

# Information Shocks and Corporate Cash Policies

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**ABSTRACT:** We examine how information environment affects corporate cash policy by examining the change in cash holdings around two events that lead to exogenous change in information environment, namely the initial enforcement of insider trading laws (ITLs) and the mandatory adoption of IFRS in European Union (EU) countries. Using a difference-in-differences approach, we find that firms decrease their cash holdings after both events. The decrease in cash holdings is more pronounced for firms with higher precautionary savings demand and with more severe agency problems. Additional tests show that the sensitivity of investment to cash holdings declines after the two events, consistent with the notion that the benefit of cash holdings in mitigating underinvestment and the private benefit of overinvesting cash holdings reduce after the events. Overall, our findings provide evidence that information environment improvements have real decision effects.

JEL Classifications: M41; M48; G31.

Keywords: cash holdings; market friction; IFRS adoption; initial enforcement of insider trading laws.

## I. INTRODUCTION

We examine how a firm's information environment affects its cash policy. In a frictionless market, as conjectured by Miller and Modigliani (1961), cash policy does not matter because firms can always raise capital in the spot market when cash is needed. However, in the presence of market frictions such as information asymmetry and agency conflict, cash policy is crucial and can affect firm value (Tirole 2006). Earlier literature also shows that cash policy affects firms' investment, financing, and product market competition (e.g., Campello, Graham, and Harvey 2010; Fresard 2010).

The existing literature (e.g., Opler, Pinkowitz, Stulz, and Williamson 1999; Bates, Kahle, and Stulz 2009) proposes that precautionary savings motive and agency motive are two important considerations in determining a firm's cash holdings. Information environment plays a key role in both motives. A better information environment implies lower cost of external financing and reduces the precautionary savings motive to hold cash (Opler et al. 1999; Denis and Sibilkov 2010). A better information environment also reduces cash holdings by improving the ability of outside investors to monitor managers and reducing the private benefits of cash holdings (Dittmar, Mahrt-Smith, and Servaes 2003; Pinkowitz, Stulz, and Williamson 2003). However, more intensive monitoring may also lower current overinvestment (Harford, Mansi, and Maxwell 2008) and reduce the need to use dividend payout as a commitment to avoid overinvestment (Hail, Tahoun, and Wang 2014), leading to a higher level of cash holdings. Thus, *ex ante*, the effect of the information environment on cash holdings is not unambiguous.

We attempt to answer this question by examining the effect on cash holdings of two events that lead to exogenous shocks to firms' information environment. The first event is the initial enforcement of insider trading laws (ITLs), and the second is the mandatory adoption of IFRS by EU countries. We examine these two events because they improve the information

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environment via different important channels and therefore the results could be more generalizable. Specifically, the initial enforcement of insider trading laws encourages external investors' private information acquisition by regulating the trading of corporate insiders (Fishman and Hagerty 1992). On the other hand, the mandatory adoption of IFRS improves firms' information environment by enforcing the compliance with country-level accounting and auditing standards and thus increasing public disclosure quality (Preiato, Brown, and Tarca 2015).

Our analysis is based on a difference-in-differences design. We compare the change in cash holdings of the firms that are subject to the shocks (the treatment firms) with the contemporaneous changes in cash holdings of a sample of control firms matched by propensity score. After controlling for other economic determinants of cash holdings, we find that the treatment firms have a more pronounced decrease in cash holdings than the control firms after both events. The decrease in cash holdings occurs right after the two events and is long lasting. Our baseline results show that after ITL enforcement (IFRS adoption), cash holdings decrease 16 percent (6 percent) for the treatment firms, compared with their pre-event period level.

We conduct several tests to mitigate the concerns of confounding effects. First, we examine the timing of the change in cash holdings around each event. We find cash holdings decline immediately after the events but not before. Second, prior studies suggest that concurrent improvement in enforcement quality and governance effectiveness could confound the effect of IFRS adoption (Christensen, Hail, and Leuz 2013). We then partition the treatment firms for the IFRS adoption sample into countries with or without concurrent improvements in enforcement quality and find no difference in the treatment effect of IFRS adoption between the two groups. We also partition the sample based on concurrent changes in governance effectiveness into two groups (Kim, Liu, and Zheng 2012). We find no difference in the treatment effect of IFRS adoption between the two groups, either.

Third, if the decrease in cash holdings is driven by the shocks to the information environment, we should observe a more pronounced decrease when shocks are stronger. Prior studies suggest that the shock brought by IFRS adoption is stronger when a country's overall enforcement quality is better (thus the implementation of the regulation changes is more credible) and when there is a greater difference between local GAAP and IFRS (Daske, Hail, Leuz, and Verdi 2013; Li 2010). Consistent with the prior studies, we find a more pronounced decrease in cash holdings in the subsamples where the strength of shocks can be deemed as stronger. We also partition the ITL sample into countries with high and low overall legal enforcement quality and into developed versus emerging markets. However, we do not find significant differences in the ITL enforcement effect on cash holdings between the subsamples.<sup>1</sup>

We then conduct two tests to further understand the mechanisms through which the two events affect cash holdings. First, we examine whether and how the effects of both events vary with firm characteristics. As explained before, the improvement of the information environment can reduce cash holdings by reducing the precautionary savings motives and/or the agency motive. The precautionary savings motive channel predicts that the effect should be more pronounced for firms with a higher precautionary savings demand before the events. Our results are consistent with this prediction. We find more pronounced effects of both events on cash holdings for firms with a higher precautionary savings demand measured before the events. The agency motive channel predicts that the effects of both events on cash holdings should be stronger for firms with more severe conflict between corporate insiders and outside investors. We also find evidence consistent with this prediction. More specifically, we partition the sample for both events based on insider ownership. Hail et al. (2014) suggest that more concentrated inside ownership increases the likelihood for corporate insiders to exploit their relative position of strength and hence exacerbates the severity of agency problems. We find a more pronounced effect of both events for firms with higher inside ownership before the informational events. Overall, our results provide evidence for both the precautionary savings motive and the agency motive channels.

Second, we conduct a more direct test to understand how the two events affect the benefits of cash holdings. Essentially, we predict that both events reduce cash holdings because the benefit of holding cash declines after the events. Based on the precautionary savings motive hypothesis, the benefit of holding cash lies in reducing future underinvestment. According to the agency motive hypothesis, managers hold cash because they can grasp private benefit by overinvesting cash reserves in the future. In both cases, the future investment should be sensitive to current cash holdings. If the two events reduce the benefit of holding cash, we should observe a lower sensitivity of future investment to current cash holdings after the two events. Our findings are consistent with the predictions.

Our study makes several contributions to the literature. First, we contribute to the understanding of the economic consequences of two important country-level regulations: insider trading laws enforcement and mandatory IFRS adoption. A number of studies on ITL enforcement and IFRS adoption focus on stock market and financial intermediaries (De George, Li, and Shivakumar 2016; Bhattacharya 2014). An emerging literature starts to examine how these two events affect a firm's real

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<sup>1</sup> Bushman, Piotroski, and Smith (2005) find that the effect of ITL enforcement on analysts' activities is stronger in countries with a weak legal environment and emerging markets, whereas Fernandes and Ferreira (2009) find that the effect of ITL enforcement on stock price informativeness is stronger in the developed markets and in countries with stronger overall enforcement quality.

decisions such as investment (Schleicher, Tahoun, and Walker 2010; Hong 2013; Biddle, Callahan, Hong, and Knowles 2015; Chen, Huang, Kusnadi, and Wei 2017b), cross-listing (Chen, Chin, Wang, and Yao 2015), dividends (Hail et al. 2014), and capital structure (Naranjo, Saavedra, and Verdi 2018). However, none of these studies examines corporate cash policy. We contribute by examining the effect of information environment on this important element in corporate finance practice and identify the channels through which the information environment works in changing firms' cash holding. We also document how reduced cash holdings affect corporate investment.

Second, our study provides a more powerful test on how the information environment shapes cash policies. While most extant empirical studies on corporate cash policy rely on cross-sectional tests and compare levels of cash holdings across firms or countries (Opler et al. 1999; Almeida, Campello, and Weisbach 2004; Dasgupta, Noe, and Wang 2011), our tests exploit exogenous shocks in the information environment. Our study considers two informational events that took place in different years and that may affect firms' information environments through different channels, finding similar results. Thus, our results suffer less concern about omitted correlated variables and are easier to generalize.

## II. RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

### The Economic Determinants of Corporate Cash Holdings

The corporate finance literature suggests that precautionary savings motive and agency motive are two determinants of corporate cash holdings (Opler et al. 1999).<sup>2</sup> According to the precautionary savings motive hypothesis, firms hoard cash to insure against future adverse shocks in internal funds when investment opportunities arrive at a time when access to external capital is costly. Thus, if the cost of future external financing is higher, the value of a cash reserve is also higher. Therefore firms reduce current investments and increase their cash reserves (Almeida et al. 2004) in order to capture future investment opportunities. Existing empirical evidence shows that firms hold more cash when they have riskier cash flows and more limited access to the external capital market (Opler et al. 1999; Khurana, Martin, and Pereira 2006; Acharya, Almeida, and Campello 2007; Duchin 2010; Neamtiu, Shroff, White, and Williams 2014; H. Chen, Z. Chen, Dhaliwal, and Huang 2017a), supporting the precautionary savings motive argument.

The prediction of agency theory on corporate cash holdings is less clear (Harford et al. 2008). On one hand, managers hold more cash because they can divert it to pursue their private benefits. Thus, cash holdings are higher when the diversion cost is lower and/or when the private benefits of diversion are higher. Consistent with this argument, Dittmar et al. (2003) find that cash holdings are higher for firms in countries with weaker investor protection. Kalcheva and Lins (2007) document evidence that management entrenchment increases cash holdings, and country-level investor protection reduces the propensity of entrenched management to hold cash. Using a sample of Chinese firms, Q. Chen, X. Chen, Schipper, Xu, and Xue (2012) find firms reduce cash holdings after the split-share reform that improves interest alignment between controlling shareholders and minority shareholders.

On the other hand, more severe agency problems may lead firms to increase overinvestment in the current period, which results in a lower level of cash holdings (Harford et al. 2008). Stulz (1990) shows that cash holdings can increase when shareholders have more effective control over management, which reduces waste of cash in overinvestments. In addition, these firms have higher sensitivity of investment to excess cash holdings, suggesting that these firms spend cash more quickly than other firms. Huang, Elkinawy, and Jain (2013) show that foreign firms have higher cash holdings after they are cross-listed in the United States. Chung, J. Kim, Y. Kim, and Zhang (2015) show that firms have lower cash holdings when they are subject to less analyst monitoring because of the brokerage merger/closure.

### ITL Enforcement, Mandatory IFRS Adoption, and Information Environment

Extant studies have suggested that ITL enforcement and mandatory IFRS adoption improve firms' information environment, although potentially through different channels.<sup>3</sup> The mandatory adoption of IFRS enforces country-level

<sup>2</sup> Opler et al. (1999) propose the tradeoff model and the financing hierarchy model to explain cash holdings. In the framework of the tradeoff model, future external financing costs (the "precautionary savings motive" hypothesis) and agency costs (the "agency motive" hypothesis) are two important costs that firms need to consider when deciding the optimal cash holdings. According to the financing hierarchy model, cash holdings are a passive result of firms' investment and financing decisions when firms can issue securities at low cost to raise cash whenever they have insufficient cash to finance their investment. In this model, there is no role of information and agency conflict. However, the financing hierarchy model does not appear to be consistent with the existing literature that suggests that firms actively manage cash holdings (e.g., Dasgupta et al. 2011; Gatchev, Pulvino, and Tarhan 2010). Indeed, Opler et al. (1999) point out that when external financing is allowed to play more of a role in the financing hierarchy model, the distinction between the financing hierarchy model and the tradeoff model becomes blurry.

