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Liquidity and the Future Stock Returns of the REIT Industry

Ming-Chi Chen · Chin-Yu Wang · So-De Shyu

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Abstract This paper examines how deviations from expected optimal cash holdings affect future stock returns in the real estate investment trust (REIT) industry. Our findings indicate that REIT managers elect to hold less cash to reduce the agency problems of cash flow, supporting the pecking order theory that growth opportunities lead managers to retain more cash on hand. The results show that any deviation from the estimated optimal cash holdings is significantly detrimental to future market performance, suggesting that excess or insufficient cash is harmful to stock returns. The adverse influence of deviations above the optimal value is insignificantly stronger than that of deviations below the optimal value. We also find that the return performances of deviations that do not differ from the expected optimal value surpass those of deviations that differ significantly from the expected level. This implies that REIT managers determine their cash policies based on future growth opportunities and the external costs of capital. Finally, for REIT firms, holding excess or insufficient cash increases the possibility of agency conflict or underinvestment, which will consequently worsen the firm's future performance.

Keywords Real estate investment trust (REIT) · Cash holdings · Agency problem · Stock returns

Introduction

Housing prices in the US rose dramatically until the summer of 2007, when turbulence in the housing market began with the deteriorating quality of

M.-C. Chen (✉) · C.-Y. Wang · S.-D. Shyu
Department of Finance, National Sun Yat-sen University, 70 Lien-hai Rd., Kaohsiung 804 Taiwan, Republic of China
e-mail: mcchen@finance.nsysu.edu.tw

C.-Y. Wang
e-mail: d964030005@student.nsysu.edu.tw

S.-D. Shyu
e-mail: dshyu@cm.nsysu.edu.tw

subprime mortgages and propagated across different assets and financial markets due to asymmetric information on the complexity of structured mortgage products. These market shocks froze global economic growth and financial investment, and then caused house prices to drop sharply. The deterioration of market conditions and funding liquidity not only had an impact on Americans and their real estate investments, but is also having drastic effects on foreign economies. Companies with the most liquid asset, cash, may survive these difficult times. Cash must be an essential element of a firm's operation. The liquidity of cash may help a company to survive economic distress or the unexpected shocks of business. On the other hand, a lack of liquidity or insufficient cash holdings can cause a profitable firm to go bankrupt. Real estate investment trusts,[1] known as REITs, are entities that invest in real estate or real estate-related assets and therefore hold less cash than conventional industries. Damodaran (2005) points out that REITs carry cash and equivalents equal to only 1.57% of total assets, considerably less than the 18.48% average reported for the full sample of public firms.

According to the trade-off theory, firm managers consider the transaction and precautionary motives to determine the optimal level of cash by comparing the benefits and costs of cash holdings (Keynes 1936). Alternatively, Myers and Majluf (1984) suggest that cash acts as a buffer between retained earnings and investment needs to minimize the costs of information asymmetry and other financing costs for the financial hierarchy. Firms prefer to finance their investments with internal funds, followed by debt and finally equity. However, Jensen's discussion of free cash flow states that managers prefer to hold cash rather than pay dividends to enable them to pursue their own objectives. The excess funds needed to provide this cash erode shareholders' wealth through the agency costs of free cash flows (Jensen 1986).

Constrained by legal limitations, REIT firms allocate most of their resources to their real estate investments, and they maintain federal tax-exempt status if the dividends distributed are at least 90% of their taxable income calculated after depreciation changes. Because depreciation comprises a large portion of non-cash deductions for real estate firms, REIT managers have discretionary capital at their disposal and a possible free cash flow problem.[2] Hardin et al. (2009) suggest that REIT managers hold little cash to reduce the agency problems of cash flow because they choose not to accumulate cash despite their ability to do so.

[1] The Internal Revenue Code lists the conditions a company must meet to qualify as a REIT. For example, the company must pay 90% of its taxable income to shareholders every year. It must also invest at least 75% of its total assets in real estate and generate 75% or more of its gross income from investments in or mortgages on real property (http://www.sec.gov/answers/reits.htm).

[2] Hardin and Hill (2008) examine the factors associated with REIT dividends in excess of the mandatory distribution. Ghosh and Sirmans (2006) find an average dividend payout ratio of 150% for their REIT study. The findings suggest that REIT managers have a good deal of control over the allocation of the cash funds. Myers and Rajan (1998) hypothesize that more liquid assets can lead to increased agency problems.

