Corporate social responsibility and corporate cash holdings

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PII: S0929-1199(16)00009-2
DOI: doi: 10.1016/j.jcorpfin.2016.01.008
Reference: CORFIN 1004

To appear in: *Journal of Corporate Finance*

Received date: 3 January 2016
Revised date: 11 January 2016
Accepted date: 19 January 2016

Please cite this article as: Cheung, Adrian (Wai Kong), Corporate social responsibility and corporate cash holdings, *Journal of Corporate Finance* (2016), doi: 10.1016/j.jcorpfin.2016.01.008

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ABSTRACT

We identify three channels and the corresponding mechanisms through which corporate social responsibility (CSR) may affect corporate cash holdings. CSR firms are expected to have relatively low cash holdings because they tend to have low idiosyncratic risk due to their higher social capital with stakeholders. CSR firms also tend to have low systematic risk due to greater loyalty from CSR investors and/or customers. Lower systematic risk may increase or decrease cash holdings. Although low systematic risk induces firms to reduce their cash holdings, it also induces firms to hold a short debt maturity structure, with higher refinancing risks that higher cash holdings may mitigate. The agency view of CSR argues that entrenched managers in a firm with strong corporate governance may use CSR activities to collude with stakeholders in order to get higher managerial discretion (including cash) to extract private benefits. However, the corporate governance role of CSR implies that CSR is also effective in reducing the agency problems associated with the cash holdings decision. Using 2,364 firms with 14,206 firm-year observations over the period 1991–2011, we establish that the positive effect of CSR on cash holdings via the systematic risk channel is robust, while the effects of CSR via the other two channels are not. Our findings are robust to different estimation methods and alternative measures of cash holdings, CSR, risks and corporate governance.

JEL classification: G30; G32; M14

Keywords: Corporate social responsibility; Cash holdings

Corporate cash holdings and corporate social responsibility

1. Introduction

While the determinants of corporate cash holdings have been widely studied in the literature, the *direct* relationship between corporate social responsibility (CSR) and corporate cash holdings remains largely unexplored. We fill this gap by examining whether and how CSR relates to corporate cash holdings. In particular, we identify and test three channels through which CSR may explain cash holdings. They are the idiosyncratic risk channel, the systematic risk channel, and the corporate governance channel. CSR firms have higher social capital because they tend to have better relationships with stakeholders, providing insurance-like protection that can mitigate harm from negative (especially firm-specific) events, thus reducing the need to maintain cash holdings at a high level. Inelastic demand due to either consumers' loyalty to CSR firms or investors' preference for CSR firms leads to lower systematic risk, which in turn makes CSR firms less sensitive to aggregate shocks. This has two competing effects on cash holdings. On the one hand, low sensitivity to aggregate shocks makes firms less inclined to build up a large cash holding. On the other hand, firms with lower systematic risk tend to have a shorter debt maturity structure and thus a higher refinancing risk, suggesting that a higher cash holding is required to mitigate the refinancing risk. The corporate governance channel may strengthen or weaken the association between CSR and cash holding. First, the corporate government role of CSR implies that CSR is also effective in reducing the agency problems associated with the cash holdings decision; the stronger the corporate governance is, the lower the level of cash holdings will be. However, the agency view of CSR argues that entrenched managers in a firm with strong corporate governance may use CSR activities to collude with stakeholders in order to get higher managerial discretion (including cash) to extract private benefits.

Using corporate social responsibility measures from Kinder, Lydenberg, and Domini (KLD) of 2,364 firms between 1991 and 2011, we examine the significance and compare the relative importance of these three channels, and find that not all of them are useful in channeling the influence of CSR on cash holdings. Among the three channels through which CSR might affect corporate cash holdings, only the systematic risk channel is a robust; the other channels are not.

Arouri and Pijourlet (2015) (hereafter called A&P (2015)) is closely related to our paper. They examine the impact of CSR on the *value* of cash holdings. In other words, they look at the cash holdings problem from investor's perspective, i.e., how investors expect cash to be used. Using 2,217 firm-year observations[1] of 50 countries over the period 2005 to 2009, they find evidence that investors assign a higher value to cash held by firms that have a high CSR performance. More specifically, in a regression specifying the market value of the firm (i.e., equity and debt) as the dependent variable, with CSR, cash holdings and their interaction term as independent variables, they report a statistically significant and positive coefficient for cash holdings and its interaction term with CSR, but an insignificant and negative coefficient for CSR. In other words, the value of cash holdings is *conditional* on CSR performance.[2] They interpret this result as being consistent with the conflict-resolution view of CSR, i.e., that firms with a high CSR rating allow managers to gain greater stakeholder commitment, leading to a more efficient use of financial resources (including cash, presumably). Our paper is different from theirs in the following ways. First, instead of taking an (indirect) investor's perspective, we look at the cash holdings problem directly from a corporate perspective. The A&P (2015)'s approach is capital market based and relies on some

[1] Their nominal sample size is 4,161 firm-year observations (or 1113 firms). A closer look at their results reveals that the effective sample size is just 2,217 firm-year observations and they base most of their key findings on these.

[2] With obvious notations, the regression may be written as $mv = a_0 + a_1*cash + a_2*csr + a_3*(cash*csr) + \ldots$. The value of cash is captured by $\partial(mv)/\partial(cash) = a_1 + a_3*csr$, where according to Table 4 of A&P (2015) a_1 and a_3 are positive (i.e., 1.750 and 0.504, respectively). In other words, the value of *cash* is *conditional* on and increasing with the level of *csr*. The A&P's interpretation is based on this conditional effect.

strong assumptions (such as stock market efficiency, rationality of and homogeneity in investor behavior, etc.) that may not be shared by all financial economists. For example, the well-known agency cost of debt problem (i.e., conflict of interests between shareholder and bondholders) predicts that shareholders tend to maximize their own interest at the expense of bondholders' interest. When it comes to corporate cash holdings, this agency view predicts that bondholders tend to favor more while shareholders tend to prefer less. In the presence of this kind of conflict of interest, it is not clear whether it is the shareholders, the bondholders or both who are happy to assign a high value to cash holdings. Second, A&P (2015)'s interpretation of the above regression results ignores an important piece of evidence reported in Table 3 of their paper. In particular, Table 3 shows that the correlation between *cash* and *csr* is -0.04 (negative and statistically significant). By incorporating the negative relationship between *cash* and *csr* into the value of cash, one can easily show that the value of cash actually depends on the level of cash in a *negative* way; the higher the cash level, the lower will be the value of cash. In addition, this observation undermines the key findings of A&P (2015) because the value of cash can be *negative* in some plausible situations.[3] Our direct approach is free of these contentious assumptions and interpretation problems. Third, A&P (2015) do not identify specific channels through which CSR affects cash holdings explicitly, but we do. We also examine the relative importance of these channels. Fourth, possibly due to data limitations, A&P (2015) do not control for corporate governance in their analysis, which may impair their main findings because of omitted variable bias. Corporate governance, if not properly controlled for, is known to be related to agency costs and cash holdings negatively, because it helps to alleviate agency problems associated with cash holdings (see, e.g., Dittmar

[3] Consistent with the evidence that *cash* and *csr* are negatively correlated, assume that $csr = b_1 * cash$ where $b_1 < 0$. Substituting this equation for *csr* in the conditional effect, we get $\partial(mv)/\partial(cash) = a_1 + a_3 * csr = a_1 + a_3 * b_1 * cash$. As Table 4 of A&P (2015) reports that a_1 and a_3 are positive (i.e., 1.750 and 0.504, respectively), this implies that $a_3 * b_1 < 0$. This also suggests that $\partial(mv)/\partial(cash)$ can be *negative* if $b_1 * cash$ takes any value less than -3.472.

and Mahrt-Smith, 2007; Yun, 2009; Chen et al., 2012). We control for corporate governance explicitly in this paper.

Our study contributes to the cash holding literature and the CSR literature in three different ways. First, we propose, and find *direct* evidence consistent with, CSR as a determinant of cash holdings that is new to the cash holdings literature; this complements the indirect evidence of A&P (2015). Second, by integrating two separate strands of literature on finance and CSR, we identify and examine three channels through which CSR may affect cash holdings. Third, our study clarifies the relative effectiveness of the various channels through which CSR affects corporate cash holdings. We find evidence supporting the systematic risk channel as a major channel through which CSR can positively affect cash holdings.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature and develops the relevant hypotheses. Section 3 discusses our key variables and data set. Section 4 presents our methodology, and Section 5 reports the empirical results. Finally, Section 6 sets forth our conclusions.

2. Literature review and hypotheses development

The last decade has witnessed a significant increase in academic research devoted to the exploration of possible links between corporate social responsibility and *key* finance decisions or parameters. Recent studies include investment or future cash flows (Manescu and Starica, 2010), systematic risk (Albuquerque et al., 2014), the cost of debt/bank loans (Menz, 2010; Goss and Roberts, 2011), the cost of equity (Dhaliwal et al., 2011; Ghoul et al., 2011), the cost of capital (Hart and Ahuja, 1996; Sharfman and Fernando, 2008), mergers and acquisitions (Deng et al., 2013), and dividend policy (Rakotomavo, 2012; Cheung, Hu and Schwiebert, 2015). However, apart from A&P (2015), which provides evidence on the

indirect relationship between CSR and corporate cash holdings from a market valuation perspective, the *direct* relationship between CSR and corporate cash holdings remains unexplored.

The literature has spawned numerous hypotheses about the determinants of cash holdings. The extant literature indicates that firms hold cash for transaction purposes (Baumol, 1952; Meltzer, 1963; Miller and Orr, 1966). The recent literature also establishes that other motives matter too. They include the precautionary motive (Opler et al., 1999; Bates et al., 2009), the agency cost motive (Jensen, 1986; Mikkelson and Partch, 2003; Pinkowitz et al., 2006; Dittmar and Mahrt-Smith, 2007; Harford et al., 2008), the financial constraint motive (Almeida et al., 2004; Han and Qiu, 2007; Denis and Sibilkov, 2010), the tax motive (Foley et al., 2007), and the diversification motive (Duchin, 2010; Tong, 2011). Other economic determinants include product market competition (Haushalter, Klasa, and Maxwell, 2007; Fresard, 2010), the firm life cycle (Dittmar and Duchin, 2011), and the customer relationship (Itzkowitz, 2013).