<sup>3</sup> ITL enforcement and mandatory IFRS adoption are common settings used in accounting and financial research. Many researchers, practitioners, and critics have examined them, and the key institutional details and potential confounding factors have been better identified (Glaeser and Guay 2017).

auditing and financial reporting standards and improves the disclosure quality of public information, i.e., accounting numbers from financial statements. After the mandatory adoption of IFRS, accounting numbers have higher quality (Hung, Li, and Wang 2015) and become more comparable across different firms (Hong, Hung, and Lobo 2014; Yip and Young 2012; DeFond, Hu, Hung, and Li 2011). Mandatory IFRS adoption leads to lower analyst forecast errors and small forecast dispersions (Preiato et al. 2015; Byard, Li, and Yu 2011). It also motivates firms to offer more management forecasts (Li and Yang 2016).

Enforcement of insider trading laws improves the information environment via a different channel. The enforcement limits the trading by insiders, and thus stimulates private information acquisition activities by outside investors. Fishman and Hagerty (1992) analytically demonstrate that restricting insider trading encourages outside investors to acquire private information and trade more aggressively. Bushman, Piotroski, and Smith (2005) find increased analysts' activities after ITL enforcement. Fernandes and Ferreira (2009) show that stock price non-synchronicity increases after ITL enforcement.

Despite the potentially different mechanisms for each event to improve firms' information environment, they reduce adverse selection in the stock market, improve stocks' liquidity and reduce firms' cost of equity (Bhattacharya and Daouk 2002; Daske, Hail, Leuz, and Verdi 2008; Li 2010; Bhattacharya 2014).

The improved information environment can also strengthen shareholders' monitoring and mitigate managerial moral hazard. Hong (2013) argues that mandatory IFRS adoption and the concurrent improvements in enforcement increase transparency and make expropriation behavior more visible. The increased visibility raises legal and reputation costs to managers and enhances minority shareholders' ability to both *ex post* intervene and *ex ante* deter expropriation. Consistent with this argument, Hong (2013) finds a decrease in voting premiums of dual-class shares after IFRS adoption. In addition, IFRS adoption increases the comparability of accounting information and enables boards to write more efficient compensation contracts with managers (Ozkan, Singer, and You 2012). Denis and Xu (2013) find that firms increase the use of equity-based compensation after ITL enforcement. Hail et al. (2014) find that firms decrease dividend payouts after both ITL enforcement and IFRS adoption.

## Hypothesis

Firms' information environment plays a pivotal role for precautionary savings hypothesis and agency hypothesis in explaining corporate cash holdings. To the extent that financing constraints are relieved by an improved information environment, firms should hold less cash because the precautionary savings motive is lower after the regulatory changes. In addition, since a more transparent environment enhances external investors' monitoring, firms may reduce cash holdings as the private benefits of cash holdings become lower. The above discussions lead to our hypothesis, in null form, as follows:

While we predict that the improvement in information environment reduces corporate cash holdings, there are economic forces that add tension to the hypothesis. For example, as discussed before, Harford et al. (2008) show that more intensive monitoring may also reduce current overinvestment and lead to a higher level of cash holdings. In addition, Hail et al. (2014) suggest that a better information environment reduces the demand for using dividends payout as a commitment to avoid overinvestment, which may also increase cash holdings. Ultimately, the effect of information environment on cash holdings is an empirical question.

The above discussions lead to our hypothesis, in null form, as follows:

**Hypothesis:** Cash holdings do not change after ITL enforcement or mandatory IFRS adoption.

## III. RESEARCH DESIGN

### Data and Sample Selection Process

We use two country-level information shocks to examine how change in the information environment affects corporate cash holdings. The first shock is initial enforcement of insider trading laws, and the second, mandatory adoption of IFRS. The ITL enforcement sample focuses on countries globally whose initial insider trading laws enforcement occurred before the year 2000. We restrict the ITL enforcement sample to the period before 2000 to ensure it does not overlap with the IFRS sample period. The staggered enforcement process enables us to eliminate concern that there may be a cluster of events during a certain time period.

Our IFRS sample focuses on EU countries that adopted IFRS mandatorily from year 2005 through 2010.<sup>4</sup> Focusing on European countries has at least two advantages. First, they have a relatively homogeneous regulatory environment compared

<sup>4</sup> IFRS adoption year varies among firms. For example, the firms listed on the Alternative Investment Market (AIM) of the London Stock Exchange are allowed to submit IFRS financial statements starting in 2007. Norway and Germany have rules that allow some firms to adopt IFRS in 2007 under specific circumstances. We require the sample firms to adopt IFRS before 2010 because we need financial data in the three years after IFRS adoption.

with other countries that have mandated IFRS adoption, which helps to reduce concerns about unobservable country-level factors. Second, the legal enforcement quality in EU countries is relatively high, and thus the adoption of IFRS is more credible (Daske et al. 2013; Christensen et al. 2013).<sup>5</sup>

We include in our sample firm-year observations in years  $[-3,+3]$  around the event year (i.e., year 0), where years  $[-3,-1]$  are defined as the pre-event period and years  $[0,+3]$  are defined as the post-event period.<sup>6</sup> The ITL sample initially contains 37,730 treatment firm-year observations (8,675 unique firms). We delete observations that are from financial institutions, have total assets below US\$1 million, have missing required variables, or have unidentified benchmark firms. We also require each firm to have at least one observation in the pre- and post-enforcement periods. Eventually, we end up with a final ITL enforcement sample containing 10,568 treatment firm years (1,724 firms). Following a similar sample construction process, we end up with an IFRS sample with 13,772 treatment firm years (2,290 firms).<sup>7</sup>

We conduct a difference-in-differences test to ensure that any change in cash holdings after the events is not driven by an unobserved time trend in cash holdings. We match each enforcement/adoption firm with a non-enforcement/non-adopting firm (from the U.S. or Canada) based on estimated propensity scores at year  $-1$ . We choose Canada and the U.S. as benchmark countries for two reasons. First, Canada and the U.S. enforced insider trading laws well before the EU, with Canada starting to do so in 1976 and the U.S. in 1961. Hail et al. (2014) use countries that have enforced insider trading laws before the sample period as a benchmark sample. Second, for our IFRS sample, Canada and the U.S. did not adopt IFRS during our sample period. Canada mandated IFRS reporting starting in 2011, and the U.S. never did. To keep this control sample consistent, we use Canada and the U.S., which do not adopt IFRS or initiate enforcement in our sample period, as benchmark countries.

To estimate the propensity score, we estimate a probit model that includes all of the pre-event observations of ITL enforcement firms (or IFRS adoption firms) and all firm-year observations of control firms in our sample period. Following previous studies (Roberts and Whited 2013; Cheng, Dhaliwal, and Zhang 2013), we include in the probit model variables correlated with corporate cash holdings, as suggested in prior studies (e.g., Bates et al. 2009).<sup>8</sup> We also include the levels of and changes in cash holdings in the pre-event period to ensure a parallel trend assumption (Roberts and Whited 2013).

We match each treatment firm with a control firm from the U.S. or Canada within the same industry using the 48-industry classification (Fama and French 1997), while the control firms are identified as those having the closest propensity score (without replacement) to the treatment firms. We tabulate the ITL enforcement sample and IFRS adoption sample distribution in Table 1.

## Model Specifications

We adopt a difference-in-differences approach and estimate the following regression model to test the effect of the two events on corporate cash holdings:

$$\ln CASH_{i,t} = \beta_0 + \beta_1 POST_{i,t} + \beta_2 POST_{i,t} \times ITL/IFRS_i + Controls + Country\ Fixed\ Effects + Industry\ Fixed\ Effects + \varepsilon_{i,t} \quad (1)$$

where  $i$  and  $t$  are indicators for firm and year, respectively. Following previous studies (e.g., Opler et al. 1999), we define the level of corporate cash holdings ( $\ln CASH$ ) as the natural logarithm of cash and cash equivalents scaled by total net assets, where total net assets are defined as the book value of total assets minus cash and cash equivalents.  $POST$  is a dummy variable equal to 1 for the post-enforcement/post-adoption period, and 0 otherwise.<sup>9</sup>  $ITL$  is a dummy variable equal to 1 for the countries that initially enforce insider trading laws, and 0 otherwise.  $IFRS$  is a dummy variable equal to 1 for the EU countries that mandatorily adopt IFRS in 2005 or after, and 0 otherwise. The effect of the events on corporate cash holdings is captured by the coefficient  $\beta_2$ .

We include variables that may determine cash holdings (Opler et al. 1999) in the regression: Tobin's Q ( $Q$ ), the natural logarithm of total assets in U.S. dollars ( $\ln TA$ ), operating cash flow ( $CFO$ ), net working capital ( $NWC$ ), leverage ( $LEV$ ), industry volatility of operating cash flow ( $SIGMA$ ), and number of business segments ( $NSEG$ ) (see Appendix A for detailed

<sup>5</sup> While IFRS adoption was clustered, the ITL enforcement events were more staggered. Thus, investigating two events in our study helps mitigate the concerns of confounding events.

<sup>6</sup> Our results are robust if we delete the observations in year 0.

<sup>7</sup> The number of observations used in our analysis can be different because of the missing values in various variables used in the analysis.

<sup>8</sup> More specifically, the probit model to estimate the propensity score includes firm size, Tobin's Q, operating cash flow, net noncash working capital, leverage, number of business segments, capital expenditures, acquisitions, R&D expenditures, a dividend payment indicator, and industry and year fixed effects. We further include average cash holdings for the previous three years and the change in cash holdings over the previous three years to ensure a parallel trend assumption.

<sup>9</sup> We do not include year fixed effects in the specification to make the economic interpretation of the coefficient on  $POST$  more straightforward. Including year fixed effects would not change the results.

**TABLE 1**  
**Sample Distribution**

**Panel A: Distribution of ITL Enforcement Firms**

Country	Number of Firm-Year Observations	Number of Unique Firms	Initial Enforcement Year
Argentina	96	17	1995
Australia	785	134	1996
Belgium	311	49	1994
Chile	267	41	1996
Denmark	617	95	1996
Finland	290	47	1993
Germany	1,631	250	1995
Greece	434	70	1996
Hong Kong	376	58	1994
Hungary	10	2	1995
India	1,272	206	1998
Indonesia	296	45	1996
Italy	427	69	1996
Japan	831	163	1990
Malaysia	581	91	1996
The Netherlands	546	83	1994
Norway	243	45	1990
Peru	26	5	1994
Spain	577	93	1998
Sri Lanka	38	7	1996
Sweden	196	34	1990
Switzerland	466	74	1995
Thailand	112	22	1993
Turkey	140	24	1996
Total	10,568	1,724	

descriptions of the variable constructions). Finally, we include industry and country fixed effects to control for time-invariant, unobservable industry- and country-level heterogeneity.