Although it is optimal for firms to hold cash to finance day-to-day operations and to provide a buffer against the cost of externally financing their investments, excessive cash holdings may have negative value implications if managers use these liquid assets inefficiently. Dittmar et al. (2003) find that cash levels are generally higher in countries with poor investor protections, reflecting possible agency problems. Dittmar and Mahrt-Smith (2007) suggest that firms with both high excess cash and poor governance subsequently experience particularly low levels of operating performance. If a firm has an optimal level of cash holdings, deviation from the optimal level might have adverse effects on future stock returns and fundamental performance. Excess or inefficient cash holdings might reduce firms' stock returns.

Prior studies investigate the determinants of cash holdings for publicly traded firms, and most focus on the role of firm-specific characteristics (Kim et al. 1998; Opler et al. 1999; Faulkender and Wang 2006; Dittmar and Mahrt-Smith 2007; Bates et al. 2009). Hardin et al. (2009) focus on the determinants of cash holdings in the REIT industry. Although the expected cash balance has been extensively studied in the finance literature, few studies focus on the link between a firm's optimal cash holdings and its future returns. It is important for investors and shareholders to understand whether deviations from an expected cash level are associated with poor future performance. This motivated us to expand upon Hardin et al. (2009) and examine the relationship between deviations from the estimated optimal cash level and future stock returns in publicly traded US REIT firms.

This paper contributes to the literature on the cash holdings of the REIT industry in several ways. First, we extend the model of Hardin et al. (2009) by considering the business cycle to examine the determinants of cash holdings in REIT companies. Second, this study links cash policy to firm value. We explore the information conveyed by the determinants of cash holdings and investigate the potential agency problems of free cash flow and the likelihood of underinvestment, which might erode the firm's value. Third, we analyze the deviations from the expected level of cash holdings and relate them to future stock returns. Finally, the empirical relationship between cash holdings and future market performance could be a helpful tool for investors or for management in resource allocation and investment portfolio decisions. The empirical findings support our hypotheses in showing that any deviation from the estimated optimal cash holdings is significantly detrimental to future market performance, suggesting that an excess or insufficiency of cash is harmful to the stock returns. The adverse influence of deviations above the optimal value is insignificantly stronger than that of deviations below the optimal value. If too much or too little cash is held, the possibilities of agency conflict and underinvestment will worsen the firm's future stock returns.

The rest of the paper is structured as follows. "Literature Reviews" discusses the existing literature on the determinants of cash holdings and their relationship to stock returns. "Data and method" describes the database and methods used. "Empirical results" reports the empirical results regarding determinants and estimated deviations, thereby examining the impacts on future stock returns in our period of study. Finally, "Conclusions" presents the conclusions of this study.

Literature Reviews

Determinants of Cash Holdings

Studies on the demand for cash holdings are based upon interest rates, income and transaction variables (Baumol 1952; Tobin, 1956; Milbourne et al. 1983). Most recent studies on the determinants of cash holdings emphasize the role of firm-specific variables in non-REIT samples. Kim et al. (1998) find that cash varies positively with the degree of cash flow volatility and growth opportunities and also show that cash varies inversely with leverage and the probability of bankruptcy. Opler et al. (1999) find that US firms with stronger growth opportunities and riskier cash flows have relatively high ratios of cash to non-cash assets. Firms that have the greatest access to capital markets such as large firms and those with high credit ratings tend to have lower ratios of cash to non-cash assets. Fazzari and Petersen (1993) report that larger firms are less likely to face borrowing constraints than smaller firms because they have better capital market access. Ozkan and Ozkan (2004) find that only managerial ownership has a significant impact on cash holdings, and their findings regarding controlled non-governance variables are consistent with those of Kim et al. (1998) and Opler et al. (1999) except for the positive link with dividend payments. Myers and Majluf (1984) show that asymmetric information increases the benefit provided by cash holdings because external financing is more costly for firms with high informational asymmetries; therefore, more growth opportunities lead to higher cash holdings. Jensen (1986) suggests that debt contracts may remedy the free cash flow problem because debt repayment serves as a disciplining force for management actions. Berger and Udell (1995) and Diamond (1984, 1991) argue that private bank debt is more effective than external financing in reducing informational asymmetries and agency problems because banks have a comparative advantage in collecting information and monitoring firms' projects. Sufi (2009) points out that access to private bank debt is an indicator of the degree of financial constraint facing a firm. Baum et al. (2006) find a negative relationship between economic uncertainty and the dispersion of firms' cash-to-assets ratios. Ferreira et al. (2005) find strong evidence that financially constrained firms hold more cash during recessions and that business conditions significantly affect constrained firms' cash decisions using the one-year market return as a proxy for the business condition. Hardin et al. (2009) focus on REIT companies and find that cash holdings have an inverse relationship with funds from operations, leverage and lines of credit, and a direct relationship with the cost of external finance and growth opportunities. These results imply that REIT managers elect to hold little cash to reduce the agency problems of cash flow.