By integrating two different lines of literature together, we argue that CSR affects corporate cash holdings via the following three channels.

2.1 The idiosyncratic risk channel

Some scholars argue that CSR may be viewed as a way in which firms accumulate social (or moral) capital over time (Godfrey, 2005; Peloza, 2006; Aoki, 2007; Russo and Perrini, 2010; Antoni and Sacconi, 2011).[4] It works because, by participating in CSR-related activities, firms strengthen and/or maintain a good relationship between (external and

[4] The World Bank defines social capital as the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions. http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALDEVELOPMENT/EXTTSOCIALCAPITAL/0,,contentMDK:20185164~menuPK:418217~pagePK:148956~piPK:216618~theSitePK:401015,00.html (accessed on February 4, 2013).

internal) stakeholders in the form of credibility among customers and investors, trust among employees and suppliers, and a strong social image among communities and regulators.[5]

Luo and Bhattacharya (2009) argue further that CSR lowers idiosyncratic risk, because firms with a higher level of social capital are expected to have a greater ability to absorb (external and internal) shocks. In particular, a good relationship with stakeholders provides these firms with insurance-like protection that stabilizes the demand and supply in times of crisis and increases resilience against shocks, contributing to accelerating their recovery and sustainable growth.

Idiosyncratic risk is connected to cash holdings positively because the precautionary motive for cash holdings is increased for firms whenever their cash flows become riskier (Bates et al., 2009). Thus, our first hypothesis is:

H1: *Firms with high CSR scores tend to have low idiosyncratic risk and small cash holdings.*

2.2 The systematic risk channel

Investors' taste for CSR firms and/or customer loyalty to CSR firms can lower systematic risk. Investors with a taste for CSR firms no longer view investment in CSR firms as investment assets, but as consumption assets, because they can derive utility from holding these assets rather than from their pay-offs (Fama and French, 2007). This investment behavior imputes some kind of inelasticity to the demand curve for CSR stocks. For example, investors may buy or sell these stocks, not because of their risk-adjusted return performance or economic fundamentals, but because of their CSR performance. Similarly, greater customer loyalty to CSR firms means that these firms will face a more loyal (i.e., less price-

[5] This argument is in line with the conflict-resolution view of CSR put forward by A&P(2015). However, as this paper shows later, we cannot find robust evidence that supports this view.

sensitive) demand and have a profit function that is less sensitive to changes in economic fundamentals. This kind of inelasticity makes these stocks less responsive to market-wide shocks, and less prone to systematic risk. This channel therefore indicates that firms with higher CSR scores tend to have lower systematic risk (Luo and Bhattacharya, 2009; Albuquerque et al., 2014; Jo and Na, 2012).

There are two competing views on the relationship between systematic risk and cash holdings. The first view is that a lower systematic risk may decrease cash holdings because it reduces the transaction motive for hoarding cash for various reasons (Palazzo, 2012; Acharya et al., 2013). Palazzo (2012) shows that firms with low correlation with aggregate shocks are less likely to experience a cash-flow shortfall in situations in which they need external financing most and, therefore, are expected to have fewer hedging needs and to hold less cash. Acharya et al. (2013) also argue that systematic risk can affect how firms choose between cash and bank credit lines. Because banks may not be able to guarantee liquidity for all firms at all times, they tend to grant credit lines to those firms with low systematic risk, so that not all firms will ask for funds at the same time. Briefly, this view argues that CSR firms tend to have less systematic risk, and this, in turn, reduces the need to hoard cash, leading to the following hypothesis:

H2a: *Firms with high CSR scores tend to have low systematic risk and, thus, small cash holdings*.

The second view is that a lower systematic risk may lead to a higher level of cash holdings because of refinancing risk. Harford, Klasa and Maxwell (2014) argue that firms with a shorter debt maturity structure face refinancing risk more frequently. To mitigate the risk, they tend to increase their cash holdings. In other words, cash holdings are important in

reducing refinancing risk for firms with short-term debt. Chen, Xu and Yang (2013) show, in a dynamic capital structure model, that firms with higher systematic risk tend to choose a longer debt maturity structure, because a longer debt maturity helps reduce refinancing risk and, thus, lower the costs of financial distress. Taken together, firms with high (low) systematic risk are expected to have a longer (shorter) debt maturity and smaller (larger) refinancing risk with smaller (larger) cash holdings. Thus, we set the following hypothesis:

H2b: *Firms with high CSR scores tend to have low systematic risk and, thus, large cash holdings*.

2.3 The corporate governance channel

On the one hand, CSR may be correlated with corporate governance negatively. The agency theory contends that both CSR activities and cash holdings are expected to be positively correlated because entrenched management tends to build up cash (Jensen, 1986) and engage in CSR activities, to pursue their own interests (Surroca and Tribo, 2008; Jiraporn and Chintrakarn, 2013; Fabrizi, Mallin, and Michelon, 2014; A&P, 2015). However, early studies of this line of research were plagued by the fact that agency cost is not directly observable, and that the moderating role of corporate governance, which may attenuate managerial entrenchment or other forms of agency costs, tended to be ignored or undermined. Recent studies typically support the role of corporate governance, and show that corporate governance is related to cash holdings negatively, because it helps alleviate agency problems associated with cash holdings (see, e.g., Dittmar and Mahrt-Smith, 2007; Yun, 2009; Chen et al., 2012). If entrenched managers are more likely to retain a free cash flow and/or pursue CSR activities, then the levels of cash holdings and CSR engagement are expected to be

lower for firms with good corporate governance. Based on this observation, we set the following hypothesis:

H3a: *Firms with low CSR scores are associated with strong corporate governance and small cash holdings.*

On the other hand, CSR may be also related to corporate governance positively for the following reasons. First, it is interesting to note that a widely used framework, so-called "Environmental, Social, and Corporate Governance" (ESG), which the international investment community uses to assess socially responsible investments, includes corporate governance as one of its building blocks. KLD adopts this framework in constructing its CSR measures. By construction, strong (weak) corporate governance leads to high (low) CSR, other things being equal. Second, Beltratti (2005) argues that CSR and corporate governance are positively related because they are complementary in their shaping of the objective function and the constraints faced by firms. Third, incumbent managers of firms with strong corporate governance may use relationships with stakeholder activists as an effective entrenchment strategy, suggesting that strong corporate governance is associated with high CSR (Cespa and Cestone, 2007; Surroca and Tribo, 2008; Fabrizi et al., 2014). The discussion leads to the following hypothesis:

H3b: *Firms with high CSR scores are associated with strong corporate governance and small cash holdings*.

It is noteworthy that our hypotheses are new to the literature. The fact that the literature has established that CSR may affect the above three channels and that the three channels may

affect corporate cash holdings does not necessarily imply that the above three hypotheses must hold. It is possible that the impact of CSR upon cash holdings via a particular channel is so weak that its overall impact on cash holdings is not statistically significant.

3. Key variables and data

3.1 Measure of corporate social responsibility, risks, and corporate governance

We use corporate social responsibility measures from Kinder, Lydenberg, and Domini (KLD) of 2,888 firms between 1991 and 2011. These KLD measure scores cover seven dimensions: community relations (*com*), corporate governance (*cg*), diversity (*div*), employee relations (*emp*), environment (*env*), human rights (*hum*), and product safety (*pro*). Each dimension is rated yearly based on a number of positive (strength) and negative (weakness) indicators. These indicators are dummy variables that are given a score of 1 if a particular strength (or weakness) is present and otherwise 0. The total number of indicators has varied from 54 in 1991 to the highest of 74 in 2007. The strengths and weaknesses for each ESG dimension are then aggregated to give an overall score for that dimension. Several popular aggregation methods are used in previous studies based on KLD data (e.g., Kempf and Osthoff, 2007; Chatterji et al., 2009). However, Manescu (2011) points out some potential limitations of these aggregation methods, including the lack of comparability across years and dimensions, due to the varying number of indicators over time, and the inflated KLD scores for industries that are not sensitive to certain ESG dimensions (such as the environment, community relations, human rights, and employee relations).

Following Deng et al. (2013), we use the relative aggregation method, which is designed to minimize the potential drawbacks of the KLD data. The formula of the relative aggregation method is shown below:

$$csr_t^i = \frac{\sum_{p=1}^{n_t^i} strength_p^i}{n_t^i} - \frac{\sum_{q=1}^{m_t^i} weakness_q^i}{m_t^i}$$

where csr_t^i is the CSR score for dimension i at time t; $strength_p^i$ is the p[th] strength indicator for dimension i at time t; $weakness_q^i$ is the q[th] strength indicator for dimension i at time t; both indicators are dummy variables that equal 1 if the firm meets strength p or weakness q, otherwise 0; and n_t^i and m_t^i are the total number of strength and weakness indicators, respectively, at time t. As strength (weakness) indicators are first summed up and then averaged each year before the CSR score is computed, this procedure ensures that year-to-year comparisons can be made meaningfully. Note that the CSR score so computed is easy to interpret as, by construction, it lies between -1 and +1. The aggregate CSR score is just a simple average of the CSR scores of the six dimensions with the corporate governance dimension excluded. The exclusion of the corporate governance dimension helps isolate the impact of this dimension when the impact of CSR on the corporate governance channel is estimated.