#### IV. EMPIRICAL RESULTS

##### Summary Statistics

Table 2 shows summary statistics for the final samples. Panel A shows summary statistics for the ITL enforcement sample, and Panel B shows summary statistics for the IFRS sample. The median natural logarithm of the cash ratio (*lnCASH*) is  $-2.804$  for ITL enforcement firms, which is equivalent to a ratio of cash to noncash assets of 6.1 percent. The median natural logarithm of cash ratio (*lnCASH*) is  $-2.354$  for IFRS firms, which is equivalent to a ratio of cash to noncash assets of 9.5 percent. This is comparable to statistics reported in previous studies of corporate cash holdings (e.g., Dittmar et al. 2003). The mean (median) value of firm size (*lnTA*) of ITL enforcement firms is 5.695 (5.588), and that of IFRS firms is 5.286 (5.133), suggesting that our sample covers relatively large firms. The first quartile of *NSEG* is 2 for both samples, suggesting that more than 75 percent of the firms are multi-segment firms. We report the Pearson correlation coefficients among main variables in Panels C and D.

##### Regression Analysis

Table 3 presents the multivariate regression results of the overall change in corporate cash holdings after the two informational events. Panel A shows the regression results using initial insider trading laws enforcement as an exogenous shock. Column [1] is the baseline regression. The coefficient of *POST* is close to 0, suggesting no significant change in

TABLE 1 (continued)

## Panel B: Distribution of IFRS Adoption Firms

Country	Number of Firm-Year Observations	Number of Unique Firms	Enforcement Quality	GAAP Difference	Adoption Year
Austria	62	10	4.51	12	2005
Belgium	213	35	4.17	13	2005
Czech Republic	56	10	NA	14	2005
Denmark	391	61	4.78	11	2005
Finland	489	76	4.89	15	2005
France	1,761	270	3.65	12	2005
Germany	1,217	193	4.21	11	2005
Greece	866	140	2.85	17	2005
Iceland	12	3	NA	NA	2005
Ireland	188	30	4.05	1	2005
Italy	52	8	2.86	12	2005
The Netherlands	481	75	4.77	4	2005
Norway	563	97	4.71	7	2005
Poland	405	82	NA	12	2005
Portugal	181	28	2.69	13	2005
Sweden	1,076	176	4.82	10	2005
Switzerland	125	19	4.81	12	2005
United Kingdom	5,634	977	4.70	1	2005
Total	13,772	2,290			

Table 1 presents sample distribution for the treatment firms for the events of ITL enforcement and IFRS adoption, respectively. Enforcement quality is measured as the average score of the efficiency of the judicial system, rule of law, and corruption from La Porta et al. (1998). GAAP difference is the number of differences between local GAAP and IFRS in 21 accounting rules (Bae et al. 2008).

cash holdings in the control firms in the post-enforcement period. The variable of interest is  $POST \times ITL$ . Column [1] reports a negative and significant coefficient of  $POST \times ITL$  ( $-0.172$ ,  $t = -4.52$ ). The results suggest there is no significant change in cash holdings for the control firms, whereas the cash holdings for the ITL enforcement firms decrease by 15.8 percent ( $\exp(-0.172 + 0) - 1$ ) compared with their pre-enforcement period level. Thus, the results are consistent with our hypothesis that firms reduce their cash holdings after a change in the information environment resulting from an exogenous shock.

Panel B of Table 3 shows the regression results using IFRS as an exogenous shock. Column [1] is our baseline regression. The coefficient of  $POST$  is positive yet insignificant, suggesting there is no significant increase in cash holdings in the control firms in the post-IFRS adoption period. Column [1] reports a negative and significant coefficient of  $POST \times IFRS$  ( $-0.076$ ,  $t = -2.26$ ). The results suggest that the cash holdings for the control firms increase by around 1.6 percent ( $\exp(0.016) - 1$ ) compared with the pre-adoption period level, whereas cash holdings for the IFRS adoption firms decrease by around 6 percent ( $\exp(-0.076 + 0.016) - 1$ ) compared with their pre-adoption period level.

To examine the sensitivity of our results to the model specification, we also estimate the regressions for the treatment firms and control firms separately, as the effect of the control variables on cash holdings can be different across the treatment and control samples. In both Panels A and B, the results are presented in Columns [2] and [3] and are qualitatively consistent with those reported in Column [1].

The signs of the control variables' coefficients are largely consistent with the literature. In both samples, the results show that corporate cash holdings are positively correlated with investment opportunities as measured by Tobin's  $Q$  ( $Q$ ), operating cash flow ( $CFO$ ), and industry cash flow volatility ( $SIGMA$ ), and are negatively correlated with noncash working capital ( $NWC$ ), and leverage ( $LEV$ ). After we estimate the regressions for the treatment firms and control firms separately, we find the coefficients on firm size ( $lnTA$ ) and business segment ( $NSEG$ ) are indeed different in different subsamples.<sup>10</sup>

<sup>10</sup> We also expand Regression (1) by including additional variables that may affect corporate cash holdings such as capital investments, acquisitions, R&D expenditures, and dividend payments (Opler et al. 1999). We do not include these variables in our baseline regression. Nevertheless, our results are qualitatively similar when we include these variables. Results are available upon request.

**TABLE 2**  
**Summary Statistics**

**Panel A: Summary Statistics for ITL Enforcement Sample (including Both Treatment and Control Firms)**

	<u>n</u>	<u>Mean</u>	<u>Std.</u> <u>Dev.</u>	<u>Percentiles</u>		
				<u>25%</u>	<u>50%</u>	<u>75%</u>
<i>lnCASH</i>	20,609	-2.905	1.624	4	-2.804	-1.732
<i>CFO</i>	20,609	0.104	0.125	0.056	0.099	0.151
<i>Q</i>	20,609	1.64	1.143	1.043	1.289	1.787
<i>lnTA</i>	20,609	5.695	1.788	4.399	5.588	6.9
<i>NWC</i>	20,609	0.089	0.203	-0.03	0.077	0.215
<i>LEV</i>	20,609	0.253	0.182	0.099	0.243	0.377
<i>SIGMA</i>	20,609	0.039	0.024	0.025	0.035	0.048
<i>NSEG</i>	20,609	3.501	1.857	2	3	4

**Panel B: Summary Statistics for IFRS Sample (including Both Treatment and Control Firms)**

	<u>n</u>	<u>Mean</u>	<u>Std.</u> <u>Dev.</u>	<u>Percentiles</u>		
				<u>25%</u>	<u>50%</u>	<u>75%</u>
<i>lnCASH</i>	26,740	-2.449	1.642	-3.445	-2.354	-1.360
<i>CFO</i>	26,740	0.084	0.182	0.038	0.091	0.152
<i>Q</i>	26,740	1.701	1.182	1.048	1.358	1.909
<i>lnTA</i>	26,740	5.286	2.159	3.703	5.133	6.749
<i>NWC</i>	26,740	0.035	0.242	-0.084	0.031	0.177
<i>LEV</i>	26,740	0.212	0.185	0.039	0.187	0.334
<i>SIGMA</i>	26,740	0.084	0.051	0.041	0.072	0.117
<i>NSEG</i>	26,740	2.958	1.736	2	3	4

**Panel C: Pearson Correlation Coefficients for ITL Enforcement Sample (including Both Treatment and Control Firms)**

	<u><i>lnCASH</i></u>	<u><i>CFO</i></u>	<u><i>Q</i></u>	<u><i>lnTA</i></u>	<u><i>NWC</i></u>	<u><i>LEV</i></u>	<u><i>SIGMA</i></u>	<u><i>NSEG</i></u>
<i>lnCASH</i>	<b>1</b>	<b>0.147</b>	<b>0.25</b>	<b>-0.119</b>	<b>-0.082</b>	<b>-0.352</b>	<b>0.147</b>	<b>-0.019</b>
<i>CFO</i>		<b>1</b>	<b>0.241</b>	<b>0.027</b>	<b>0.135</b>	<b>-0.285</b>	<b>0.017</b>	<b>0.041</b>
<i>Q</i>			<b>1</b>	<b>-0.079</b>	<b>-0.049</b>	<b>-0.268</b>	<b>0.102</b>	<b>-0.015</b>
<i>lnTA</i>				<b>1</b>	<b>-0.175</b>	<b>0.167</b>	<b>-0.188</b>	<b>0.264</b>
<i>NWC</i>					<b>1</b>	<b>-0.256</b>	<b>-0.047</b>	<b>0.067</b>
<i>LEV</i>						<b>1</b>	<b>-0.104</b>	<b>-0.064</b>
<i>SIGMA</i>							<b>1</b>	<b>0.056</b>
<i>NSEG</i>								<b>1</b>

We also examine whether our results are sensitive to using alternative control firms. In particular, we repeat our baseline analysis with different control samples as a robustness check in Table 4. The first alternative benchmark group we use is a combination of all non-ITL enforcement firms and all non-IFRS firms. When we match ITL enforcement firms with non-ITL enforcement firms in all non-ITL enforcement countries (i.e., not just the U.S. and Canada), we obtain a total sample of 123,270 firm-year observations (19,933 firms) from 31 countries. Similarly, when we match IFRS adopting firms with non-IFRS adopting firms in all non-IFRS adopting countries, we obtain a treatment sample of 17,310 firm years (2,840 firms) from 18 EU countries and a control sample of 128,985 firm years (22,447 firms) from 14 countries.<sup>11</sup> The second alternative benchmark

<sup>11</sup> The non-IFRS adopting countries are Argentina, Brazil, Canada, China, India, Indonesia, Japan, South Korea, Malaysia, Mexico, Pakistan, Taiwan, Thailand, and the U.S. We drop Russia, Columbia, Zimbabwe, etc., because there are too few observations from each country.



TABLE 2 (continued)

## Panel D: Pearson Correlation Coefficients for IFRS Sample (including Both Treatment and Control Firms)

	<i>lnCASH</i>	<i>CFO</i>	<i>Q</i>	<i>lnTA</i>	<i>NWC</i>	<i>LEV</i>	<i>SIGMA</i>	<i>NSEG</i>
<i>lnCASH</i>	<b>1</b>	<b>0.197</b>	<b>0.27</b>	<b>-0.22</b>	<b>-0.077</b>	<b>-0.516</b>	<b>0.326</b>	<b>-0.065</b>
<i>CFO</i>		<b>1</b>	<b>0.358</b>	<b>0.146</b>	<b>0.081</b>	<b>-0.221</b>	-0.001	<b>0.043</b>
<i>Q</i>			<b>1</b>	<b>-0.022</b>	<b>-0.105</b>	<b>-0.2</b>	<b>0.169</b>	<b>-0.036</b>
<i>lnTA</i>				<b>1</b>	<b>-0.064</b>	<b>0.325</b>	<b>-0.351</b>	<b>0.286</b>
<i>NWC</i>					<b>1</b>	<b>-0.169</b>	<b>-0.111</b>	<b>0.083</b>
<i>LEV</i>						<b>1</b>	<b>-0.306</b>	<b>0.071</b>
<i>SIGMA</i>							<b>1</b>	<b>-0.11</b>
<i>NSEG</i>								<b>1</b>

Panel A presents summary statistics for the ITL enforcement sample. Panel B presents summary statistics for the IFRS sample. Pearson correlation coefficients are reported in Panels C and D for each sample. The correlation coefficients in bold are statistically significant at least at the 10 percent level. *lnCASH* is the logarithm of the ratio of cash and cash equivalents to net total assets. *Q* is Tobin's *Q*, computed as the market value of total assets to the book value of total assets, where the market value of total assets is defined as the book value of total assets plus the difference between the market value of equity and book value of equity. *lnTA* is the natural logarithm of total assets. *CFO* is operating cash flow scaled by net assets. *NWC* is noncash working capital scaled by net assets. *LEV* is the sum of long-term and short-term debts scaled by total assets. *SIGMA* is the industry volatility of cash flows. *NSEG* is the number of business segments.

group we use comprises propensity score matched non-ITL enforcement firms or non-IFRS adopting firms. Due to the matching procedure, we end up with 14,414 ITL enforcement firm years (2,371 firms) and 13,897 control firm years (2,371 firms), and 17,228 IFRS adopting firm years (2,825 firms) and 17,135 control firm years (2,825 firms). The third alternative benchmark sample we use consists of the voluntary IFRS adopters from the same EU countries, with 8,071 firm years (1,274 firms); together with the treatment sample of 17,310 firm years (2,840 firms), we end up with a total sample of 25,381 firm years (4,114 firms). We do not have voluntary benchmark firms for the ITL enforcement sample because the enforcement is at the country level, not the firm level. With respect to different benchmark groups, we obtain qualitatively similar results for both samples.<sup>12</sup>

### Robustness Tests

While the results reported in Tables 3 and 4 indicate a decline in cash holdings after IFRS adoption and ITL enforcement, the findings could be attributed to alternative, uncontrolled confounding events. We thus conduct several robustness checks to address this concern.