Effect of Cash Holdings on Future Performance

The expected optimal model of cash balance has been extensively studied in the finance literature. However, it is more interesting and important for public investors to explore the link between a firm's expected cash level and its future performance. Harford (1999) argues that a firm with a large amount of excess cash

will face severe agency problems, echoing Jensen (1986). Mikkelson and Partch (2003) find that excess cash has no apparent relationship to operating performance. Richardson (2006) points out that firm management tends to over-invest when there are positive free cash flows, thereby driving down future return on assets (ROA). However, Richardson (2006) focuses only on cash rich firms and does not investigate firms with low cash flows. Li (2008) finds evidence that deviations from the expected cash level can predict future ROA. The results show that higher deviations (in absolute terms) are associated with lower future ROA, and the effect of negative deviation on future ROA is stronger than that of positive deviation. Specifically, the paper finds that one year ahead stock returns are negatively associated with a firm's residual cash, and a hedging strategy of buying stocks in the lowest quintile of absolute value of residual cash and simultaneously selling those in the highest quintile can produce 3.60% annual hedge returns. Excess cash holdings may deliver an ambiguous signal to the market because of their indication of a future growth potential, an improved survival capacity and the increased likelihood of agency problems. Oler and Picconi (2010) find that one year ahead ROA and stock returns decreasing according to the level of deviation from an estimated optimal cash holding, whether the firm has a shortage or excess of cash.

Empirical Hypotheses

This study extends Hardin et al.'s (2009) study of REIT firms and mainly examines the effect on future stock returns when a firm deviates from its estimated optimal cash balance. Compared with a firm with an optimal cash level, too much or too little cash holdings might have harmful effects on its future stock returns. This implies that the agency problems of free cash flows erode the wealth of shareholders (Jensen 1986), and imprudent investment and the possibility of bankruptcy lessen the firm's value due to a lack of liquidity (Myers and Majluf 1984). Therefore, we hypothesize that

H1a: Positive deviations from the expected optimal cash level are associated with negative future returns.

H1b: Negative deviations from the expected optimal cash level are inversely associated with future returns.

H2: The effect of cash holdings above an estimated optimal level on future stock returns is stronger than that of cash holdings below the optimal level.

Data and Method

Sample and Discussion of the Variables

We collected accounting and financial data from various sources, including company annual reports, websites,[3] and financial databases like Compustat. We use a sample

[3] The website http://www.reit.com links to the websites of REIT firms.

consisting of an unbalanced panel of annual report data from 1998 to 2007 for publicly traded REIT firms. The final sample consists of 865 firm-year observations over the 1998 to 2007 period.

The models employed to predict REIT cash holdings ($Cash_{i,t}$) contain factors examined in non-REIT industries including cash flow ($FFO_{i,t}$), market-to-book ratio ($M/B_{i,t}$), capital market access ($Size_{i,t}$), leverage ($LEV_{i,t}$), dividend ($Div_{i,t}$), business condition ($Index_t$), and access to line of credit ($LOC_{i,t}$). The future stock returns ($Return_{i,t+1}$) model in Eq. 2 is constructed from the estimated deviation from the expected optimal cash holdings in Eq. 1 and is controlled by the prior stock returns ($Return_{i,t}$) and price-to-earnings effect[4] ($P/E_{i,t}$). Table 1 describes the main variables of our study.