To construct our measure of corporate governance, we take advantage of the fact that corporate governance is among the seven dimensions of the KLD measures. Thus, we use this dimension to construct the corporate governance measure. In particular, using the relative aggregation method, we compute the corporate governance measure as follows:

$$cg_t = \frac{\sum_{p=1}^{n_t} strength_p}{n_t} - \frac{\sum_{q=1}^{m_t} weakness_q}{m_t}$$

where cg_t is the score for the corporate governance dimension at time t; other variables are similarly defined as in the CSR equation except that now dimension i is confined to the corporate governance dimension only.

Following the literature on idiosyncratic risk (e.g., Ferreira and Laux, 2007; Luo and Bhattacharya, 2009; and Jo and Na, 2012), we use the market model to compute idiosyncratic risk and systematic risk. Using the daily stock returns of the previous twelve months, we run an OLS regression on stock returns with a stock market index[6] and compute the regression coefficient on the stock market index. This coefficient is beta, and we use it as a measure of systematic risk. We also compute idiosyncratic risk as the root mean squared error of the regression.[7]

3.2. Measure of corporate cash holdings and control variables

Our measure of corporate cash holdings is the ratio of cash to assets. It has been employed extensively in the finance literature (e.g., Almeida et al., 2004; Han and Qiu, 2007; Acharya et al., 2013; Palazzo, 2012).[8] We also use a set of standard control variables that are known to be determinants of corporate cash holdings in the literature (e.g., Opler et al., 1999; Dittmar et al., 2003; Bates et al., 2009). They include firm size, book-to-market, leverage, capital expenditure, payouts, research and development expenditure, net working capital, cash flow, cash flow volatility, and retained earnings to total assets. A comprehensive list of variables, definitions, and sources is provided in Appendix 1.

3.3. Data

We obtain financial data from Compustat, and stock market data from CRSP. We begin with 1991 because KLD information on CSR is available from 1991. The sample is restricted

[6] In particular, a value-weighted market index from CRSP called the "CRSP value-weighted index" (*vwretd*) is used.
[7] As shown in the robustness tests section, our main results are robust to an alternative measure of idiosyncratic risk and systematic risk derived from the Fama–French four-factor model.
[8] We do not use excess cash as a measure of corporate cash holdings because it is sensitive to the model of "normal" or "expected" cash specified, and "it is not straight-forward to interpret a change in excess cash, since this may be caused by either a change in total cash or a change in some of the determinants of optimal cash" (Dittmar and Mahrt-Smith, 2007).

to only those firms that have non-missing values for cash holdings, CSR and other key variables. Financial firms with SIC codes 6000–6999 and utility firms with SIC codes 4900–4999 are excluded from the sample. To mitigate the effect of outliers, all the variables (except the CSR variables) are winsorized at their first and ninety-ninth percentiles. Our final sample consists of 2,364 firms with 14,206 firm-year observations.

4. Methodology

To test the research hypotheses, we specify the following empirical model:

$$cash_{it} = \beta_0 + \beta_1 idio_{it} + \beta_2 beta_{it} + \beta_3 cg_{it} + \beta_4 csr_{it} + \sum_{j=5}^{M} \beta_j \, control_{it} + \varepsilon_{it} \quad (1)$$

$$idio_{it} = \alpha_0 + \alpha_1 csr_{it} + \sum_{j=5}^{N} \alpha_j control_{it} + \omega_{it} \quad (2)$$

$$beta_{it} = \theta_0 + \theta_1 csr_{it} + \sum_{j=5}^{P} \theta_j control_{it} + v_{it} \quad (3)$$

$$cg_{it} = \gamma_0 + \gamma_1 csr_{it} + + \sum_{j=5}^{Q} \gamma_j control_{it} + \epsilon_{it} \quad (4)$$

The model consists of four equations. Equation (1) describes how the idiosyncratic risk (*idio*) channel, the unsystematic risk (*beta*) channel, and the corporate governance (*cg*) channel determine corporate cash holdings (*cash*). The presence of corporate social responsibility (*csr*) in equation (1) allows for the possibility that *csr* may have a direct effect on corporate cash holdings. Equations (2) to (4) describe how *csr* affects the idiosyncratic risk channel (Equation (2)), the unsystematic risk channel (Equation (3)), and the corporate governance channel (Equation (4)), respectively. In this model, idiosyncratic risk, systematic risk, and corporate governance are the channels through which *csr* affects cash holdings indirectly. Note that the control variables may overlap with each other in these four equations.

As for estimation, we first use the Maximum Likelihood (ML) method for the empirical model (i.e., Equations (1) to (4)) as a *simultaneous equations model*. One of the advantages of the ML method is that correlations between the error terms across equations are allowed for. As a robustness check, we also use the Two Stage Least Squares (TSLS) estimation method to control for endogeneity. Furthermore, we re-estimate the empirical model with alternative definitions of cash holdings and risks to check whether the results are sensitive to the presence of these data or measurement issues.

The total effect of *csr* on cash holdings can be decomposed into direct and indirect effects. The direct effect is β_4, while the indirect effects are $\beta_1\alpha_1$ from the idiosyncratic risk channel, $\beta_2\theta_1$ from the systematic risk channel, and $\beta_3\gamma_1$ from the corporate governance channel, respectively. To test for the indirect effect of, for example, the idiosyncratic risk channel, the null hypothesis may be set as follows:

$$\text{Ho: } \beta_1\alpha_1 = 0. \qquad (5)$$

Note that an indirect effect (for example, $\beta_1\alpha_1$ from the idiosyncratic risk channel) is determined by how *csr* may affect a particular channel (α_1) and how this channel affects cash holdings (β_1) *jointly*. This also means that it is possible to see that both α_1 and β_1, when tested independently, are statistically significant (insignificant) but are statistically insignificant (significant) when tested *jointly*.

To test for the statistical significance of the joint effect (or indirect effect), we first estimate the indirect effect by multiplying the regression coefficients on key variables (i.e., *idio*, *beta*, *cg*, and *csr*) between the cash holdings equation and a particular channel equation. To illustrate, suppose we are interested in the indirect effect of *csr* on cash holdings via the

idiosyncratic risk channel. The relevant coefficients are the coefficient of idiosyncratic risk from equation (1) (i.e., β_1) and the coefficient of *csr* from equation (2) (i.e., α_1). The indirect effect is just the product of these coefficients, namely, $\alpha_1\beta_1$. Since these regression coefficients are themselves random variables, we need to estimate the standard error of the indirect effect. In principle, Goodman (1960) shows that with the normality assumption in the error terms, the standard error of the indirect effect can be computed exactly as follows:

$$s(\alpha_1\beta_1) = \sqrt{\alpha_1^2 s_{\beta_1}^2 + \beta_1^2 s_{\alpha_1}^2 - s_{\alpha_1}^2 s_{\beta_1}^2} \qquad (6)$$

However, simulation studies show that the multivariate delta method proposed by Sobel (1982, 1986) provides the least unbiased estimates (MacKinnon, Warsi, and Dwyer, 1995; MacKinnon, Lockwood, Hoffman, West and Sheets, 2002). The multivariate delta method approximates the standard errors of transformations of random variables (i.e., α_1 and β_1) using a first-order Taylor approximation. If the sample is large, the test statistic will converge to a normal variable and standard statistical inference can be applied. Note that the delta method may not work well in cases in which the normality assumption is questionable, because the distribution of the product of two random variables (i.e., α_1 and β_1) is not necessarily normal even though these two random variables are normally distributed. To circumvent this issue, we use the bootstrapping method proposed by MacKinnon, Lockwood, and Williams (2004). In particular, we resample the N units *with replacement* from the original sample of N units. For each resample, we estimate the indirect effect in the resampled data. If we repeat the process k times and sort the values of indirect effect estimates from low to high, then we can find the upper and lower bounds of a 100(1-α) per cent confidence interval as the $(\alpha/2)k^{th}$ and $(1 + (1 - \alpha/2)k)^{th}$ values in this sorted distribution.

In our case, we set k = 1000. In practice, the distribution of the indirect effect is typically skewed; this confidence interval can be further improved through bias correction, as shown by MacKinnon et al. (2004). One can reject the null hypothesis if zero does not lie within this bias-corrected confidence interval.

5. Results

5.1. Summary statistics results

Table 1 shows the summary statistics of the key variables. The table shows that the average value of corporate cash holdings (*cash*) is 14% of the total assets. The sample firms show an average CSR score of 0.01, while their scores on idiosyncratic risk (*idio*), systematic risk (*beta*), and corporate governance (*cg*) are 2.05%, 1.14, and -0.13, respectively. In other words, the average CSR firm is a firm without an impressive performance on CSR or corporate governance. Consistent with the findings of Campbell et al. (2001) that individual stocks have become increasingly volatile, they tend to have a relatively high portion of idiosyncratic risk (i.e., 0.0205/0.026 = 78.84%). They also tend to have high systematic risk (i.e., greater than one), meaning that they are also generally riskier than the stock market. The average firm may also be characterized as a large firm (*fsize* = 7.68) with some cash-flow-generating ability (*cfa* = 4%), not much leverage (*lev* = 0.18), and some willingness to spend money on investment (*capxa* = 5%) and research and development (*rnds* = 3%). It is more likely to be a dividend payer (*payer* = 60%); when it pays dividends, the amount is small (*dvpa* = 0.00%). Consistent with the low dividend payout, the retained earnings are quite high (*reta* = 19%).