### Dynamic Analysis

We explicitly test the timing of a cash holdings change around the informational events. Specifically, we replace the dummy variable *POST* in baseline Equation (1) with a series of time indicators that break up the entire sample into subperiods. Specifically, we define  $T[-2,-1]$  as a dummy variable that equals 1 for years  $[-2,-1]$  relative to the initial enforcement/adoption year, and 0 otherwise.  $T[0,+1]$  is a dummy variable that equals 1 for years  $[0,+1]$  relative to the initial enforcement/adoption year, and 0 otherwise, and  $T[+2,+3]$  is a dummy variable that equals 1 for years  $[+2,+3]$  relative to the initial enforcement/adoption year, and 0 otherwise. Year  $-3$  serves as benchmark period relative to the initial enforcement/adoption year.

Table 5 tabulates the test results. The coefficients on  $ITL \times T[-2,-1]$  and  $IFRS \times T[-2,-1]$  are insignificant at the conventional level (0.053,  $t = 1.03$ ;  $-0.003$ ,  $t = -0.07$ ). The findings indicate that the cash holdings in our treatment and control groups prior to the events are statistically similar and there is no reliable change in cash holdings prior to the informational events.

In contrast, the coefficients on  $ITL \times T[0,+1]$  and  $IFRS \times T[0,+1]$  are significantly negative at the 10 percent level ( $-0.087$ ,  $t = -1.74$ ;  $-0.057$ ,  $t = -1.66$ ), suggesting there is a reduction in cash holdings shortly around the event year. The coefficients on  $ITL \times T[+2,+3]$  and  $IFRS \times T[+2,+3]$  are also significantly negative ( $-0.105$ ,  $t = -1.69$ ;  $-0.084$ ,  $t = -2.17$ ), suggesting that

<sup>12</sup> As we examine two informational events in our study, we design additional tests to examine if there are any interaction effects between ITL enforcement and IFRS adoption and if each information shock has a long-lasting incremental effect on cash holdings. We find that the effect of IFRS adoption does not depend on whether a country has enforced ITL, and each event has an incremental, long-lasting effect on cash holdings. The results are available upon request.

**TABLE 3**  
**Change in Corporate Cash Holdings after Change in Information Environment**

**Panel A: Change in Corporate Cash Holdings after Initial Enforcement of Insider Trading Laws**

	Baseline Model [1]	ITL Enforcement Firms Only [2]	Control Firms Only [3]
<i>POST</i>	0.000 (0.01)	-0.167*** (-5.79)	-0.004 (-0.14)
<i>POST</i> × <i>ITL</i>	-0.172*** (-4.52)		
<i>Q</i>	0.121*** (13.09)	0.053*** (3.86)	0.119*** (9.48)
<i>lnTA</i>	-0.076*** (-12.09)	0.032*** (3.68)	-0.135*** (-15.09)
<i>CFO</i>	1.002*** (12.74)	2.422*** (17.80)	0.760*** (7.67)
<i>NWC</i>	-1.457*** (-26.62)	-0.973*** (-13.01)	-1.572*** (-19.90)
<i>LEV</i>	-2.856*** (-47.45)	-1.996*** (-24.44)	-3.174*** (-35.72)
<i>SIGMA</i>	5.228*** (10.26)	3.482*** (6.43)	5.204*** (4.40)
<i>NSEG</i>	0.001 (0.13)	0.043*** (5.89)	-0.040*** (-4.84)
Country Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.3244	0.3271	0.3788
n	20,609	10,568	10,041
Test of the difference in the coefficient of <i>POST</i> between [2] and [3]:			
F-value		20.40	
p-value		[< 0.0001]	

the decline in cash holdings lasts a few years after the implementation of the regulations. A formal test shows that  $\lambda_{T[0,+1]} - \lambda_{T[-2,-1]}$  is significantly negative (p-value < 0.0001), suggesting a significant reduction in cash holdings right after the initial insider trading laws enforcement. The coefficient of  $\lambda_{T[+2,+3]}$  is also significantly negative, although not reliably different from  $\lambda_{T[0,+1]}$ . The results on IFRS sample exhibit a similar conclusion.

Thus, we find a significant reduction in cash holdings for treatment firms immediately after the event year. This finding enhances our confidence that the decline in cash holdings is attributed to the informational events. The results also suggest that the effect is long lasting.

***Concurrent Enforcement Changes around Informational Events***

Christensen et al. (2013) document that many EU countries experience significant improvement in the enforcement quality of financial reporting concurrent with IFRS adoption. They also find that the documented stock market benefit of mandatory IFRS adoption becomes weaker after controlling for the concurrent enforcement change. Although we do not aim to disentangle the mandatory IFRS adoption effect from concurrent enforcement quality improvement, we attempt to evaluate if our results vary in subsamples with and without the concurrent enforcement quality change.

We separate the sample into those countries with concurrent enforcement quality improvement (i.e., Finland, Germany, Iceland, The Netherlands, Norway, and the U.K.) and those without, and then we estimate our baseline regression for each subsample. Columns [1] and [2] of Table 6 report the results. We find that the coefficient of *POST* × *IFRS* is negative and significant in countries with concurrent improvement in enforcement quality (-0.085, t = -1.97) and without (-0.101, t = -1.99). The difference is statistically insignificant (F-value = 1.53; p-value = 0.2164).

TABLE 3 (continued)

## Panel B: Change in Corporate Cash Holdings after Mandatory IFRS Adoption

	Baseline Model [1]	IFRS Adoption Firms Only [2]	Control Firms Only [3]
<i>POST</i>	0.016 (0.68)	-0.060*** (-2.71)	0.020 (0.80)
<i>POST</i> × <i>IFRS</i>	-0.076** (-2.26)		
<i>Q</i>	0.185*** (24.77)	0.210*** (20.76)	0.168*** (15.40)
<i>lnTA</i>	-0.028*** (-5.88)	0.002 (0.24)	-0.051*** (-7.59)
<i>CFO</i>	0.447*** (9.79)	0.206*** (3.29)	0.625*** (9.61)
<i>NWC</i>	-1.225*** (-30.81)	-0.844*** (-15.34)	-1.472*** (-25.86)
<i>LEV</i>	-3.362*** (-65.19)	-3.105*** (-45.01)	-3.518*** (-45.87)
<i>SIGMA</i>	2.419*** (9.06)	1.439*** (4.42)	3.631*** (7.17)
<i>NSEG</i>	0.003 (0.59)	-0.001 (-0.21)	0.009 (1.17)
Country Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.314	0.288	0.364
n	26,740	13,772	12,968
Test of the difference in the coefficient of <i>POST</i> between [2] and [3]:			
F-value		5.10**	
p-value		[0.0239]	

\*\*\*, \*\* Indicate significance levels of 1 percent and 5 percent, respectively.

The dependent variable is *lnCASH*, defined as the logarithm of the ratio of cash and cash equivalents to net total assets. *POST* is the indicator for the post-ITL/IFRS adoption period. *ITL* is the indicator for the countries initially enforcing insider trading laws. *IFRS* is the indicator for mandatory IFRS adoption countries. *Q* is Tobin's *Q*. *lnTA* is the natural logarithm of total assets. *CFO* is operating cash flow scaled by net assets. *NWC* is noncash working capital scaled by net assets. *LEV* is the sum of long-term and short-term debts scaled by total assets. *SIGMA* is the industry volatility of cash flows. *NSEG* is the number of business segments. t-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level.

We also partition the sample based on concurrent changes in governance effectiveness. Following Kim et al. (2012), we measure the change in governance effectiveness as the average of the change in corporate board effectiveness and in auditing and accounting practices, with the data obtained from the Annual Executive Opinion Survey conducted by the Institute for Management Development. Specifically, the change in board effectiveness is defined as the average score of corporate board effectiveness in the years 2006 through 2008 minus the score in 2004. The auditing and accounting practices are defined as the average score of auditing and accounting practices in years 2006 through 2008 minus the score in 2005.<sup>13</sup> Countries with a change in governance effectiveness that is greater (lower) than the sample median are placed in the high (low) group.

The results are reported in Columns [3] and [4] of Table 6. We find that the coefficient on *POST* × *IFRS* is significantly negative in both subsamples. In particular, for countries that experience small concurrent governance effectiveness changes, the coefficient is -0.083 (t = -1.92). For those countries that experience large concurrent governance effectiveness changes, the coefficient is -0.079 (t = -1.99). The difference is not statistically significant (F-value = 0.16; p-value = 0.6915).

<sup>13</sup> The 2005 score is used as an approximation for the pre-IFRS measure because the survey data related to auditing and accounting practices for the pre-2005 period are not available.

**TABLE 4**  
**Change in Corporate Cash Holdings after Mandatory IFRS Adoption**  
**Alternative Benchmark Groups**

**Panel A: Change in Corporate Cash Holdings after Initial Enforcement of Insider Trading Laws**

	Unmatched Non-ITL Enforcement Firms [1]	Matched Non-ITL Enforcement Firms		
		Baseline Model [2]	ITL Enforcement Firms Only [3]	Control Firms Only [4]
<i>POST</i>		−0.010 (−0.45)	−0.097*** (−3.94)	−0.0151 (−0.73)
<i>ITL</i>				
<i>POST</i> × <i>ITL</i>	−0.042** (−2.47)	−0.092*** (−2.87)		
Other Variables included in Table 3				
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	No
Adj. R <sup>2</sup>	0.354	0.306	0.349	0.302
n	123,270	28,311	14,414	13,897
Test of the difference in the coefficient of <i>POST</i> between [3] and [4]:				
F-value			8.24***	
p-value			[0.0041]	

**Panel B: Change in Corporate Cash Holdings after Mandatory IFRS Adoption**

	Unmatched Non-IFRS Firms [1]	Matched Non-IFRS Firms			
		Baseline Model [2]	IFRS Adoption Firms Only [3]	Control Firms Only [4]	Voluntary Adopters [5]
<i>POST</i>		0.056** (2.88)	−0.059*** (−2.83)	0.056*** (2.79)	0.061 (−1.12)
<i>IFRS</i>					−0.080** (−2.22)
<i>POST</i> × <i>IFRS</i>	−0.072*** (−3.21)	−0.126*** (−4.46)			−0.071* (−1.82)
Other Variables included in Table 3					
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	No	No	No	No
Adj. R <sup>2</sup>	0.332	0.311	0.287	0.35	0.286
n	146,295	34,363	17,228	17,135	25,381
Test of the difference in the coefficient of <i>POST</i> between [3] and [4]:					
F-value			19.86***		
p-value			[< 0.0001]		

\*\*\*, \*\*, \* Indicate significance levels of 1 percent, 5 percent, and 10 percent, respectively.