Existing models for estimating optimal cash holdings consider firm characteristics such as size, opportunity growth, leverage, and cash flow. Firm managers can accumulate cash for investments by retaining cash flow. Generally, prior studies proxy for cash flow ($FFO_{i,t}$) by calculating earnings adjusting interest, depreciation, and taxes (Kim et al. 1998; Opler et al. 1999) or funds from operations (Hardin et al. 2009). Firms with greater growth opportunities will retain more internal funds for potential profit investments, and managers are not forced to seek costly external financing. Kim et al. (1998), Opler et al. (1999), Ozkan and Ozkan (2004) and Hardin et al. (2009) employed the market-to-book ratio ($M/B_{i,t}$) to proxy growth opportunities. Jensen's (1986) free cash flow theory states that excess funds will erode shareholder wealth through the agency costs of free cash flow, and debt contracts may remedy the free cash flow problem because of debt repayment restricting management actions. Kim et al. (1998), Opler et al. (1999), Ozkan and Ozkan (2004), and Hardin et al. (2009) found an inverse relationship between cash holdings and leverage measured as total debt ratio ($LEV_{i,t}$). The likelihood of underinvestment decreases when capital market access improves. Larger firms are less likely to face borrowing constraints than smaller firms are (Fazzari and Petersen 1993). Prior literature proxies for the capital market access ($Size_{i,t}$) by the natural logarithm of total assets (Opler et al. 1999) and the natural logarithm of total revenues (Kim et al. 1998; Hardin et al. 2009). Firms without access to credit lines have greater difficulties raising funds via capital markets (Sufi 2009). Credit line access in a given year ($LOC_{i,t}$) is used to measure the relationship between cash holdings and credit line (Sufi 2009; Hardin et al. 2009). Opler et al. (1999) and Ozkan and Ozkan (2004) found that dividends are significantly related to cash holdings, and a dividend payout ratio ($Div_{i,t}$) is used to control the potential influence of a firm's dividend policy on its cash holdings. When macroeconomic conditions are volatile, managers will adopt a more conservative approach by increasing the liquidity level of the firm. Business conditions significantly affect constrained firms' cash decisions with the one-year market return ($Index_t$) as proxy for the business condition (Ferreira et al. 2005).

[4] Basu (1977, 1983) finds that a portfolio of low price-to-earnings (P/E) ratio stocks has higher average returns than a portfolio of stocks with high ratios. DeBondt and Thaler (1990) argue that the P/E effect can be explained by optimistic earnings expectations. Thus, high P/E firms tend to be poor investments in general.

Table 1 Definitions of all variables used in the analyses

Variable	Definition	Expected sign
Panel A: The determinants of REIT cash holdings		
$Cash_{i,t}$	Ratio of the cash and equivalents accounts to total assets for firm *i* at time *t*	
$FFO_{i,t}$	Net income excluding gains or losses from sales of property, plus depreciation and amortization scaled by total assets for firm *i* at time *t*	Cash flow (expect -)
$M/B_{i,t}$	Ratio of the firm's market value to total assets for firm *i* at time *t*	Growth opportunity (expect +)
$LEV_{i,t}$	Ratio of the firm's total debt over total assets for firm *i* at time *t*	Leverage (expect -)
$Size_{i,t}$	The logarithm value of total revenues for firm *i* at time *t*	Capital market access (expect -)
$Div_{i,t}$	The dividend payout ratio for firm *i* at time *t*	Dividends (expect -)
$LOC_{i,t}$	Dummy variable coded 1 if firm *i* has access to credit lines at time *t*, 0 otherwise	Credit of line (expect -)
$Index_t$	The annual market return of the All-REITs index at time *t*	Business condition (expect -)
Panel B: The factors in the model of future stock returns		
$Return_{i,t}$	The buy-and-hold stock return over a 12-month period starting at the beginning of each fiscal year for firm *i* at time *t*	
Deviation[1] $DEV_{i,t}$	The residual from the estimated optimal model for firm *i* at time *t*	expect-
Deviation[2] $ABS(DEV_{i,t})$	The absolute value of the residual from the estimated optimal model for firm *i* at time *t*	expect-
Deviation[3] $DUM(DEV_{i,t})$	Dummy variable coded 1 if a firm's residual from the estimated optimal model is positive, 0 otherwise	expect -
$P/E_{i,t}$	Price per share to earnings per share for firm *i* at time *t*	expect -