[Insert Table 1 about here]

Table 2 presents the correlation matrix of the variables. First, we find that the level of corporate cash holdings (*cash*) is positively and significantly correlated with CSR (0.09), suggesting that CSR firms are likely to hold more cash. Note that this finding is in contrast with A&P (2015) that report a negative correlation of -0.04.[9] This also provides a preliminary support to Hypotheses 2b and 3a, which predict a positive correlation between CSR and cash holdings. Second, consistent with the precautionary cash holding motive, cash holdings are correlated with idiosyncratic risk and systematic risk positively. Interestingly, their correlation with idiosyncratic risk happens to be the same as that with systematic risk (i.e., 0.21). Third, cash holdings are not correlated with corporate governance (-0.01), lending little support to the agency cost motive that firms with poor corporate governance (and thus a high agency cost) tend to hold more cash. The level of cash holdings is also positively correlated with the firm's market-to-book ratio (0.15), R&D to sales (0.56), cash flow to assets (0.09), and cash flow volatility (0.62), while it is negatively correlated with the firm size (-0.36), capital expenditure (-0.14), net working capital to assets (-0.11), leverage ratio (-0.43), magnitude of dividend payments (-0.14), whether the firm pays dividends (-0.36), retained earnings to total assets (-0.10) and whether the firm's business is diversified (-0.20). This result is consistent with the view that firms with higher cash holdings tend to be those smaller and younger non-dividend-paying firms with lower leverage, working capital and business diversification but with higher growth opportunities, innovations, earnings, and business risk.

[Insert Table 2 about here]

5.2. Main results

[9] Our sample is much larger in size and covers a longer time period, making our analysis results not amenable to possible criticisms on sample representativeness and short time span issues, which might plague the A&P (2015) results. There are only 289 US firms (1,132 observations) used in A&P (2015).

Columns (1) to (4) of Table 3 present the estimation results of our simultaneous equations on the relationship between cash holdings and CSR. The estimation is performed by the Maximum Likelihood (ML) method on Equations (1) to (4) as a *simultaneous* equations system. We include a set of control variables that is similar to that of Opler et al. (1999) in our regression model. They include the firm size (*size*), market-to-book ratio (*mtb*), leverage ratio (*lev*), capital expenditure to total assets (*capxa*), dividends to total assets (*dvpa*), research and development to sales (*rnds*), net working capital to assets (*nwca*), cash flow to assets (*cfa*), cash flow volatility (*cfav*), and retained earnings to total assets (*reta*), as well as a dummy variable capturing whether a firm pays dividends or not (*payer*).[10] To control for unobserved heterogeneity, we also use a set of dummy variables capturing industry effect at two-digit SIC level and year effects.[11]

[Insert Table 3 about here]

Before getting into the details, we note that the results for the control variables are generally consistent with the prior literature. For example, we find that cash holdings are positively related to the market-to-book ratio (*mtb*), cash flow volatility (*cfav*), and R&D to sales (*rnds*), while they are negatively related to the leverage ratio (*lev*), retained earnings to total assets (*reta*), and whether or not the firm pays dividends (*payer*) (Opler et al., 1999; Dittmar et al., 2003; Bates et al., 2009; Dittmar and Duchin, 2011). Idiosyncratic risk is positively related to the cash flow to volatility (*cfav*), leverage ratio (*lev*), capital expenditure (*capxa*), R&D expenditure (*rnds*) and dividend payout (*dvpa*) but negatively related to the cash flow to assets (*cfa*), market-to-book ratio (*mtb*), firm size (*fsize*), retained earnings to

[10] Interestingly, a similar set of variables has been used to explain idiosyncratic risk and systematic risk (see Ferreira and Laux, 2007; Luo and Bhattacharya, 2009; Jo and Na, 2012).
[11] We do not specify fixed effects at firm level for two reasons. First, the ML estimation is inconsistent because of the incidental parameter problem. Second, panel fixed effect estimation methods may result in a substantial loss of information if *csr* is highly persistent (Guenster et al., 2011).

total assets (*reta*) and diversification (*diver*) (Ferreira and Laux, 2007; Luo and Bhattacharya, 2009).

The results reported in column (1) show that corporate cash holdings are related positively (and statistically significantly) to idiosyncratic risk while they are related negatively (and statistically significantly) to systematic risk, confirming the results of Bates et al. (2009) and Acharya et al. (2013). Despite both the Dittmar and Mahrt-Smith (2007) and Chen et al. (2012) papers having reported a negative association between corporate governance and cash holdings, we cannot find any statistically significant relationship between them. This inconsistency might be explained by the fact that the KLD measure of corporate governance focuses more on the transparency issue.[12] The coefficient of *csr* is negative as well as statistically significant at the 10% level, suggesting that there may be a direct effect of CSR on cash holdings.[13] Consistent with Luo and Bhattacharya (2009) and Albuquerque et al. (2014), Columns (2) to (3) reveal that *csr* is negatively related to idiosyncratic risk and systematic risk, even though its coefficient in the idiosyncratic risk equation is not statistically significant. Similar to Jo and Harjoto (2012), Column (4) shows that *csr* is positively and statistically significantly associated with corporate governance.

Panel B of Table 3 reports the results of hypothesis testing on the indirect effects of the three channels based on the delta method. Column (1) of Panel B shows that the indirect effect of *csr* is -0.006 (via *idio*), 0.158 (via *beta*), and -0.226 (via *cg*), respectively. Only the indirect effect of the systematic risk channel is statistically significant at the 5% level while the other two channels are not, providing a strong support to Hypothesis 2b.

5.3. Robustness tests

[12] However, as shown in the Robustness tests section, we use institutional ownership (*insown*), an alternative measure of corporate governance, and still get similar results.

[13] As discussed later, this apparently significant result disappears once we estimate the same model after controlling for endogeneity.

Several tests are performed to check the robustness of our findings. In particular, we employ a different econometric technique that accounts for endogeneity and alternative specifications of cash holdings, *csr*, risks, and corporate governance.

5.3.1. Accounting for endogeneity

One may argue that *csr* is likely to be endogenous. For example, according to the agency theory, agency costs, which are not directly observable, may drive both cash holdings and *csr* to move together, even though we have controlled for some firm characteristics that can mimic the scope of managerial discretion (i.e., the severity of agency costs) in a firm.[14] In other words, some unobserved variables that are omitted from the model but drive *csr*, are correlated with the error terms in the cash holdings equation (i.e., equation (1)). To deal with the endogeneity issue, we use the instrumental variable estimation (two-stage least squares) method to estimate the empirical model. Following Deng, Kang and Low (2013) and Di Giuli and Kostovetsky (2014), we use an instrument called red state (*redstate*) for *csr*. The instrument refers to a dummy variable that equals one if a firm's headquarters is located in a red (Republican) state and zero otherwise. The information about whether a state is a red (Republican) or blue (Democratic) state is available at the US Electoral College (http://www.archives.gov/federal-register/electoral-college/historical.html). We use this instrument because it is found to be correlated with *csr* (Deng et al., 2013; Di Giuli and Kostovetsky, 2014) and is unlikely to have a significant effect on the firm's cash holdings. Di Giuli and Kostovetsky (2014) argue that "political affiliation is a natural measure of preferences for social responsibility. The Democratic Party platform places more emphasis on CSR-related issues such as environmental protection, anti-discrimination laws and affirmative action, employee protection, and helping the poor and disadvantaged" (p.159) and

[14] The variance-covariance matrix of residuals as reported in Table 3 reveals that residuals are highly correlated among equations, suggesting that even after controlling for industry and year fixed effects there are still some hidden variables that can explain the whole system of equations.

report evidence that csr scores are associated with the political affiliation of external stakeholders of firms (measured by voting patterns in the state where the firm is headquartered). In particular, Democratic-leaning firms are more socially responsible than Republican-leaning firms in the sense that they spend more on CSR.

To construct the instrument, we first extract data on a firm's headquarters address from its annual reports (i.e., 10-K and related reports) on SEC's Edgar website and find out the state in which the firm's headquarters is/was located.[15] We then match the state with the list of blue or red states developed from the electoral results available at the US Electoral College's website to identify whether that state is a blue or red state in a particular year.

[Insert Table 4 about here]

Panel A of Table 4 shows the 2SLS estimation results in Columns (1) to (4). As far as the weak instrument issue is concerned, we cannot find any evidence of a weak instrument because the F-statistic of the coefficient of the instrument "*redstate"* from the first stage regression is 43.96 (i.e., far greater than ten).

After controlling for endogeneity, Columns (2) to (4) of Panel A indicate that *csr* can explain all of the three channels while Column (1) suggests that only systematic risk can explain cash holdings. Column (1) also shows that corporate cash holdings are least sensitive to changes in idiosyncratic risk because a unit increase in idiosyncratic risk will give rise to a 29.0% increase in corporate cash holdings. However, a similar increase in systematic risk (corporate governance) leads to a 73.0% (39.3%) decrease (increase) in corporate cash holdings. Note that now there is no direct effect of *csr* on corporate cash holdings as the coefficient of *csr* is 0.186 and statistically insignificant at conventional levels. Consistent

[15] 1109 observations are lost due to missing observations and/or incomplete/invalid records on SEC's Edgar website.

with Hypotheses 2b, Columns (2) and (4) reveal that firms with high *csr* scores tend to be less risky in the sense that they tend to have lower systematic risk and idiosyncratic risk; a 0.01 unit increase in the *csr* score is associated with a 4.087% (11.884%) reduction in systematic (idiosyncratic) risk.[16] However, the same increase in *csr* score leads to only a 0.977% increase in corporate governance.

Once we control for endogeneity, Columns (1) to (4) of Table 4 reveal a result similar to that of the ML estimation. The only differences are that idiosyncratic risk and csr lose their statistical significance in explaining cash holdings (see Column (1)) and that *csr* can now also explain idiosyncratic risk as well (see Column (2)).

The bootstrapped confidence sets of the indirect effect test also confirm similar results (see Columns (1) to (4) in Panel B). The bootstrap results indicate that the indirect effect of the systematic risk channel is still statistically significant at the 5% level, regardless of whether or not we control for endogeneity. The other two channels are not statistically significant.