Panel A presents results on the change in corporate cash holdings after initial enforcement of insider trading laws with different control samples. The sample period for the ITL enforcement sample is from 1987 to 2001. Panel B presents results on the change in corporate cash holdings after IFRS adoption with different control samples. The sample period is three years before IFRS adoption to three years after IFRS adoption. The dependent variable in all regressions is *lnCASH*, defined as the logarithm of the ratio of cash and cash equivalents to net total assets. *POST* is the indicator for the post-ITL enforcement period or post-IFRS adoption period. *ITL* is the indicator for the countries initially enforcing insider trading laws, and *IFRS* is the indicator for mandatory IFRS adoption countries. t-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level. Control variables are the same as in Table 3.

**TABLE 5**  
**Timing of the Changes in Cash Holdings around Informational Events**

	ITL Sample	IFRS Sample
$T[-2,-1]$	0.010 (0.28)	0.002 (0.06)
$T[0,+1]$	0.015 (0.43)	-0.017 (-0.51)
$T[+2,+3]$	-0.017 (-0.39)	0.014 (0.33)
$ITL \times T[-2,-1], \dots, \lambda_{T[-2,-1]}$	0.053 (1.03)	
$ITL \times T[0,+1], \dots, \lambda_{T[0,+1]}$	-0.087* (-1.74)	
$ITL \times T[+2,+3], \dots, \lambda_{T[+2,+3]}$	-0.105* (-1.69)	
$IFRS \times T[-2,-1], \dots, \lambda'_{T[-2,-1]}$		-0.003 (-0.07)
$IFRS \times T[0,+1], \dots, \lambda'_{T[0,+1]}$		-0.057* (-1.66)
$IFRS \times T[+2,+3], \dots, \lambda'_{T[+2,+3]}$		-0.084** (-2.17)
$Q$	0.121*** (13.01)	0.186*** (24.74)
$\ln TA$	-0.077*** (-12.20)	-0.028*** (-5.89)
$CFO$	1.006*** (12.78)	0.446*** (9.77)
$NWC$	-1.462*** (-26.68)	-1.223*** (-30.76)
$LEV$	-2.856*** (-47.43)	-3.363*** (-65.20)
$SIGMA$	5.093*** (10.02)	2.428*** (9.12)
$NSEG$	0.001 (0.16)	0.003 (0.57)
Country Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Adj. R <sup>2</sup>	0.3264	0.3160
n	20,609	26,740
p-value of F-test on the difference across coefficients:		
$\lambda_{T[-2,-1]} = \lambda_{T[0,+1]}$	[0.0000]	
$\lambda_{T[0,+1]} = \lambda_{T[+2,+3]}$	[0.1589]	
$\lambda'_{T[-2,-1]} = \lambda'_{T[0,+1]}$		[0.0078]
$\lambda'_{T[0,+1]} = \lambda'_{T[+2,+3]}$		[0.1454]

\*\*\*, \*\*, \* Indicate significance levels of 1 percent, 5 percent, and 10 percent, respectively.

The dependent variable is  $\ln CASH$ .  $T[-2,-1]$  is a dummy variable that equals 1 for years  $[-2,-1]$  around the year of initial enforcement/adoption, and 0 otherwise.  $T[0,+1]$  is a dummy variable that equals 1 for years  $[0,+1]$ , and 0 otherwise.  $T[+2,+3]$  is a dummy variable that equals 1 for years  $[+2,+3]$ , and 0 otherwise. The control variables are similarly defined as in Table 3. t-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level.

### ***The Strength of Information Shock***

In this section, we examine whether and how the strength of information shocks affects the change in cash holdings. We posit that if the decrease in cash holdings is driven by the information environment shocks, we should observe a more pronounced decrease in cash holdings in countries where the shocks are stronger. In our tests, we measure the strength of information shock

**TABLE 6**  
**The Effect of Concurrent Change in Enforcement Quality and Corporate Governance Effectiveness**

	Partition Variable = $\Delta$ Enforcement		Partition Variable = $\Delta$ Governance Effectiveness	
	Yes [1]	No [2]	Large [3]	Small [4]
$POST \times IFRS$	-0.085** (-1.97)	-0.101** (-1.99)	-0.083* (-1.92)	-0.079** (-1.99)
Other Variables included in Table 3	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.3111	0.3373	0.303	0.339
n	16,402	10,338	16,436	10,304
Test of the difference in the coefficient of $POST \times IFRS$ between:	Yes – No		Large – Small	
F-value	1.53		0.16	
p-value	[0.2164]		[0.6915]	

\*\*\*, \*\*, \* Indicate significance levels of 1 percent, 5 percent, and 10 percent, respectively.

The dependent variable in all of the regressions is  $\ln CASH$ , defined as the natural logarithm of the ratio of cash and cash equivalents to net assets. To save space, only the coefficients and t-statistics of  $POST \times IFRS$  are reported. Countries with concurrent enforcement change ( $\Delta$ Enforcement = Yes) include Finland, Germany, Iceland, The Netherlands, Norway, and the U.K.  $\Delta$ Governance Effectiveness is defined as the average of corporate board effectiveness and the auditing and accounting practices from Kim et al. (2012). Board effectiveness is defined as the average country-level score of corporate board effectiveness between 2006 and 2008 minus the score in 2004. The auditing and accounting practices variable is defined as the average country-level score of auditing and accounting practices between 2006 and 2008 minus the score in 2005. Countries with a  $\Delta$ Governance Effectiveness greater (smaller) than the median value are placed in the large (small) sample. t-statistics are reported in parentheses and are based on the standard errors adjusted for clustering at the country level.

with an enforcement quality index, the average of the country-level scores of (1) efficiency of the judicial system, (2) rule of law, and (3) corruption (La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1998; Li 2010). Countries with enforcement values above (below) the sample median are defined to have strong (weak) enforcement quality. We also use the number of differences between local GAAP and international accounting standards to measure the strength of information shocks in IFRS-related tests (Bae, Tan, and Welker 2008), which is the number of differences in 21 accounting rules between local GAAP and IFRS. Prior studies show that IFRS adoption has a stronger capital market effect when a country's overall enforcement quality is better and when there is a bigger difference between local GAAP and IFRS (Daske et al. 2008; Li 2010; Hail et al. 2014). Nevertheless, the evidence regarding how legal enforcement quality affects the capital market effect of insider trading regulation is relatively mixed. Bushman et al. (2005) find a more pronounced ITL enforcement effect on analysts' activities in emerging markets where legal protection is weaker. However, Fernandes and Ferreira (2009) find a more pronounced increase in market efficiency after ITL enforcement in developed markets that have stronger overall legal enforcement quality.

The results are reported in Table 7. Panel A presents the results for the sample of insider trading laws enforcement. We find cash holdings decrease after initial enforcement of insider trading laws in both countries with strong ( $-0.149$ ,  $t = -2.54$ ) and weak ( $-0.161$ ,  $t = -3.15$ ) legal enforcement quality. However, the differences in the coefficients of  $POST \times ITL$  between the two subsamples are not significant (F-value = 0.01; p-value = 0.9185). We also partition the sample into developed and emerging markets. We categorize whether the country is an emerging market based on data from the World Bank. We find negative coefficients of  $POST \times ITL$  in both markets. But the differences in the coefficients of  $POST \times ITL$  between the two subsamples are not significant either (F-value = 1.20; p-value = 0.2737).

Panel B reports results using the IFRS sample. Consistent with previous studies, we find a more pronounced decrease in cash holdings in countries with stronger enforcement quality and in countries that have a larger difference between local GAAP and IFRS. The coefficient of  $POST \times IFRS$  for firms in countries with stronger enforcement quality is significantly negative ( $-0.105$ ,  $t = -2.48$ ), and for firms in countries with weaker enforcement quality, it is insignificant ( $-0.029$ ,  $t = -0.51$ ). The difference between the subsamples is also significant (F-value = 7.14; p-value = 0.0075).<sup>14</sup> In countries with a larger GAAP

<sup>14</sup> We also exclude the U.K. from the subsample of countries with stronger enforcement quality and find the results are qualitatively similar.

**TABLE 7**  
**Strength of Information Shocks and the Change of Corporate Cash Holdings**  
**Legal Enforcement Quality**

**Panel A: Change in Corporate Cash Holdings after Initial Enforcement of Insider Trading Laws**

	Partition Variable = <i>Legal Enforcement Quality</i>		Partition Variable = <i>Emerging Market</i>	
	Strong	Weak	Yes	No
$POST \times ITL$	-0.149** (-2.54)	-0.161*** (-3.15)	-0.214*** (-2.86)	-0.136*** (-3.01)
Other Variables included in Table 3	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.386	0.270	0.3122	0.329
n	7,966	11,835	5,356	14,445
Test of the difference in the coefficient of $POST \times ITL$ :				
	Strong – Weak		Large – Small	
F-value	0.01		1.20	
p-value	0.9185		0.2737	

**Panel B: Change in Corporate Cash Holdings after Mandatory IFRS Adoption**

	Partition Variable = <i>Legal Enforcement Quality</i>		Partition Variable = <i>GAAP Difference</i>	
	Strong	Weak	Large	Small
$POST \times IFRS$	-0.105** (-2.48)	-0.029 (-0.51)	-0.127*** (-2.80)	-0.022 (-0.44)
Other Variables included in Table 3	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.312	0.337	0.349	0.294
n	17,149	8,619	13,375	12,393
Test of the difference in the coefficient of $POST \times IFRS$ :				
	Strong – Weak		Large – Small	
F-value	7.14***		7.49***	
p-value	(0.0075)		(0.0062)	

\*\*\*, \*\* Indicate significance levels of 1 percent and 5 percent, respectively.

Panel A presents results using ITL enforcement sample, and Panel B presents results using IFRS sample. The dependent variable in all of the regressions is  $\ln CASH$ , defined as the natural logarithm of the ratio of cash and cash equivalent to net assets. To save space, only the coefficients and t-statistics of  $POST \times IFRS$  ( $POST \times ITL$ ) are reported. Legal enforcement quality is measured as the average score of the efficiency of the judicial system, rule of law, and corruption from La Porta et al. (1998). GAAP difference is defined as the sum of differences between local GAAP and IFRS in 21 accounting Rules (Bae et al. 2008). Emerging market and developed market category are based on data from the World Bank. We sort each country into strong and weak enforcement groups based on the country-level median value of the legal enforcement quality score, and into large and small GAAP difference groups based on the country-level median value of the GAAP difference. t-statistics are reported in parentheses, and are based on standard errors adjusted for clustering at the country level.

difference, the coefficient of  $POST \times IFRS$  is  $-0.127$  ( $t = -2.80$ ), which is significantly lower than the insignificant coefficient of  $POST \times IFRS$  ( $-0.022$ ,  $t = -0.44$ ) in countries with a smaller GAAP difference (F-value = 7.49; p-value = 0.0062).