Panel Least Squares Model with Fixed Effects

We begin our exploration on the influence of deviations from the estimated optimal cash level on future stock returns with an examination of the expected optimal model of cash holdings. We then turn to deviations, which are computed by the difference between the actual and expected cash holdings. We employ Eq. 1 to construct the panel data model with fixed effects to examine determinants of cash holdings and the expected optimal level of cash holdings. Next, we estimate deviations from Eq. 1 and use deviations to predict future stock returns in Eq. 2. Otherwise, cash is scaled by total assets for mitigating the potential for the largest firms to dominate the results in Eq. 1. Explanatory variables are defined in

Panel A of Table 1, and the following empirical regression is used to predict optimal cash levels of REIT firms:

$$Cash_{i,t} = \beta_0 + \beta_1 FFO_{i,t} + \beta_2 (M/B)_{i,t} + \beta_3 LEV_{i,t} + \beta_4 Size_{i,t} + {}_{+}\beta_j Control\ variables_{i,t} + \mu_i + \varepsilon_{i,t} \quad (1)$$

Further, our aim is to examine effects of deviations from expected optimal cash holdings on future stock returns ($Return_{i,t+1}$) in Eq. 2. Deviations are computed by the difference between the actual value and the estimated value from Eq. 1. The panel regression model of Eq. 2 is employed to explore the relationship between future stock returns ($Return_{i,t+1}$) and deviations from the estimated optimal cash level developed below, where deviations have three measures (j=3), such as $DEV_{i,t}$, ABS ($DEV_{i,t}$), and DUM($DEV_{i,t}$), defined in Panel B of Table 1. We use the lag term of regressors in Eq. 2 for avoiding a simultaneous situation.

$$Return_{i,t+1} = \alpha_0 + \alpha_1 Return_{i,t} + \alpha^{j}_{2} Deviation^{j}_{i,t} + \alpha_3 (P/E)_{i,t} + \eta_i + \omega_{i,t} \quad (2)$$

In Eq. 2, the absolute value of deviations is mainly used to examine hypotheses *H1a and H1b* regarding whether any deviation is negatively related to market returns. A dummy variable coded 1 if the residuals from the estimated optimal model are positive is utilized to estimate hypothesis *H2*, which suggests that the effect of positive deviations is much stronger than that of negative deviations.

Because the intercept and slope coefficients may vary between individual firms and over time, the pooling ordinary least squares regression might suffer from heterogeneity bias. We use the panel least squares model with fixed effects to capture the difference in intercepts between the sampled firms. A redundant fixed effects –likelihood ratio test is estimated to identify the proper specification, and the *t* statistics are calculated using White's (1980) robust standard errors. We also employ the Wald test[5] to categorize the deviations as positive, negative or neutral. The details are omitted here due to space constraints but can be found in the book by Brooks (2008).

Empirical Results

Descriptive Statistics

The final sample consists of 865 firm-year observations for the publicly traded REIT firms from 1998 to 2007, and Table 2 presents their descriptive statistics. The distribution of cash-to-assets ratios is right-skewed across the sample of REITs, with the sample mean and median equal to 2.14% and 0.77%, respectively. The FFO to assets ratio is evenly distributed with a mean of 6.12% and a median of 5.93%. These results are similar to those reported by Hardin et al. (2009). Panel A in Table 3 shows the distribution of the sample across time and access to credit lines.

[5] The Wald test can be used to test the true value of the parameter based on the sample estimate. The Wald statistic is $\frac{\left(\widehat{\theta}-\theta_0\right)^2}{\mathrm{var}\left(\widehat{\theta}\right)}$ and is comparable to a chi-square distribution at 5% level.

Table 2 Descriptive statistics

Variables	Mean	Std. Dev.	Median	Maximum	Minimum
Cash	2.14%	4.16%	0.77%	41.22%	0.00%
M/B	7.44%	3.53%	6.80%	24.61%	0.94%
FFO	6.12%	2.57%	5.93%	24.96%	−1.69%
LOC	0.96	0.20	1.00	1.00	0.00
Size	12.20	1.30	12.30	15.66	7.83
LEV	55.21%	16.80%	55.76%	113.76%	2.30%
Div	153.89%	118.80%	122.20%	975.00%	0.00%
Index	9.19%	18.75%	7.96%	32.55%	−20.85%

This table shows the sample characteristics of the 865 REIT-year observations over the period 1998 to 2007. Cash is the ratio of cash and equivalents to total assets. FFO is net income excluding gains or losses from property sales, plus depreciation and amortization scaled by total assets. M/B is the ratio of market capitalization to total assets. LEV is the ratio of total debt to total assets. Size is the logarithm of fiscal year revenues. Div is the dividend payout ratio. LOC is an indicator variable equaling 1 if the REIT has access to a line of credit in yeart and 0 otherwise. Index is the ALL-REITs index annual return.