5.3.2. Alternative definition of cash holdings

We use, as an alternative definition of firm cash holdings, the ratio of the firm's cash and cash equivalents divided by its book value of net assets (i.e., CHE/(AT - CHE)) and regress the alternative measure on CSR. Opler et al. (1999), Dittmar et al. (2003), and Bates et al. (2009) have used this alternative measure. The 2SLS regression results are shown in Columns (1) to (4) of Table 5.[17] The results are similar to those obtained using the main definition. The only difference is that now we have a weak evidence showing that the idiosyncratic risk channel so matters. In particular, the 2SLS result shows that the coefficient of idiosyncratic

[16] This kind of interpretation assumes that change in csr is small. However, by construction, the *csr* score must lie between 0 and 5. One unit change in *csr* (e.g., from zero to one) is admittedly too large.
[17] Only the 2SLS results are reported and discussed, because the 2SLS regression controls for endogeneity and the ML estimation is sensitive for the normality assumption.

risk is now, significantly, at 10% (see Column (1) in Panel A) and the bootstrap result also confirms that the indirect effect of the idiosyncratic risk channel is negative (see Panel B). However, this does not affect our main findings that the systematic risk channel is statistically significant at the 5% level (see Panel B of Table 5).

[Insert Table 5 about here]

5.3.3. Alternative definition of csr

We also check for the robustness of our findings by using an alternative measure of csr called *csrstr*. This measure captures the strengths of CSR only, and may be interpreted as investment in CSR. The advantage of this alternative measure is that it can avoid an interpretation problem with *net* CSR scores. In particular, two firms with the same net CSR scores can be very different in terms of their scores on CSR strengths and CSR weaknesses, respectively. For example, Firm A (Firm B) may have a CSR strengths score of 5 (1) and a CSR weaknesses score of 5 (1), but these two firms share the same net CSR score (i.e., zero). We re-estimate the model by using CSR strengths only as an alternative measure of CSR. Table 6 shows that the regression coefficients of the three channels are of the same signs and similar magnitudes as in Table 3. Panel B of Table 6 reinforces the main finding that the indirect effect of the systematic risk channel is still statistically significant while the other channels are not.

[Insert Table 6 about here]

5.3.4. Alternative measure of idiosyncratic risk

We employ the Fama–French four-factor model to generate the residuals and use them to compute an alternative measure of idiosyncratic risk called *idio1*. This measure has been used by Cao et al. (2008), Ferreira and Laux (2007), and Luo and Bhattacharya (2009). The results are reported in Table 7. The results are essentially similar to but generally weaker than our main results reported in Table 3, because the coefficient of *beta* is now statistically significant at 10% only. However, the test on the indirect effects indicates that both the systematic risk channel and the idiosyncratic risk channel can explain cash holdings (see Panel B).

[Insert Table 7 about here]

5.3.5. Alternative measure of systematic risk

The main results may be sensitive to how the systematic risk is measured. The current beta measure uses the market model for estimation purposes. In particular, we compute the beta of year t from the market model by using daily stock market data from year t-1 to year t. We estimate an alternative measure of beta based on the Fama and French 4 factors model. We re-estimate and report the regression results in Table 8. Interestingly, our findings show that the coefficient of this alternative measure of beta is much larger. However, the main results remain largely intact. In particular, Panel B of Table 8 shows that only the systematic risk channel is always statistically significant at the 5% level while the other two channels are not.

[Insert Table 8 about here]

5.3.6. Alternative measure of corporate governance

Recall that the KLD measure on corporate governance focuses more on the transparency issue. We replace the KDL's corporate governance measure with the institutional ownership percentage (*insown*) and data for institutional ownership are taken from Thomson Reuters institutional data (formerly called Spectrum). The estimation results are reported in Table 9. Panel B of Table 9 shows that only the indirect effect of the systematic risk channel is consistently statistically significant at 5%. It is noteworthy that the idiosyncratic risk channel is also statistically significant.

[Insert Table 9 about here]

Taken together, we have clear evidence that CSR affects cash holdings indirectly. We also have strong evidence that the systematic risk channel is a major channel through which CSR can affect cash holdings. As the evidence on the significance of the idiosyncratic risk channel and the corporate governance channel is mixed, we cannot attain a definite answer regarding the existence and the significance of these two channels in mediating the effect of CSR on cash holdings.

6. Conclusion

This study examines whether and how corporate social responsibility affects corporate cash holdings. In particular, it examines three channels through which corporate social responsibility affects cash holdings. The first channel argues that CSR-related activities can build up the social (or moral) capital of firms, because they enhance good relationships with stakeholders. Firms can use the social (or moral) capital to weather bad times and reduce the need to hold excessive cash. The second channel posits that price-inelastic demand due to

customer loyalty and/or investor loyalty to CSR firms makes these firms less sensitive to aggregate market shocks (i.e., lowers the systematic risk), and this may increase or decrease the cash holdings. On the one hand, the need for cash hoarding may decrease because of lower systematic risk; on the other hand, the need may increase because firms with lower systematic risk tend to have a shorter debt maturity structure and, thus, a higher refinancing risk. The third channel argues that CSR plays a corporate governance role and may increase or reduce the agency problems associated with corporate cash holdings.

Using 2,364 firms with 14,206 firm-year observations over the period 1991–2011, we find that CSR is correlated with corporate cash holdings significantly and positively. We also find strong evidence that only one of the three channels is useful in linking CSR and corporate cash holdings, namely the systematic risk channel. The evidence on the idiosyncratic risk channel and the corporate governance channel is mixed and insufficiently robust. This implies that the systematic risk channel is a major channel through which CSR affects corporate cash holdings, while the other two channels are not.

Our findings are robust to a variety of econometric approaches and alternative specifications of cash holdings, *csr*, risks and corporate governance. Thus, they provide strong support for the importance of corporate social responsibility in determining corporate cash holdings.

Acknowledgments

I would like to thank Millicent Chang, Robert Durand, Joseph Fan, Lewis Tam, Julio Sarmiento-Sabogal, Jamie Tong, Joey Yang and seminar participants at the Macao

International Symposium on Accounting and Finance 2013, University of Western Australia, CRAE Research Forum at Curtin University for helpful conversations and comments. I acknowledge financial support from the National Natural Science Foundation of China (NSFC) Project (No. 71272033), the School of Economics and Finance, and Curtin Business School, Curtin University, for financial support. The usual disclaimer applies. I thank Necia France for the editorial assistance.

Appendix A: Key variables, sources, and definitions

Variable	Source	Definition
Corporate Social Responsibility (*csr*)	KLD	The average of net scores of KLD Measures on seven dimensions (community relations, corporate governance, diversity, employee relations, environment, human rights, and product safety).
Corporate Social Responsibility 1(*csrstr*)	KLD	The average of strength scores of KLD Measures on the seven dimensions.
Cash to Assets (*cash*)	Compustat	Cash and Cash Equivalents/Book Assets
Cash to Net Assets (*cash1*)	Compustat	Cash and Cash Equivalents/(Book Assets - Cash and Cash Equivalents)
Idiosyncratic Risk (*idio*)	CRSP	Residual variance of the market model using daily stock returns of the previous twelve months.
Idiosyncratic Risk 1 (*idio1*)	CRSP	Residual variance of the Fama-French 4 Factors Model using daily stock returns of the previous twelve months.
Systematic Risk (*beta*)	CRSP	Beta coefficient of the market model using daily stock returns of previous twelve months.
Systematic Risk 1(*beta1*)	CRSP	Beta coefficient of the market risk premium of the Fama-French 4 factors model using daily stock returns of previous twelve months.
Corporate Governance (*cg*)	KLD	Net Score for the Corporate Governance Dimension of the KLD Measures.
Corporate Governance1 (*insown*)	Thomson Reuters	Percentage of institutional ownership.
Cash Flow to Assets (*cfa*)	Compustat	(Income before Extraordinary Items - Common Dividends)/Book Assets
Cash Flow Volatility (*cfav*)	Compustat	Standard deviation of Cash Flow to Assets (cfa) for the previous ten years.
Market-to-book Ratio (*mtb*)	Compustat	(Stock Price * Shares Outstanding + Book Assets - Book Equity) / Book Assets
Firm Size (*fsize*)	Compustat	Natural logarithm of Book Assets
Leverage Ratio (*lev*)	Compustat	(Long-Term Debt + Debt in Current Liabilities)/Book Assets
Capital Expenditure to Assets (*capxa*)	Compustat	Capital Expenditures/Book Assets
Net Working Capital to Assets (*nwc*)	Compustat	(Working Capital - Cash and Short-Term Investments)/Book Assets
Dividend to Assets (*dvpa*)	Compustat	Dividends/Book Assets
Repurchase to Assets (*repa*)	Compustat	Share Repurchases/Book Assets
R&D to Sales (*rnds*)	Compustat	R&D Expense/Sales

Payer (*payer)*	Compustat	Dummy variable equals one if dividend-paying and zero if otherwise
Retained Earnings to Total Equity (*reta*)	Compustat	Retained Earnings/Total Equity
Diversification (*diver*)	Compustat	Dummy variable equals one if the number of business segments > 1 and zero if otherwise
Sales Growth Rate (*sgr*)	Compustat	Annual percentage change of Sales
Red State (*redstate*)	SEC's Edgar + the US Electoral College	Dummy variable equals one if a firm's headquarters is located in a red (republican) state and zero if otherwise. The list of blue or red states is based on the electoral results obtained from the US Electoral College (http://www.archives.gov/federal-register/electoral-college/historical.html).