## V. ADDITIONAL ANALYSIS

As discussed before, the information environment can affect corporate cash holdings through a precautionary savings channel and/or through an agency problem channel. The baseline results reported in Table 3 can be due to reduced

precautionary savings motive after the information shocks. Alternatively, the results could be driven by a reduced private benefit of cash holdings after information shocks, resulting in firms holding less cash. It is also possible that reduced agency problems increase cash holdings by forcing managers to cut overinvestment and reducing the need to pay dividends (Harford et al. 2008; Hail et al. 2014), but the effect is weaker than that of the reduced precautionary savings motive. In this section, we conduct several analyses to further highlight the channels through which the improvement in information environment affects cash holdings.

### Cross-Sectional Variation in the Change in Corporate Cash Holdings

We first test the cross-sectional variation in the change of cash holdings after the information environment shocks to further examine the channels. Following DeFond, Hung, S. Li, and Y. Li (2015), we partition the sample based on conditioning variables into subsamples and then compare the difference in the coefficients of  $POST \times ITL/IFRS$  from the baseline regressions estimated within each subsample.

#### *The Precautionary Savings Motive Channel*

The precautionary savings motive hypothesis argues that firms save cash to insure against a shortfall in internal funds that will prevent them from investing in profitable projects due to the high cost of external financing. Thus the precautionary savings motive should be stronger when the risk of inadequate internal funds is greater. If the information shocks reduce cash holdings through the precautionary savings motive channel, then the effect should be more pronounced for firms with higher precautionary savings demand. Acharya et al. (2007) and Duchin (2010) argue that such risk is higher when a firm has a more volatile internal cash flow and/or more volatile investment opportunities. In addition, the risk is higher if the correlation between internal cash flow and investment opportunities is low (i.e., if firms tend to have low internal cash flow when investment opportunities arrive).

We use three proxies to measure the precautionary savings incentives following Almeida, Campello, and Weisbach (2011) and Duchin (2010)—the standard deviation of the industry (three-digit SIC) median operating cash flow ( $IND\_STDCFO$ ), the standard deviation of industry investment opportunities proxied by the industry median Tobin's Q ( $IND\_STDQ$ ), and the negative of the correlation between the industry median operating cash flow and industry median Tobin's Q ( $NEG\_IND\_CORR$ ). To avoid the potential effect of IFRS adoption on these variables, we use the data in the ten years before the IFRS adoption year to compute these variables. The fourth measure for precautionary savings demand is a composite index; we first convert  $IND\_STDCFO$ ,  $IND\_STDQ$ , and  $NEG\_IND\_CORR$  into percentiles within each year and then compute the composite index,  $PS\_DEMAND$ , as the average of the three individual percentiles.<sup>15</sup>

The results for ITL enforcement firms are presented in Panel A, Table 8. When the precautionary savings incentive is measured with composite index  $PS\_DEMAND$ , the  $POST \times ITL$  coefficient is more pronounced in the subsample with high precautionary savings demand ( $-0.239$ ,  $t = -3.41$ ), and the two subsamples are significantly different (F-value = 14.58; p-value = 0.0001). We also find consistent results when using the individual measure  $IND\_STDCFO$ . We find that the cash holdings decrease in both subsamples after the initial enforcement of insider trading laws when we use  $IND\_STDQ$  and  $NEG\_IND\_CORR$  as a proxy for precautionary savings demand; however, the declines are not reliably different between the subsamples.

The results for the IFRS sample are presented in Panel B and are generally similar to those in Panel A. The coefficient of  $POST \times IFRS$  is significantly negative for firms with higher precautionary savings demand ( $-0.162$ ,  $t = -2.70$ ) and is insignificant for firms with lower precautionary savings demand ( $0.047$ ,  $t = 0.87$ ). This finding suggests that the effect of IFRS adoption on corporate cash holdings is concentrated in firms with higher precautionary savings demand when it is measured by the composite score  $PS\_DEMAND$ . Furthermore, the difference between subsamples is significant (F-value = 27.34; p-value = 0.0001).

We also use the three individual measures of precautionary savings demand to partition the sample. The results are largely consistent with those obtained using the composite measure. The exceptions are the results from the partition based on  $NEG\_IND\_CORR$ , which show that the coefficient of  $POST \times IFRS$  is insignificant in both samples. Overall, the results are consistent with the notion that information environment shocks decrease corporate cash holdings by reducing precautionary savings motive.

<sup>15</sup> Related to our tests, Opler et al. (1999) provide a discussion on how financial constraints affect firms' cash holdings out of the precautionary savings incentive. They argue that, in financially constrained firms, an agency cost of debt arises because the interests of shareholders differ from those of the debtholders and the interests differ among different classes of debtholders. The agency cost of debt makes it expensive to raise additional funds, thus incentivizes firms to hold more cash. Consistent with our conjecture, with common financial constraint measures (including firm size, WW-index, and KZ-index), we find that financially constrained firms reduce cash holdings more after the informational shocks.



**TABLE 8**  
**Cross-Sectional Variation in the Change of Corporate Cash Holdings**  
**Precautionary Savings Demand**

**Panel A: Change in Corporate Cash Holdings after Initial Enforcement of Insider Trading Laws**

	Partition Variable = <i>PS_DEMAND</i>		Partition Variable = <i>IND_STDCF0</i>		Partition Variable = <i>IND_STDQ</i>		Partition Variable = <i>NEG_IND_CORR</i>	
	High	Low	High	Low	High	Low	High	Low
<i>POST</i> × <i>ITL</i>	-0.239*** (-3.41)	-0.056 (-0.81)	-0.220*** (-3.26)	-0.036 (-1.38)	-0.127* (-1.92)	-0.165** (-2.35)	-0.168** (-2.47)	-0.144** (-2.12)
Other Variables included in Table 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.378	0.293	0.353	0.334	0.395	0.272	0.375	0.311
n	6,482	6,393	6,478	6,397	6,488	6,387	6,312	6,563
Test of the difference in the coefficient of <i>POST</i> × <i>ITL</i> between the High and Low subsamples:								
F-value	14.58***		10.16***		1.81		0.13	
p-value	[0.0001]		[0.0014]		[0.1782]		[0.7193]	

**Panel B: Change in Corporate Cash Holdings after Mandatory IFRS Adoption**

	Partition Variable = <i>PS_DEMAND</i>		Partition Variable = <i>IND_STDCF0</i>		Partition Variable = <i>IND_STDQ</i>		Partition Variable = <i>NEG_IND_CORR</i>	
	High	Low	High	Low	High	Low	High	Low
<i>POST</i> × <i>IFRS</i>	-0.162*** (-2.70)	0.047 (0.87)	-0.189*** (-3.20)	0.076 (1.39)	-0.147** (-2.50)	0.031 (0.57)	-0.054 (-0.91)	-0.048 (-0.87)
Other Variables included in Table 3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.295	0.275	0.300	0.270	0.295	0.289	0.320	0.310
n	9,147	9,795	9,189	9,753	9,243	9,699	9,227	9,715
Test of the difference in the coefficient of <i>POST</i> × <i>IFRS</i> between the High and Low subsamples:								
F-value	27.34***		34.30***		18.27*		1.65	
p-value	[0.0001]		[0.0001]		[0.0001]		[0.1986]	

\*\*\*, \*\*, \* Indicate significance levels of 1 percent, 5 percent, and 10 percent, respectively.

Panel A presents results using the ITL enforcement sample. Panel B presents results using the IFRS sample. The dependent variable in all of the regressions is *lnCASH*, defined as the natural logarithm of the ratio of cash and cash equivalents to net assets. To save space, only the coefficients and t-statistics of *POST* × *IFRS* (*POST* × *ITL*) are reported. *IND\_STDCF0* is the standard deviation of the industry median operating cash flows. *IND\_STDQ* is the standard deviation of the industry median Tobin's Q. *NEG\_IND\_CORR* is the negative correlation between industry median operating cash flows and industry median Tobin's Q. To compute *PS\_DEMAND*, we first convert *IND\_STDCF0*, *IND\_STDQ*, and *NEG\_IND\_CORR* into within-year percentiles. *PS\_DEMAND* is the mean value of the percentile ranks of *IND\_STDCF0*, *IND\_STDQ*, and *NEG\_IND\_CORR*. t-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level.

***The Agency Motive Channel***

As discussed in earlier sections, a more severe agency problem can lead to either a higher or lower level of cash holdings. On one hand, a more severe agency problem may imply a higher private benefit of holding cash and motivate managers to hold more cash reserves (Dittmar et al. 2003). On the other hand, a more severe agency problem may imply that managers quickly spend cash through overinvesting, leading to a lower level of cash reserves (Harford et al. 2008). If the information environment improvement reduces the private benefit of holding cash, then we expect to observe a more pronounced decrease in cash holdings for firms with more severe agency problems after the shocks. In contrast, if the information shocks reduce firms' waste of cash through overinvesting and the need to mitigate agency problems by paying dividends, then we expect to

**TABLE 9**  
**Cross-Sectional Variation in the Change of Corporate Cash Holdings**  
**Agency Problem**

**Panel A: Change in Corporate Cash Holdings after ITL**

	Partition Variable = <i>Inside Ownership</i>	
	High [1]	Low [2]
$POST \times ITL$	-0.225*** (-3.01)	-0.027 (-0.41)
Industry and Country Fixed Effects	Yes	Yes
Adj. R <sup>2</sup>	0.3031	0.3137
n	5,868	8,076
Test of the difference in the coefficient of $POST$ :		
F-value	10.37	
p-value	[0.0013]	

**Panel B: Change in Corporate Cash Holdings after Mandatory IFRS Adoption**

	Partition Variable = <i>Inside Ownership</i>	
	High [1]	Low [2]
$POST \times IFRS$	-0.105** (-2.24)	0.089 (1.27)
Industry and Country Fixed Effects	Yes	Yes
Adj. R <sup>2</sup>	0.3562	0.3426
n	6,946	6,671
Test of the difference in the coefficient of $POST$ :		
F-value	16.13	
p-value	[< 0.0001]	

\*\*\*, \*\* Indicate significance levels of 1 percent and 5 percent, respectively.

Panel A presents results using the ITL enforcement sample. Panel B presents results using the IFRS sample. The dependent variable in all of the regressions is  $\ln CASH$ , defined as the natural logarithm of the ratio of cash and cash equivalents to net assets. To save space, only the coefficients and t-statistics of  $POST \times IFRS$  ( $POST \times ITL$ ) are reported. *Inside Ownership* is the percentage of closely held shares in total common shares outstanding. t-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level.

observe a less pronounced decrease, or even an increase, in cash holdings for firms with more severe agency problems after information shocks.

We measure the severity of agency problems by inside ownership, defined as the percentage of closely held shares relative to total shares outstanding. Agency problems are perceived as more severe in firms with higher inside ownership (Jensen and Meckling 1976; Opler et al. 1999; Hail et al. 2014). We separate our sample into subsamples with high and low inside ownership, based on the median level of inside ownership of the sample firms.

