous analyses, but confine our attention to the balanced sample of 2406 treated and untreated observations. Our regression results on $MW_t^*\Delta CA_t$ again show that the presence of SOX 404 material weaknesses in internal control over financial reporting is an important determinant of the value of cash holdings ($p < 0.05$ for columns 1 and 2). In columns 3 and 4, we illustrate that this observation is not driven by auditable, account-specific weaknesses but by more severe, company-level material weaknesses. Hence, the attribute-matching results strengthen our basic conclusion that the observed spread of cash valuation is not caused by the endogeneity of internal control quality. In short, it emerges from our analyses that the precautionary benefits attributable to liquidity management, on average, exceed its agency costs in weak ICFR firms.

7. Summary and conclusions

In this paper, we test which effect dominates, the precautionary benefits of cash or its agency costs, in the context of internal control over financial reporting. Our approach is unique in the sense that SOX Section 404 disclosures enable us to identify an intriguing sample of firms that are more susceptible to tunneling risks and lemons problems, which are the main sources of agency costs and precautionary benefits of cash reserves. In general, if the benefits exceed the costs, corporate cash holdings are likely to be warranted. Conversely, building financial slack is likely to be unjustified, if the benefits provided by the safety margin are swamped by its higher agency costs.

Our results indicate that liquid asset holdings contribute more to weak ICFR firms than to their counterparts that have no material weaknesses in internal control. The findings suggest that precautionary benefits tend to outweigh agency costs, so that liquidity management is valued at a premium, as opposed to at a discount, in weak ICFR firms vis-à-vis other firms. Our inference is strengthened by the fact that the value of cash diminishes with the remediation of material weaknesses in internal control. Our main conclusion is unaltered, when we account for the number of reported material weaknesses in internal control. It also survives sample splits and alternative variable specifications for abnormal returns and unanticipated changes in cash holdings. Further, we validate that our results are not driven by less severe weaknesses at the account level, which are less likely to have notable influences on the costs of both adverse selection and moral hazard.

We conclude our empirical analysis by addressing the concern that corporate status as having ICFR weaknesses could be endogenously determined with firm value. We use Heckman's two-stage procedure, as well as propensity-score matching sample analysis, to address this possibility. While self-selection bias is present in the data, the link between internal control quality and cash valuation remains economically and statistically significant. Hence, our findings suggest that internal control over financial reporting is a crucial channel through which the value of cash changes widely. Moreover, what we observe is that the gains from financial

Table 11
Material weaknesses in internal control and valuation of liquid asset holdings: matched sample results.

	(1)	(2)	(3)	(4)
MW_t	−0.041**	−0.037*		
	(0.03)	(0.08)		
$MW_t{}^*\Delta CA_t$	0.177**	0.193**		
	(0.02)	(0.02)		
CMW_t			−0.050**	−0.044**
			(0.03)	(0.05)
$CMW_t{}^*\Delta CA_t$			0.232**	0.240**
			(0.03)	(0.02)
AMW_t			−0.026	−0.024
			(0.26)	(0.29)
$AMW_t{}^*\Delta CA_t$			−0.217	−0.140
			(0.38)	(0.57)
ΔCA_t	1.659***	1.623***	1.731***	1.681***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔER_t	0.351***	0.366***	0.343***	0.358***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔNA_t	0.330***	0.309***	0.334***	0.312***
	(0.00)	(0.00)	(0.00)	(0.00)
ΔRD_t	0.135	0.256	0.038	0.171
	(0.66)	(0.33)	(0.88)	(0.48)
ΔIR_t	0.074	0.198	0.011	0.141
	(0.91)	(0.81)	(0.99)	(0.86)
ΔDIV_t	1.504	1.506	1.461	1.467
	(0.76)	(0.72)	(0.28)	(0.29)
CA_{t-1}	0.282***	0.335***	0.293***	0.344***
	(0.00)	(0.00)	(0.00)	(0.00)
LEV_t	−0.442***	−0.385***	−0.423***	−0.386***
	(0.00)	(0.00)	(0.00)	(0.00)
NF_t	−0.137	−0.115	−0.132	−0.110
	(0.25)	(0.35)	(0.19)	(0.29)
$CA_{t-1}{}^*\Delta CA_t$	−0.161	−0.082	−0.103	−0.025
	(0.23)	(0.61)	(0.74)	(0.94)
$LEV_t{}^*\Delta CA_t$	−1.670***	−1.811***	−1.658***	−1.795***
	(0.00)	(0.00)	(0.00)	(0.00)
Intercept	−0.327***	−0.320***	−0.324***	−0.318**
	(0.00)	(0.00)	(0.00)	(0.01)
No of obs.	2406	2406	2406	2406
Adjusted *R*-squared	28.01%	28.27%	28.28%	28.45%

This table reports estimates of ordinary least squares regressions relating abnormal returns, internal control weaknesses, cash reserves, and a set of firm characteristics from the matched sample analysis. The dependent variable is a firm's annual excess stock return ($r_{i,t} - R_{i,t}$), where $r_{i,t}$ is the annual stock raw return of firm i at time t, and $R_{i,t}$ in columns 1 and 3 is Fama and French's (1993) 25 size and book-to-market matched portfolio return during fiscal year t. In columns 2 and 4, $R_{i,t}$ represents the value-weighted industry return based on the Fama–French (1997) 48-industry classification. MW_t is an indicator variable that is set to one if the firm is identified as having SOX 404 material weaknesses, and zero otherwise. CMW_t is an indicator variable that equals one if the firm has company-level material weaknesses or more than three account-specific control problems, and zero otherwise. AMW_t is an indicator variable that is set to one if a weak ICFR firm does not fall in the *CMW* category, and zero if a firm is part of the *CMW* group or belongs to the class of effective ICFR firms. CA_t is cash plus marketable securities scaled by the lagged market value of equity (M_{t-1}). ER_t is the ratio of earnings before extraordinary items and interest to M_{t-1}. NA_t (RD_t, IR_t, DIV_t) is total assets net of cash and cash equivalents (R&D expenditures, interest expenses, common dividends) normalized by M_{t-1}. CA_{t-1} is cash and marketable securities over the previous fiscal year deflated by M_{t-1}. LEV_t is total debts scaled by the sum of total debts and market value of equity. NF_t is the sum of equity and debt issuances net of stock repurchases and debt redemption normalized by the lagged market value of equity. Year and industry effects are included. *p*-values, which are calculated using standard errors clustered at the firm level, are reported in parentheses. *, **, and *** denote two-tailed significance at the 10%, 5%, and 1% levels.

flexibility, net of its agency costs, appear remarkable for the average firm with internal control failures. A caveat to our findings is that the quality of ICFR is unlikely to capture all aspects of a firm's agency problems and information risk. Consequently, our findings may not extend to the entire universe of firms whose precautionary benefits and agency costs of cash are likely to be significant.

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