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TABLE 1: Summary Statistics of the Key Variables

This table reports the summary statistics of the key variables for the period 1991 to 2011. *cash* is defined as cash and cash equivalents divided by assets. *csr* and *cg* are the aggregate corporate social responsibility score and the net score of the corporate governance dimension of KLD measures, respectively. *idio* and *beta* refer to idiosyncratic risk and systematic risk derived from the market model. *fsize* is the natural logarithm of the book value of assets. *mtb* is the market value of assets divided by the book value of assets. *lev* is defined as the book value of debt divided by the book value of assets. *nwca* is the working capital net of cash and cash equivalents divided by the book value of assets. *cfa* is defined as the operating cash flow divided by the book value of assets. *cfav* is the standard deviation of *cfa* for the previous ten years, requiring at least three observations. *capxa* is capital expenditure to total assets, while *dvpa* and *repa* refer to total dividends to total assets and share repurchases to total assets. *rnds* is defined as research and development expenses divided by sales revenue. *payer* and *diver* are dummy variables capturing whether or not the firm pays dividends and whether the firm's number of business segments is greater than one. *sgr* is the sales growth rate. Our proxy for the firm life cycle is retained earnings to total assets (*reta*).

	mean	median	std dev.	skewness	kurtosis
cash	0.14	0.08	0.15	1.70	5.81
csr	0.01	0.00	0.08	1.05	9.96
beta	1.14	1.09	0.47	0.53	3.15
idio	2.05	1.83	1.00	2.19	13.18
cg	-0.13	0.00	0.28	-0.28	4.23
cfa	0.04	0.04	0.06	-0.61	11.35
stdcfa	0.06	0.04	0.06	1.81	7.97
mtb	2.81	2.13	2.33	2.78	12.89
fsize	7.68	7.58	1.53	0.30	2.59
lev	0.18	0.16	0.16	0.88	3.43
capexa	0.05	0.04	0.04	1.79	7.12
nwca	0.05	0.03	0.13	0.15	3.18
dvpa	0.00	0.00	0.00	5.73	41.74
rnds	0.03	0.00	0.06	2.34	8.25
payer	0.60	1.00	0.49	-0.42	1.18
reta	0.19	0.24	0.93	-27.36	1004.88
diver	0.70	1.00	0.46	-0.86	1.73
sgr	0.12	0.08	0.59	69.36	6703.66
repa	0.00	0.00	0.01	5.22	32.36

TABLE 2: Correlation Matrix of the Key Variables

This table presents the Spearman correlation matrix between the variables used in the regressions. For the definition of the variables, see Appendix A.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	*cash*	1.00																	
2	*csr*	0.09***	1.00																
3	*beta*	0.21***	-0.03***	1.00															
4	*idio*	0.21***	-0.03***	0.38***	1.00														
5	*cg*	-0.01	0.12***	0.03***	-0.02*	1.00													
6	*cfa*	0.09***	0.06***	-0.04***	-0.12***	-0.05***	1.00												
7	*stdcfa*	0.62***	0.06***	0.18***	0.25***	-0.01	0.08***	1.00											
8	*mtb*	0.15***	0.08***	-0.03***	-0.08***	-0.11***	0.31***	0.12***	1.00										
9	*fsize*	-0.36***	-0.01	-0.21***	-0.34***	-0.26***	-0.05***	-0.38***	-0.02**	1.00									
10	*lev*	-0.43***	-0.08***	-0.04***	-0.01	-0.02*	-0.23***	-0.35***	-0.04***	0.26***	1.00								
11	*capexa*	-0.14***	-0.00	-0.01	0.04***	0.02*	0.11***	-0.09***	0.10***	-0.04***	0.02	1.00							
12	*nwca*	-0.11***	-0.00	0.08***	0.08***	0.08***	0.14***	-0.05***	-0.11***	-0.31***	-0.10***	0.01	1.00						
13	*dvpa*	-0.14***	-0.00	-0.04***	-0.05***	0.00	-0.14***	-0.12***	-0.07***	0.13***	0.27***	-0.07***	-0.08***	1.00					
14	*rnds*	0.56***	0.14***	0.15***	0.15***	-0.10***	-0.00	0.44***	0.16***	-0.18***	-0.28***	-0.11***	-0.01	-0.09***	1.00				
15	*payer*	-0.36***	-0.01	-0.26***	-0.36***	0.03***	-0.09***	-0.39***	-0.01	0.37***	0.12***	0.01	-0.03***	0.11***	-0.32***	1.00			
16	*reta*	-0.10***	0.01	-0.12***	-0.14***	0.03**	0.19***	-0.14***	0.03***	0.03***	-0.08***	0.06***	0.10***	-0.04***	-0.14***	0.15***	1.00		
17	*diver*	-0.20***	-0.04***	-0.06***	-0.13***	-0.08***	-0.08***	-0.16***	-0.08***	0.26***	0.09***	-0.06***	0.01	0.04***	-0.14***	0.19***	0.00	1.00	
18	*sgr*	0.03**	0.01	0.04***	0.02	0.02*	0.09***	0.09***	0.04***	-0.03**	-0.01	0.04***	-0.00	0.00	0.02	-0.07***	-0.01	-0.04***	1.00
19	*repa*	-0.14***	-0.00	-0.04***	-0.06***	-0.00	-0.13***	-0.12***	-0.07***	0.14***	0.23***	-0.05***	-0.07***	0.84***	-0.08***	0.11***	-0.04***	0.04***	-0.00

* p<0.05, ** p<0.01, *** p<0.001

TABLE 3: Maximum Likelihood (ML) Estimation Results

This table presents the Maximum Likelihood (ML) estimation results of our cash holdings model (i.e., equations (1) to (4)) in Columns (1) to (4). Panel A reports the estimation results for each of the four equations and Panel B shows the joint test results of the three channels where standard errors are estimated using the delta method. *cash* is defined as cash and cash equivalents to assets. *idio* is idiosyncratic risk and *beta* is systematic risk. *cg* is a corporate governance index based on KLD CSR measures. The control variables include the cash flow to total assets (*cfa*), its volatility (*cfav*), market to book ratio (*mtb*), firm size (*fsize*), working capital net of cash and cash equivalents to total assets (*nwca*), leverage (*lev*), capital expenditure to total assets (*capxa*), total dividends to total assets (*dvpa*), share repurchases to total assets (*repa*), retained earnings to total assets (*reta*), research and development expenses to sales revenue (*rnds*), diversification (*diver*), sales growth rate (*sgr*), and a dummy variable capturing whether the firm is a dividend-paying firm (*payer*). Robust standard errors are reported. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A	(1)	(2)	(3)	(4)
VARIABLES	*cash*	*idio*	*beta*	*cg*
constant	0.182	3.337***	1.092***	0.450***
	(0.31)	(0.17)	(0.09)	(0.03)
idio	0.215***			
	(0.05)			
beta	-0.817***			
	(0.19)			
cg	0.496			
	(0.42)			
csr	-0.368*	-0.026	-0.193***	0.456***
	(0.20)	(0.07)	(0.04)	(0.04)
cfa	0.203	-1.882***	-0.444***	-0.140***
	(0.14)	(0.20)	(0.08)	(0.04)
cfav	0.773***	2.079***	0.418***	-0.175***
	(0.16)	(0.17)	(0.08)	(0.05)
mtb	0.018***	-0.024***	0.008***	-0.006***
	(0.00)	(0.00)	(0.00)	(0.00)
fsize	0.037	-0.209***	-0.027***	-0.062***
	(0.03)	(0.01)	(0.00)	(0.00)
lev	-0.187***	0.869***	0.187***	-0.010
	(0.06)	(0.07)	(0.03)	(0.02)
capxa	0.146	1.056***	0.795***	-0.156**
	(0.19)	(0.20)	(0.10)	(0.06)
nwca	-0.087	-0.039	0.215***	0.036
	(0.05)	(0.08)	(0.04)	(0.02)
dvpa	-1.158	18.518**	0.868	0.220
	(4.09)	(9.44)	(5.19)	(4.95)
rnds	1.226***	1.202***	0.566***	-0.572***
	(0.28)	(0.16)	(0.09)	(0.05)
reta	-0.012	-0.079***	-0.032***	0.007***
	(0.01)	(0.02)	(0.01)	(0.00)
payer	-0.006***			
	(0.00)			
diver		-0.079***		
		(0.01)		
sgr			0.005**	
			(0.00)	
repa				-0.293

				(0.33)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
Var-cov matrix				
cash	0.105**			
	(0.05)			
rmse1	-0.000	0.554***		
	(0.03)	(0.02)		
beta	0.097***	0.138***	0.152***	
	(0.03)	(0.00)	(0.00)	
cg	-0.031	-0.006***	-0.001	0.064***
	(0.03)	(0.00)	(0.00)	(0.00)
1-stage F statistic				43.96
No. of Observations	14,206	14,206	14,206	14,206
R^2 adjusted	-3.384	0.491	0.303	0.193

Panel B		Delta Method		
	Coefficient	Std error	Z	p-value
Indirect (*idio*)	-0.006	0.015	-0.36	0.715
Indirect (*beta*)	0.158	0.049	3.17	0.002
Indirect (*cg*)	0.226	0.191	1.18	0.238

TABLE 4: Two Stage Least Square (2SLS) Estimation Results

This table presents the Two Stage Least Square (2SLS) estimation results of our cash holdings model (i.e., equations (1) to (4)) in Columns (1) to (4). The instrument for *csr* is *redstate.* Panel A reports the estimation results for each of the four equations and Panel B shows the joint test results of the three channels where standard errors are estimated using the bootstrapping method with 1000 replications. *cash* is defined as cash and cash equivalents to assets. *idio* is idiosyncratic risk and *beta* is systematic risk. *cg* is a corporate governance index based on KLD CSR measures. The control variables include the cash flow to total assets (*cfa*), its volatility (*cfav*), market to book ratio (*mtb*), firm size (*fsize*), working capital net of cash and cash equivalents to total assets (*nwca*), leverage (*lev*), capital expenditure to total assets (*capxa*), total dividends to total assets (*dvpa*), share repurchases to total assets (*repa*), retained earnings to total assets (*reta*), research and development expenses to sales revenue (*rnds*), diversification (*diver*), sales growth rate (*sgr*), and a dummy variable capturing whether the firm is a dividend-paying firm (*payer*). *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A	(1)	(2)	(3)	(4)
VARIABLES	*cash*	*idio*	*beta*	*cg*
constant	0.239	3.631***	1.200***	0.441***
	(0.35)	(0.68)	(0.29)	(0.15)
idio	0.290			
	(0.18)			
beta	-0.730**			
	(0.35)			
cg	-0.393			
	(0.52)			
csr	0.186	-11.884***	-4.087***	0.977**
	(0.82)	(2.27)	(0.91)	(0.48)
cfa	0.283	-1.181***	-0.223**	-0.160***
	(0.24)	(0.24)	(0.10)	(0.05)
cfav	0.470*	1.972***	0.349***	-0.189***
	(0.28)	(0.23)	(0.10)	(0.05)
mtb	0.013***	-0.006	0.014***	-0.007***
	(0.00)	(0.01)	(0.00)	(0.00)
fsize	-0.005	-0.188***	-0.022***	-0.064***
	(0.02)	(0.01)	(0.00)	(0.00)
lev	-0.262***	0.724***	0.127***	0.004
	(0.09)	(0.09)	(0.04)	(0.02)
capxa	-0.148	2.035***	1.110***	-0.203***
	(0.23)	(0.35)	(0.15)	(0.08)
nwca	-0.067	-0.215*	0.158***	0.053**
	(0.10)	(0.11)	(0.05)	(0.02)
dvpa	-4.014	38.625**	9.119	2.337
	(5.63)	(15.20)	(6.37)	(5.28)
rnds	0.657**	3.065***	1.199***	-0.641***
	(0.29)	(0.43)	(0.18)	(0.09)
reta	0.000	-0.066***	-0.027***	0.006**
	(0.01)	(0.01)	(0.00)	(0.00)
payer	0.044			
	(0.07)			
diver		-0.112***		
		(0.02)		
sgr			0.015**	
			(0.01)	