The REIT-year observations are evenly distributed across time, and the mean cash-to-assets ratio has increased in recent years. After considering access to lines of credit, panel B illustrates that almost all REIT-year observations, 95.72%, have access to bank lines of credit. The sub-sample with credit line access has a mean cash ratio of 1.76%, compared to an average cash ratio of 10.59% for those without credit line access. The difference in mean cash ratios between the two groups is significant at the 1% level. This result suggests that REITs that are less financially constrained hold less cash, echoing the findings of Hardin et al. (2009).

Table 3 Distributions of REIT firms' samples across time and access to credit lines

	Number of observations	Mean Cash-to-total assets		Number of observations	Mean Cash-to-total assets
Panel A: Times distribution of samples					
Year			Year		
1998	79	1.27%	2003	79	2.65%
1999	88	1.74%	2004	89	2.78%
2000	85	1.17%	2005	94	2.48%
2001	79	2.38%	2006	98	2.80%
2002	78	1.76%	2007	96	2.16%
Panel B: Access to line of credit					
Yes	828	1.76%	No	37	10.59%

This table presents the distribution of samples across time and access to credit lines for the sample of REITs used in the cash holdings analysis. The samples consist of 865 REIT-year observations for publicly traded REITs during the period from 1998 to 2007. Mean Cash-to-total assets ratios are reported as percentages.

The Expected Optimal Model of Cash Holdings

We begin our exploration of the influence of deviations from the estimated optimal cash level on future stock returns with an examination of the expected optimal model of cash holdings and we then turn to deviations, which are computed by the difference between the actual and expected cash holdings. We employed Eq. 1 to construct the panel data model with fixed effects to examine the determinants of cash holdings, and the estimated *t* statistics are calculated using White's (1980) robust standard errors. Panel A in Table 4 presents the estimated results using the fixed-effects method, while Panel B shows the pooled results.

Compared to the two regression models, the estimated coefficient of market-to-book ratio (M/B) is significant at the 5% and 1% levels, respectively, in the fixed-effects model and pooling regression. This estimated positive relationship supports the view that capital markets allow REITs with high growth opportunities to hold more cash to feed profitable projects. This supports the pecking order theory and implies that managers who access future growth opportunities accordingly retain

Table 4 Panel model and pooled OLS results of the determinants of cash holdings

Dependent variable: Cash				Dependent variable: Cash			
Panel A				Panel B			
Panel Least Squares model with fixed effects				Pooling OLS model			
Variable	Coefficient	Std. Error	Prob.	Variable	Coefficient	Std. Error	Prob.
C	−0.009	0.050	0.852	C	0.133**	0.021	0.000
LEV	−0.076**	0.024	0.002	LEV	−0.013	0.013	0.326
LOC	−0.044**	0.012	0.000	LOC	−0.085**	0.018	0.000
M/B	0.129*	0.065	0.047	M/B	0.134**	0.048	0.005
Size	0.008*	0.004	0.033	Size	−0.003*	0.001	0.011
FFO	0.086	0.107	0.424	FFO	−0.002	0.086	0.985
Index	0.006	0.006	0.294	Index	0.011	0.007	0.097
Div	0.003	0.002	0.201	Div	0.001	0.002	0.715
F test		5.946 **		F test		33.874**	
Adjusted R-squared		0.405		Adjusted R-squared		0.210	
Panel C: Redundant Fixed Effects Tests							
		Statistic	Prob.			Statistic	Prob.
Cross-section F test		3.51**	0.000	Cross-section Chi-square test		366.28**	0.000