The results are reported in Table 9. In Panel A, we find that a decrease in corporate cash holdings is more pronounced in firms with high inside ownership using the ITL sample. The coefficient of  $POST \times ITL$  is significantly negative (-0.225,  $t = -3.01$ ) for the firms with high inside ownership. In contrast, the coefficient of  $POST \times ITL$  for firms with low inside ownership is insignificant (-0.027,  $t = -0.41$ ). The difference in the coefficient of  $POST \times ITL$  between the two subsamples is highly significant (F-value = 10.37; p-value = 0.0013).

Panel B reports the results using the IFRS sample, and the inference is qualitatively similar. The decrease in cash holdings is significant only in firms with high inside ownership. The coefficient of  $POST \times IFRS$  is negative and significant at the 5 percent level (-0.105,  $t = -2.24$ ). The change in cash holdings for firms with low inside ownership is insignificantly positive (0.089,  $t = 1.27$ ). The difference in the coefficient of  $POST \times IFRS$  between the two subsamples is also highly significant (F-value = 16.13; p-value < 0.0001).

The findings in Table 9 suggest that the information shocks reduce corporate cash holdings through the agency problem channel by reducing the private benefits of holding excessive cash reserves. Collectively, both a reduced precautionary savings incentive and mitigated agency problems motivate firms to reduce cash holdings after the initial enforcement of insider trading laws and IFRS adoption.

### Informational Events and Economic Consequences of Cash Holdings

In this section, we conduct a direct test to highlight the mechanism through which the two events affect the economic consequence of cash holdings. Our main hypothesis predicts that firms decrease cash holdings because the benefit of cash holdings is lower when the information environment improves. Based on the precautionary savings hypothesis, the benefit of cash holdings lies in mitigating underinvestment in the future due to an inability to raise funds from the spot market when investment opportunities arrive. According to the agency hypothesis, managers hold cash for private benefit from overinvestment in the future (Harford et al. 2008). As the information environment improves, it is easier for firms to raise external capital from the spot market in the future. Therefore, future investment will depend less on current cash holdings. The improved information environment also facilitates monitoring so that the private benefit from overinvestment of internal fund becomes smaller. Thus, the managers have less incentive for overinvesting even if cash holdings are high. According to both the precautionary savings hypothesis and the agency hypothesis, future investment will be less sensitive to current cash holdings after the informational events.

We test this prediction with following regression:

$$\begin{aligned} INVESTMENT_{i,t+1} = & (a_1POST + a_2POST \times ITL/IFRS_i + Country\ Fixed\ Effects) \\ & + (b_1POST + b_2POST \times ITL/IFRS_i + Country\ Fixed\ Effects) \times lnCASH_{i,t} + Controls \\ & + Industry\ Fixed\ Effects + \varepsilon_{i,t} \end{aligned} \quad (2)$$

*INVESTMENT* is measured as the sum of net capital expenditure and acquisitions, scaled by lagged total assets. Following previous studies, we control for investment opportunity as measured by Tobin's Q (*Q*), operating cash flow (*CFO*), and firm size (*lnTA*) in the regression. With Equation (2), we predict a significantly negative coefficient on  $b_2$  after the informational events.

The results are reported in Table 10. The results reveal a reliable decrease in the sensitivity of investment to cash after the information shock for treatment firms. In particular, in Column [1], the coefficient on  $lnCASH \times POST \times ITL$  is significantly negative ( $-0.043$ ,  $t = -1.85$ ). In Column [2], the coefficient on  $lnCASH \times POST \times IFRS$  is also significantly negative ( $-0.012$ ,  $t = -3.01$ ). Both findings are consistent with the notion that firms' reliance on cash reserves for investment reduces after the informational events. In other words, cash holdings become less useful in mitigating underinvestment and/or acquiring private benefits for managers by overinvestment, indicating a decline in the benefit of cash holdings.<sup>16</sup>

## VI. CONCLUSIONS

This study examines whether a change in the information environment affects corporate cash holdings and how the change in the information environment affects firms' investment behaviors. Using a difference-in-differences approach and two exogenous shocks—initial enforcement of insider trading laws and mandatory IFRS adoption—we find that firms significantly reduce their cash holdings after their information environment is improved. The decrease occurs shortly after the informational events and the effect lasts for at least three years. For IFRS adoption, the decline in cash holdings is larger when enforcement of the regulatory changes is more credible (i.e., in countries whose enforcement quality is higher); however, we do not find that the effect of the initial enforcement of insider trading laws on cash holdings differs significantly between strong and weak enforcement regimes.

We find the information shock affects cash holdings via both channels of precautionary savings incentive and agency incentive, as we find the decrease in cash holdings is larger in firms operating in industries with higher precautionary savings demand (i.e., with more volatile cash flow and/or more volatile investment opportunities) and in firms with more agency conflicts (i.e., with more insider ownership). Furthermore, we find that after the initial enforcement of insider trading laws and mandatory IFRS adoption, firms' investments become less sensitive to cash holdings, thus cash reserves are less valuable as a means of mitigating future underinvestment problems and in acquiring private benefits for managers.

<sup>16</sup> The results are similar when we replace (logarithm of) raw cash holdings with excess cash holdings, defined as the residual term from annual cross-sectional regressions of cash holdings on Tobin's Q (*Q*), firm size (*lnTA*), operating cash flow (*CFO*), net working capital (*NWC*), leverage (*LEV*), industry cash flow volatility (*SIGMA*), number of business segments (*NSEG*), and country and industry fixed effects. When we use excess cash, instead of (logarithm of) raw cash holdings, we control for the expected level of cash holdings for each firm after taking common cash holdings determinants into account.

**TABLE 10**  
**Informational Events and Investment to Cash Holdings Sensitivity**

Independent Variables	ITL Sample [1]	IFRS Sample [2]
<i>POST</i>	0.003 (0.06)	-0.004 (-0.96)
<i>POST</i> × <i>ITL/IFRS</i>	0.065 (0.85)	-0.007 (-1.15)
<i>lnCASH</i> × <i>POST</i>	0.000 (0.03)	-0.004*** (-2.65)
<i>lnCASH</i> × <i>POST</i> × <i>ITL/IFRS</i>	-0.043* (-1.85)	-0.012** (-3.01)
<i>Q</i>	0.008 (0.82)	0.011*** (13.61)
<i>lnTA</i>	-0.002 (-0.34)	0.002*** (4.81)
<i>CFO</i>	0.083 (0.98)	0.044*** (8.97)
<i>NWC</i>	-0.020 (-0.33)	-0.026*** (-6.04)
<i>LEV</i>	0.071 (1.05)	0.053*** (9.01)
<i>SIGMA</i>	0.934* (1.72)	0.078*** (2.76)
<i>NSEG</i>	-0.010* (-1.68)	-0.002*** (-4.09)
<i>lnCASH</i> × Country Fixed Effects	Yes	Yes
Country Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Adj. R <sup>2</sup>	0.0731	0.2998
n	18,306	25,326

\*\*\*, \*\*, \* Indicate significance levels of 1 percent, 5 percent, and 10 percent, respectively.

Table 10 presents the regression results of informational events' impact on investment to cash holdings sensitivity. The dependent variable is *INVESTMENT*, measured as net capital expenditures plus acquisitions. *POST* is the indicator for the post-ITL enforcement period or the post-IFRS adoption period. *ITL* is the indicator for the countries initially enforcing insider trading laws, and *IFRS* is the indicator for mandatory IFRS adoption countries. t-statistics are reported in parentheses and are based on standard errors adjusted for clustering at the country level.

Our findings are insightful to corporate managers. With our findings, managers should recognize how the country-level regulations (or institutional factors in general, such as legal protection of investors) offered by policymakers will interact with firm-level measures of hedging needs and agency conflicts in attaining optimal cash management policies for their firms. Our findings also identify contexts in which firms can better capture investment opportunities, thus creating value for shareholders. Thus, our findings are also value relevant to external investors.

## REFERENCES

- Acharya, V. V., H. Almeida, and M. Campello. 2007. Is cash negative debt? A hedging perspective on corporate financial policies. *Journal of Financial Intermediation* 16 (4): 515–554.
- Almeida, H., M. Campello, and M. S. Weisbach. 2004. The cash flow sensitivity of cash. *The Journal of Finance* 59 (4): 1777–1804.
- Almeida, H., M. Campello, and M. S. Weisbach. 2011. Corporate financial and investment policies when future financing is not frictionless. *Journal of Corporate Finance* 17 (3): 675–693.
- Bae, K. H., H. Tan, and M. Welker. 2008. International GAAP differences: The impact on foreign analysts. *The Accounting Review* 83 (3): 593–628.

- Bates, T. W., K. M. Kahle, and R. M. Stulz. 2009. Why do U.S. firms hold so much more cash than they used to? *The Journal of Finance* 64 (5): 1985–2021.
- Bhattacharya, U. 2014. Insider trading controversies: A literature review. *Annual Review of Financial Economics* 6 (1): 385–403.
- Bhattacharya, U., and H. Daouk. 2002. The world price of insider trading. *The Journal of Finance* 57 (1): 75–108.
- Biddle, G. C., C. M. Callahan, H. A. Hong, and R. L. Knowles. 2015. Do adoptions of International Financial Reporting Standards enhance capital investment efficiency? Available at : [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2353693](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2353693)
- Bushman, R. M., J. D. Piotroski, and A. J. Smith. 2005. Insider trading restrictions and analysts' incentives to follow firms. *The Journal of Finance* 60 (1): 35–66.
- Byard, B., Y. Li, and Y. Yu. 2011. The effect of mandatory IFRS adoption on financial analysts' information environment. *Journal of Accounting Research* 49 (1): 69–96.
- Campello, M., J. R. Graham, and C. R. Harvey. 2010. The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics* 97 (3): 470–487.
- Chen, H., Z. Chen, D. S. Dhaliwal, and Y. Huang. 2017a. Accounting restatements and corporate cash policy. *Journal of Accounting, Auditing & Finance*.
- Chen, Q., X. Chen, K. Schipper, Y. Xu, and J. Xue. 2012. The sensitivity of corporate cash holdings to corporate governance. *Review of Financial Studies* 25 (12): 3610–3644.
- Chen, T. Y., C. L. Chin, S. Wang, and C. Yao. 2015. The effects of financial reporting on bank loan contracting in global markets: Evidence from mandatory IFRS adoption. *Journal of International Accounting Research* 14 (2): 45–81.
- Chen, Z., Y. Huang, Y. Kusnadi, and K. J. Wei. 2017b. The real effect of the initial enforcement of insider trading laws. *Journal of Corporate Finance* 45: 687–709.
- Cheng, M., D. Dhaliwal, and Y. Zhang. 2013. Does investment efficiency improve after the disclosure of material weaknesses in internal control over financial reporting? *Journal of Accounting and Economics* 56 (1): 1–18.
- Christensen, H. B., L. Hail, and C. Leuz. 2013. Mandatory IFRS reporting and changes in enforcement. *Journal of Accounting and Economics* 56 (2/3): 147–177.
- Chung, K. H., J. C. Kim, Y. S. Kim, and H. Zhang. 2015. Information asymmetry and corporate cash holdings. *Journal of Business Finance & Accounting* 42 (9/10): 1341–1377.
- Dasgupta, S., T. H. Noe, and Z. Wang. 2011. Where did all the dollars go? The effect of cash flows on capital and asset structure. *Journal of Financial and Quantitative Analysis* 46 (5): 1259–1294.
- Daske, H., L. Hail, C. Leuz, and R. S. Verdi. 2008. Mandatory IFRS reporting around the world: Early evidence on the economic consequences. *Journal of Accounting Research* 46 (5): 1085–1142.
- Daske, H., L. Hail, C. Leuz, and R. S. Verdi. 2013. Adopting a label: Heterogeneity in the economic consequences around IAS/IFRS adoptions. *Journal of Accounting Research* 51 (3): 495–547.
- De George, E. T., X. Li, and L. Shivakumar. 2016. A review of the IFRS adoption literature. *Review of Accounting Studies* 21 (3): 898–1004.
- DeFond, M., X. Hu, M. Hung, and S. Li. 2011. The impact of mandatory IFRS adoption on foreign mutual fund ownership: The role of comparability. *Journal of Accounting and Economics* 51 (3): 240–258.
- DeFond, M. L., M. Hung, S. Li, and Y. Li. 2015. Does mandatory IFRS adoption affect crash risk? *The Accounting Review* 90 (1): 265–299.
- Denis, D. J., and V. Sibilkov. 2010. Financial constraints, investment, and the value of cash holdings. *Review of Financial Studies* 23 (1): 247–269.
- Denis, D. J., and J. Xu. 2013. Insider trading restrictions and top executive compensations. *Journal of Accounting and Economics* 56 (1): 91–112. [h](#)
- Dittmar, A., J. Mahrt-Smith, and H. Servaes. 2003. International corporate governance and corporate cash holdings. *Journal of Financial and Quantitative Analysis* 38 (1): 111–133.
- Duchin, R. 2010. Cash holdings and corporate diversification. *The Journal of Finance* 65 (3): 955–992.
- Fama, E. F., and K. R. French. 1997. Industry costs of equity. *Journal of Financial Economics* 43 (2): 153–193.
- Fernandes, N., and M. A. Ferreira. 2009. Insider trading laws and stock price informativeness. *Review of Financial Studies* 22 (5): 1845–1887.
- Fishman, M. J., and K. M. Hagerty. 1992. Insider trading and the efficiency of stock prices. *The RAND Journal of Economics* 23 (1): 106–122.
- Fresard, L. 2010. Financial strength and product market behavior: The real effects of corporate cash holdings. *The Journal of Finance* 65 (3): 1097–1122.
- Gatchev, V. A., T. Pulvino, and V. Tarhan. 2010. The interdependent and inter-temporal nature of financial decisions: An application to cash flow sensitivities. *The Journal of Finance* 65 (2): 725–763.
- Glaeser, S., and W. R. Guay. 2017. Identification and generalizability in accounting research: A discussion of Christensen, Floyd, Liu, and Maffett (2017). *Journal of Accounting and Economics* 64 (2/3): 305–312.