repa				-0.721*
				(0.39)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
1-stage F statistic				43.96
No. of Observations	13,657	13,657	13,657	13,657
R^2 adjusted	-2.695	-0.232	-0.083	0.178

Panel B		Bootstrap Method		
		Bootstrap	Bootstrap-based	
	Coefficient	Std. error	95% confidence interval	
Indirect (*idio*)	-3.448	39.89	-109.970	-0.270
Indirect (*beta*)	2.982	32.31	0.617	23.102
Indirect (*cg*)	-0.384	3.504	-9.308	0.318

TABLE 5: 2SLS Results for Alternative Cash holdings Measure (*cash1*)

This table presents the 2SLS results of our cash holdings model (i.e., equations (1) to (4)) where we use an alternative measure of cash called *cash1*. The instrument for *csr* is *redstate.* Panel A reports the estimation results for each of the four equations. Panel B shows the joint test results of the three channels where standard errors are estimated by the bootstrapping method with 1000 replications. *cash1* is defined as cash and cash equivalents to net assets. *idio* is idiosyncratic risk and *beta* is systematic risk. *cg* is a corporate governance index based on KLD CSR measures. The control variables include the cash flow to total assets (*cfa*), its volatility (*cfav*), market to book ratio (*mtb*), firm size (*fsize*), working capital net of cash and cash equivalents to total assets (*nwca*), leverage (*lev*), capital expenditure to total assets (*capxa*), total dividends to total assets (*dvpa*), share repurchases to total assets (*repa*), retained earnings to total assets (*reta*), research and development expenses to sales revenue (*rnds*), diversification (*diver*), sales growth rate (*sgr*), and a dummy variable capturing whether the firm is a dividend-paying firm (*payer*). *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A	(1)	(2)	(3)	(4)
VARIABLES	*cash1*	*idio*	*beta*	*cg*
constant	0.209	3.631***	1.200***	0.441***
	(0.93)	(0.68)	(0.29)	(0.15)
idio	0.852*			
	(0.48)			
beta	-1.917**			
	(0.95)			
cg	-0.993			
	(1.38)			
csr	1.130	-11.884***	-4.087***	0.977**
	(2.21)	(2.27)	(0.91)	(0.48)
cfa	0.838	-1.181***	-0.223**	-0.160***
	(0.65)	(0.24)	(0.10)	(0.05)
cfav	0.473	1.972***	0.349***	-0.189***
	(0.76)	(0.23)	(0.10)	(0.05)
mtb	0.031**	-0.006	0.014***	-0.007***
	(0.01)	(0.01)	(0.00)	(0.00)
fsize	0.008	-0.188***	-0.022***	-0.064***
	(0.05)	(0.01)	(0.00)	(0.00)
lev	-0.604***	0.724***	0.127***	0.004
	(0.23)	(0.09)	(0.04)	(0.02)
capxa	-0.444	2.035***	1.110***	-0.203***
	(0.62)	(0.35)	(0.15)	(0.08)
nwca	-0.061	-0.215*	0.158***	0.053**
	(0.26)	(0.11)	(0.05)	(0.02)
dvpa	-11.028	38.625**	9.119	2.337
	(15.07)	(15.20)	(6.37)	(5.28)
rnds	1.513*	3.065***	1.199***	-0.641***
	(0.78)	(0.43)	(0.18)	(0.09)
reta	0.002	-0.066***	-0.027***	0.006**
	(0.02)	(0.01)	(0.00)	(0.00)
payer	0.168			
	(0.19)			
diver		-0.112***		
		(0.02)		
sgr			0.015**	
			(0.01)	

repa				-0.721*
				(0.39)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
1st stage F- statistic				43.96
No. of Observations	13,657	13,657	13,657	13,657
R^2 adjusted	-4.299	-0.232	-0.083	0.178

Panel B		Bootstrap Method		
		Bootstrap	Bootstrap-based	
	Coefficient	Std error	95% confidence interval	
Indirect (*idio*)	-10.121	242.147	-109.593	-1.339
Indirect (*beta*)	7.837	192.488	1.006	45.414
Indirect (*cg*)	-0.970	78.072	-25.681	0.942

TABLE 6: 2SLS Results for Alternative CSR Measure (*csrstr*)

This table presents the 2SLS results of our cash holdings model (i.e., equations (1) to (4)) where we use an alternative measure of CSR called *csrstr*. This measure is computed using the strengths of KLD scores only. The instrument for *csrstr* is *redstate.* Panel A reports the estimation results for each of the four equations. Panel B shows the joint test results of the three channels where standard errors are estimated by the bootstrapping method with 1000 replications. *cash* is defined as cash and cash equivalents to assets. *idio* is idiosyncratic risk and *beta* is systematic risk. *cg* is a corporate governance index based on KLD CSR measures. The control variables include the cash flow to total assets (*cfa*), its volatility (*cfav*), market to book ratio (*mtb*), firm size (*fsize*), working capital net of cash and cash equivalents to total assets (*nwca*), leverage (*lev*), capital expenditure to total assets (*capxa*), total dividends to total assets (*dvpa*), share repurchases to total assets (*repa*), retained earnings to total assets (*reta*), research and development expenses to sales revenue (*rnds*), diversification (*diver*), sales growth rate (*sgr*), and a dummy variable capturing whether the firm is a dividend-paying firm (*payer*). *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A	(1)	(2)	(3)	(4)
VARIABLES	*cash*	*idio*	*beta*	*cg*
constant	0.440*	0.147	0.042	0.808***
	(0.26)	(0.56)	(0.19)	(0.07)
idio	0.257			
	(0.19)			
beta	-0.697**			
	(0.28)			
cg	-0.360			
	(0.55)			
csrstr	0.761	-21.922***	-6.910***	1.992***
	(1.02)	(2.69)	(0.93)	(0.36)
cfa	0.249	-1.771***	-0.416***	-0.105**
	(0.31)	(0.33)	(0.11)	(0.04)
cfav	0.519	1.913***	0.340**	-0.179***
	(0.32)	(0.38)	(0.13)	(0.05)
mtb	0.011***	0.017*	0.020***	-0.010***
	(0.00)	(0.01)	(0.00)	(0.00)
fsize	-0.026	0.346***	0.147***	-0.113***
	(0.03)	(0.07)	(0.02)	(0.01)
lev	-0.216***	0.022	-0.083	0.069***
	(0.08)	(0.17)	(0.06)	(0.02)
capxa	-0.199	1.854***	0.972***	-0.206***
	(0.22)	(0.51)	(0.18)	(0.07)
nwca	-0.073	-0.275	0.141**	0.061**
	(0.09)	(0.18)	(0.06)	(0.02)
dvpa	-3.909	-32.638	-16.292*	4.903
	(5.20)	(25.22)	(8.68)	(5.32)
rnds	0.589	4.044***	1.446***	-0.740***
	(0.39)	(0.52)	(0.18)	(0.07)
reta	-0.001	-0.071***	-0.030***	0.007***
	(0.01)	(0.02)	(0.01)	(0.00)
payer	0.020			
	(0.08)			
diver		-0.078**		
		(0.04)		
sgr			0.021**	
			(0.01)	

repa				-0.430
				(0.39)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
1st stage F- statistic				43.96
No. of Observations	13,657	13,657	13,657	13,657
R^2 adjusted	-2.407	-2.435	-1.015	0.168

Panel B		Bootstrap Method		
		Bootstrap	Bootstrap-based	
	Coefficient	Std error	95% confidence interval	
Indirect (*idio*)	-5.632	44.270	-123.306	2.446
Indirect (*beta*)	4.818	17.830	1.635	74.025
Indirect (*cg*)	-0.718	13.518	-63.809	0.438

TABLE 7: 2SLS Results for Alternative Idiosyncratic Risk Measure (*idio1*)

This table presents the 2SLS results of our cash holdings model (i.e., equations (1) to (4)) where we use an alternative measure of idiosyncratic risk called *idio1*. The instrument for *csr* is *redstate*. Panel A reports the estimation results for each of the four equations. Panel B shows the joint test results of the three channels where standard errors are estimated by the bootstrapping method with 1000 replications. *cash* is defined as cash and cash equivalents to assets. *Idio1* is idiosyncratic risk estimated by the Fama-French 4-factor model and *beta* is systematic risk. *cg* is a corporate governance index based on KLD CSR measures. The control variables include the cash flow to total assets (*cfa*), its volatility (*cfav*), market to book ratio (*mtb*), firm size (*fsize*), working capital net of cash and cash equivalents to total assets (*nwca*), leverage (*lev*), capital expenditure to total assets (*capxa*), total dividends to total assets (*dvpa*), share repurchases to total assets (*repa*), retained earnings to total assets (*reta*), research and development expenses to sales revenue (*rnds*), diversification (*diver*), sales growth rate (*sgr*), and a dummy variable capturing whether the firm is a dividend-paying firm (*payer*). *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A	(1)	(2)	(3)	(4)
VARIABLES	*cash*	*idio1*	*beta*	*cg*
constant	0.268	3.493***	1.200***	0.441***
	(1.03)	(0.67)	(0.29)	(0.15)
idio1	0.961			
	(0.61)			
beta	-2.038*			
	(1.12)			
cg	-1.358			
	(1.75)			
csr	1.212	-11.659***	-4.087***	0.977**
	(2.46)	(2.22)	(0.91)	(0.48)
cfa	0.922	-1.131***	-0.223**	-0.160***
	(0.78)	(0.23)	(0.10)	(0.05)
cfav	0.235	2.017***	0.349***	-0.189***
	(0.99)	(0.23)	(0.10)	(0.05)
mtb	0.030**	-0.006	0.014***	-0.007***
	(0.01)	(0.01)	(0.00)	(0.00)
fsize	-0.008	-0.179***	-0.022***	-0.064***
	(0.05)	(0.01)	(0.00)	(0.00)
lev	-0.643**	0.709***	0.127***	0.004
	(0.28)	(0.08)	(0.04)	(0.02)
capxa	-0.473	1.984***	1.110***	-0.203***
	(0.69)	(0.35)	(0.15)	(0.08)
nwca	-0.004	-0.227**	0.158***	0.053**
	(0.32)	(0.11)	(0.05)	(0.02)
dvpa	-13.959	38.373***	9.119	2.337
	(18.10)	(14.88)	(6.37)	(5.28)
rnds	1.413	2.941***	1.199***	-0.641***
	(0.91)	(0.42)	(0.18)	(0.09)
reta	0.005	-0.064***	-0.027***	0.006**
	(0.03)	(0.01)	(0.00)	(0.00)
payer	0.210			
	(0.24)			
diver		-0.111***		
		(0.02)		
sgr			0.015**	
			(0.01)	

repa				-0.721*
				(0.39)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
1st stage F statistic				43.96
No. of Observations	13,657	13,657	13,657	13,657
R^2 adjusted	-5.603	-0.278	-0.083	0.178

Panel B		Bootstrap Method		
		Bootstrap	Bootstrap-based	
	Coefficient	Std error	95% confidence interval	
Indirect (*idio*)	-11.210	95.311	-695.181	-0.699
Indirect (*beta*)	8.327	82.155	0.438	65.144
Indirect (*cg*)	-1.327	25.111	-77.579	1.019

TABLE 8: 2SLS Results for Alternative Beta Measure (*beta1*)

This table presents the 2SLS results of our cash holdings model (i.e., equations (1) to (4)) where we use an alternative measure of beta called *beta1*. This beta is estimated by the Fama-French 4-factor model based on previous 12 months. The instrument for *csr* is *redstate*. Panel A reports the estimation results for each of the four equations. Panel B shows the joint test results of the three channels where standard errors are estimated by the bootstrapping method with 1000 replications. *cash* is defined as cash and cash equivalents to net assets. *idio* is idiosyncratic risk. *cg* is a corporate governance index based on KLD CSR measures. The control variables include the cash flow to total assets (*cfa*), its volatility (*cfav*), market to book ratio (*mtb*), firm size (*fsize*), working capital net of cash and cash equivalents to total assets (*nwca*), leverage (*lev*), capital expenditure to total assets (*capxa*), total dividends to total assets (*dvpa*), share repurchases to total assets (*repa*), retained earnings to total assets (*reta*), research and development expenses to sales revenue (*rnds*), diversification (*diver*), sales growth rate (*sgr*), and a dummy variable capturing whether the firm is a dividend-paying firm (*payer*). *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A	(1)	(2)	(3)	(4)
VARIABLES	*cash*	*idio*	*beta1*	*cg*
constant	0.814*	3.631***	0.013***	0.441***
	(0.42)	(0.68)	(0.00)	(0.15)
idio	0.036			
	(0.10)			
beta1	-67.751**			
	(27.83)			
cg	0.324			
	(0.31)			
csr	-0.088	-11.884***	-0.020***	0.977**
	(0.75)	(2.27)	(0.01)	(0.48)
cfa	-0.001	-1.181***	-0.001*	-0.160***
	(0.18)	(0.24)	(0.00)	(0.05)
cfav	0.864***	1.972***	0.001*	-0.189***
	(0.18)	(0.23)	(0.00)	(0.05)
mtb	0.001	-0.006	-0.000***	-0.007***
	(0.00)	(0.01)	(0.00)	(0.00)
fsize	0.004	-0.188***	-0.000***	-0.064***
	(0.01)	(0.01)	(0.00)	(0.00)
lev	-0.113*	0.724***	0.001***	0.004
	(0.06)	(0.09)	(0.00)	(0.02)
capxa	-0.241	2.035***	0.003***	-0.203***
	(0.18)	(0.35)	(0.00)	(0.08)
nwca	-0.201***	-0.215*	0.001*	0.053**
	(0.04)	(0.11)	(0.00)	(0.02)
dvpa	-2.736	38.625**	-0.025	2.337
	(4.60)	(15.20)	(0.05)	(5.28)
rnds	0.908***	3.065***	0.004***	-0.641***
	(0.25)	(0.43)	(0.00)	(0.09)
reta	-0.010	-0.066***	-0.000***	0.006**
	(0.01)	(0.01)	(0.00)	(0.00)
payer	-0.033			
	(0.05)			
diver		-0.112***		
		(0.02)		
sgr			0.000**	
			(0.00)	
repa				-0.721*

				(0.39)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
1st stage F statistic				43.96
No. of Observations	13,657	13,657	13,657	13,657
R^2 adjusted	-1.656	-0.232	0.006	0.178

Panel B		Bootstrap Method		
		Bootstrap	Bootstrap-based	
	Coefficient	Std error	95% confidence interval	
Indirect (*idio*)	-0.427	8.907	-9.491	1.981
Indirect (*beta1*)	1.369	7.440	0.304	6.050
Indirect (*cg*)	0.316	6.331	-0.191	3.190

TABLE 9: 2SLS Results for Alternative Corporate Governance Measure (institutional ownership)

This table presents the 2SLS results of our cash holdings model (i.e., equations (1) to (4)) where we use institutional ownership (*insown*) as an alternative measure of corporate governance. The instrument for *csr* is *redstate*. Panel A reports the estimation results for each of the four equations. Panel B shows the joint test results of the three channels where standard errors are estimated by the bootstrapping method with 1000 replications. *cash* is defined as cash and cash equivalents to net assets. *idio* is idiosyncratic risk and *beta* is systematic risk. The control variables include the cash flow to total assets (*cfa*), its volatility (*cfav*), market to book ratio (*mtb*), firm size (*fsize*), working capital net of cash and cash equivalents to total assets (*nwca*), leverage (*lev*), capital expenditure to total assets (*capxa*), total dividends to total assets (*dvpa*), share repurchases to total assets (*repa*), retained earnings to total assets (*reta*), research and development expenses to sales revenue (*rnds*), diversification (*diver*), sales growth rate (*sgr*), and a dummy variable capturing whether the firm is a dividend-paying firm (*payer*). *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A	(1)	(2)	(3)	(4)
VARIABLES	*cash*	*idio*	*beta*	*insown*
constant	0.255	3.798***	1.251***	0.338***
	(0.38)	(0.75)	(0.30)	(0.13)
idio	0.145*			
	(0.08)			
beta	-0.594**			
	(0.27)			
insown	0.500			
	(0.81)			
csr	0.203	-14.162***	-4.505***	-1.675***
	(0.84)	(2.62)	(0.96)	(0.41)
cfa	-0.203	-0.715**	-0.158	0.624***
	(0.43)	(0.29)	(0.11)	(0.05)
cfav	0.745***	1.868***	0.366***	0.103**
	(0.12)	(0.27)	(0.11)	(0.05)
mtb	0.013**	-0.006	0.015***	-0.002*
	(0.01)	(0.01)	(0.00)	(0.00)
fsize	-0.014	-0.185***	-0.023***	0.019***
	(0.02)	(0.01)	(0.00)	(0.00)
lev	-0.258*	0.645***	0.117***	0.166***
	(0.13)	(0.10)	(0.04)	(0.02)
capxa	-0.002	2.327***	1.161***	0.004
	(0.31)	(0.42)	(0.16)	(0.07)
nwca	-0.112	-0.277**	0.140***	-0.059***
	(0.07)	(0.13)	(0.05)	(0.02)
dvpa	-5.822	44.628**	6.323	2.268
	(6.63)	(17.61)	(6.90)	(4.63)
rnds	0.788***	3.401***	1.199***	0.408***
	(0.19)	(0.48)	(0.19)	(0.08)
reta	-0.007	-0.085***	-0.030***	0.005**
	(0.01)	(0.01)	(0.01)	(0.00)
payer	0.011			
	(0.06)			
diver		-0.127***		
		(0.03)		
sgr			0.009	
			(0.01)	
repa				0.637*

				(0.34)
Year effects	Yes	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Yes
1st stage F statistic				43.96
No. of Observations	12,613	12,613	12,613	12,613
R^2 adjusted	-1.400	-0.569	-0.180	-0.043

Panel B		Bootstrap Method		
		Bootstrap	Bootstrap-based	
	Coefficient	Std error	95% confidence interval	
Indirect (*idio*)	-2.052	24.631	-54.571	-0.027
Indirect (*beta*)	2.678	16.833	0.354	24.216
Indirect (*cg*)	-0.837	35.191	-37.063	1.872