- Hail, L., A. Tahoun, and C. Wang. 2014. Dividend payouts and information shocks. *Journal of Accounting Research* 52 (2): 403–456.
- Harford, J., S. Mansi, and W. Maxwell. 2008. Corporate governance and firm cash holdings in the U.S. *Journal of Financial Economics* 87 (3): 535–555.
- Hong, H. A. 2013. Does mandatory adoption of international financial reporting standards decrease the voting premium for dual-class shares? *The Accounting Review* 88 (4): 1289–1325.
- Hong, H. A., M. Hung, and G. J. Lobo. 2014. The impact of mandatory IFRS adoption on IPOs in global capital markets. *The Accounting Review* 89 (4): 1365–1397.
- Huang, Y., S. Elkinawy, and P. K. Jain. 2013. Investor protection and cash holdings: Evidence from U.S. cross-listing. *Journal of Banking & Finance* 37 (3): 937–951.
- Hung, M., X. Li, and S. Wang. 2015. Post-earnings-announcement drift in global markets: Evidence from an information shock. *Review of Financial Studies* 28 (4): 1242–1283.
- Jensen, M., and W. H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3 (4): 305–360.
- Kalcheva, I., and K. V. Lins. 2007. International evidence on cash holdings and expected managerial agency problems. *Review of Financial Studies* 20 (4): 1087–1112.
- Khurana, I. K., X. Martin, and R. Pereira. 2006. Financial development and the cash flow sensitivity of cash. *Journal of Financial and Quantitative Analysis* 41 (4): 787–808.
- Kim, J. B., X. Liu, and L. Zheng. 2012. The impact of mandatory IFRS adoption on audit fees: Theory and evidence. *The Accounting Review* 87 (6): 2061–2094.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny. 1998. Law and finance. *Journal of Political Economy* 106 (6): 1113–1155.
- Li, S. 2010. Does mandatory adoption of International Financial Reporting Standards in the European Union reduce the cost of equity capital? *The Accounting Review* 85 (2): 607–636.
- Li, X., and H. I. Yang. 2016. Mandatory financial reporting and voluntary disclosure: The effect of mandatory IFRS adoption on management forecasts. *The Accounting Review* 91 (3): 933–953.
- Miller, M. H., and F. Modigliani. 1961. Dividend policy, growth, and the valuation of shares. *The Journal of Business* 34 (4): 411–433.
- Naranjo, P. L., D. Saavedra, and R. S. Verdi. 2018. *The pecking order and financing decisions: Evidence from changes to financial reporting regulation*. Available at:
- Neamtiu, M., N. Shroff, H. D. White, and C. D. Williams. 2014. The impact of ambiguity on managerial investment and cash holdings. *Journal of Business Finance & Accounting* 41 (7/8): 1071–1099.
- Opler, T., L. Pinkowitz, R. Stulz, and R. Williamson. 1999. The determinants and implications of corporate cash holdings. *Journal of Financial Economics* 52 (1): 3–46.
- Ozkan, N., Z. V. I. Singer, and H. You. 2012. Mandatory IFRS adoption and the contractual usefulness of accounting information in executive compensation. *Journal of Accounting Research* 50 (4): 1077–1107.
- Pinkowitz, L., R. M. Stulz, and R. Williamson. 2003. Do firms in countries with poor protection of investor rights hold more cash? *NBER working paper*.
- Preiato, J., P. Brown, and A. Tarca. 2015. A comparison of between-country measures of legal setting and enforcement of accounting standards. *Journal of Business Finance & Accounting* 42 (1/2): 1–50.
- Roberts, M. R., and T. M. Whited. 2013. *Endogeneity in Empirical Corporate Finance. Handbook of the Economics of Finance*. North Holland, The Netherlands: Elsevier.
- Schleicher, T., A. Tahoun, and M. Walker. 2010. IFRS adoption in Europe and investment-cash flow sensitivity: Outsider versus insider economies. *The International Journal of Accounting* 45 (2): 143–168.
- Stulz, R. 1990. Managerial discretion and optimal financing policies. *Journal of Financial Economics* 26 (1): 3–27.
- Tirole, J. 2006. *The Theory of Corporate Finance*. Princeton, NJ: Princeton University Press.
- Yip, R. W. Y., and D. Young. 2012. Does mandatory IFRS adoption improve information comparability? *The Accounting Review* 87 (5): 1767–1789.

**APPENDIX A**  
**Variable Definitions**

Variable	Definition	Sources
<i>lnCASH</i>	The natural logarithm of cash and cash equivalents divided by total net assets, where total net assets are defined as the book value of total assets minus cash and cash equivalents.	Worldscope
<i>POST</i>	Dummy variable, equal to 1 for the post-adoption/post-enforcement period, and 0 otherwise.	Worldscope
<i>IFRS</i>	Dummy variable used in the IFRS sample, equal to 1 for the IFRS firms, and 0 otherwise.	Worldscope
<i>ITL</i>	Dummy variable used in the insider trading laws sample, equal to 1 for countries that initially enforce insider trading laws, and 0 otherwise.	Bhattacharya and Daouk (2002)
<i>CFO</i>	Operating cash flow, defined as the net operating cash flow divided by net total assets.	Worldscope
<i>Q</i>	Tobin's Q, defined as market value of total assets to book value of total assets, where the market value of total assets is defined as the book value of total assets plus the difference between the market value of equity and the book value of equity.	Worldscope
<i>lnTA</i>	Natural logarithm of total assets in U.S. dollars.	Worldscope
<i>NWC</i>	Net working capital, defined as the noncash working capital divided by net total assets.	Worldscope
<i>LEV</i>	Leverage, defined as the sum of long-term debt and short-term debt divided by total assets.	Worldscope
<i>SIGMA</i>	Industry volatility of operating cash flow, defined as the median value of the standard deviation of the operating cash flow of all firms in the same industry over the past ten years.	Worldscope
<i>NSEG</i>	Number of business segments with identifiable assets greater than zero.	Worldscope
<i>CAPX</i>	Capital expenditure, defined as capital expenditure divided by net total assets.	Worldscope
<i>ACQ</i>	Acquisition expenditure, defined as acquisition expenditure divided by net total assets.	Worldscope
<i>ΔNWC</i>	Annual change in noncash net working capital.	Worldscope
<i>ΔSTD</i>	Annual change in short-term debt, where short-term debt is defined as short-term debt divided by net total assets.	Worldscope
<i>INVESTMENT</i>	Investment, defined as net capital expenditure plus acquisitions, divided by lagged total assets.	Worldscope
<i>XF</i>	Total external financing, defined as the sum of equity issuance and debt issuance, divided by lagged total assets.	Worldscope
<i>PS_DEMAND</i>	Mean value of the percentile ranks of <i>IND_STDCFO</i> , <i>IND_STDQ</i> , and <i>NEG_IND_CORR</i> . Firms with values above (below) the sample median are defined as firms having high (low) precautionary savings demand.	Worldscope
<i>IND_STDCFO</i>	Standard deviation of the industry median operating cash flows over the past ten years. Firms with standard deviations above (below) the sample median are defined as firms having high (low) precautionary savings demand.	Worldscope
<i>IND_STDQ</i>	Standard deviation of the industry median Tobin's Q over the past ten years. Firms with standard deviations above (below) the sample median are defined as firms having high (low) precautionary savings demand.	Worldscope
<i>NEG_IND_CORR</i>	Negative correlation between industry median operating cash flows and industry median Tobin's Q. Firms with standard deviations above (below) the sample median are defined as firms having high (low) precautionary savings demand.	Worldscope
<i>Inside Ownership</i>	The percentage of closely held shares in common shares outstanding. Firms with values above (below) the sample median are defined as firms having high (low) institutional ownership.	Worldscope
<i>ΔEnforcement</i>	Countries with concurrent enforcement change, including Finland, Germany, Iceland, The Netherlands, Norway, and the U.K.	Christensen et al. (2013)
<i>ΔGovernance Effectiveness</i>	The average change in scores measuring corporate board effectiveness and the auditing and accounting practices. Countries with a value greater (smaller) than the median value are placed in the large (small) sample.	Kim et al. (2012)

## APPENDIX A (continued)

<b>Variable</b>	<b>Definition</b>	<b>Sources</b>
<i>Legal Enforcement Quality</i>	Average score of the efficiency of the judicial system, rule of law, and corruption. Countries with enforcement values above (below) the sample median are defined as firms having strong (weak) enforcement quality countries.	<a href="#">La Porta et al. (1998)</a>
<i>GAAP Difference</i>	The number of differences between local GAAP and IFRS in 21 accounting rules. Countries with values larger (smaller) than the median are defined as having large (small) difference.	<a href="#">Bae et al. (2008)</a>