This table presents predicted REIT cash holdings calculated using fixed-effects and pooled OLS regression results. The sample consists of 865 firm-years over the period 1998 to 2007. The dependent variable is Cash, defined as the ratio of cash and equivalents to total assets. FFO is net income excluding lgains or losses from property sales, plus depreciation and amortization scaled by total assets. M/B is the ratio of market capitalization to total assets. LEV is the ratio of total debt to total assets. Size is the natural logarithm of fiscal year revenues. LOC is an indicator variable equaling one if the REIT has access to a line of credit in year t and zero otherwise. Div is the dividend payout ratio. Index is the ALL-REITs index annual return. The standard errors are calculated according to White's (1980) heteroskedasticity consistent standard errors. Statistical significance is indicated by one (5%) or two (1%) asterisks.

more cash on hand. The estimated coefficient of leverage is negatively significant at the 1% level in both models, corroborating the view that debt is a substitute for cash and is used as a bonding mechanism, thereby reducing the ability of a firm to accumulate cash and alleviating the agency problem of free cash flow. The negative cash-leverage relationship reiterates the estimated findings of Kim et al. (1998), Opler et al. (1999), and Hardin et al. (2009).

Lines of credit are another substitute for cash management. Berger and Udell (1995) argue that private bank debt is more effective in reducing information asymmetries and agency conflicts due to the comparative advantage in monitoring and collecting this information. The estimated coefficient of credit line access is negatively significant at the 1% level. REITs without access to lines of credit have cash ratios that are about 4% greater than those with credit line access. This implies that more financially constrained REIT firms seem to hold more cash for unexpected contingencies.[6] The estimated influences of business condition and dividend variables on cash holdings are statistically insignificant.

Table 4 summarizes that growth opportunities, the availability of external capital, and external monitoring matter in determining the level of cash holdings. REIT managers assess future growth prospects and hold more cash, supporting the pecking order theory. Access to capital markets and lines of credit enables managers to curtail their cash holdings to mitigate the agency problem and find cheaper funds. These findings are similar to those of previous studies (Myers and Majluf 1984; Jensen 1986; Kim et al. 1998; Opler et al. 1999; Hardin et al. 2009).

Do Deviations from the Expected Optimal Cash Holdings Predict Future Stock Returns?

Panel C in Table 4 presents the results of the redundant fixed effects tests and suggests that the fixed effects specification is preferable for evaluating the optimal level of REIT cash holdings, where the statistics of the *F* test and chi-square test are both significant at the 1% level. Thus, we calculate deviations as the estimated difference from the cash holdings predicted by the panel least squares model with fixed effects in Panel A of Table 4. We use the raw value ($DEV_{i,t}$), the absolute value ($ABS(DEV_{i,t})$), and a dummy variable ($DUM(DEV_{i,t})$) for positive residuals to examine the relationship between future stock returns ($Return_{i,t+1}$) and the consequences of an excess or shortage of cash. Equation 2 of the panel data model with fixed effects is used to examine the effect of deviations from the optimal cash level on future stock performance in Table 5. The estimated *t* statistics are calculated using White's (1980) robust standard errors.

Table 5 presents influences of deviations on future stock returns in Eq. 2. After controlling for the price-to-earnings effect and the previous returns, models 1 through 3 demonstrate that deviations from expected optimal cash holdings have adverse effects on future returns. However, only the deviation in absolute value is

[6] Sufi (2009) suggests that access to private bank debt is an indicator of the degree of financial constraint, so firms without access to credit lines have greater difficulty raising funds via capital markets. Almeida et al. (2004) show that less financially constrained firms hold less cash than their counterparts in non REIT samples.

Table 5 Regression results regarding the impact of deviations on future stock returns

Dependent variable: $Return_{i,t+1}$						
Variable	Model 1		Model 2		Model 3	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
C	0.200**	0.072	0.181*	0.075	0.195**	0.065
$Return_{i,t}$	0.366	0.346	0.366	0.348	0.351	0.345
$ABS(DEV_{i,t})$	−1.641*	0.716				
$DEV_{i,t}$			−1.117	0.829		
$DUM(DEV_{i,t})$					−0.026	0.036
$P/E_{i,t}$	−0.007*	0.003	−0.007*	0.003	−0.007*	0.003
F test	1.422**		1.436**		1.391**	
R−squared	0.221		0.223		0.218	
Adjusted R-squared	0.066		0.068		0.061	

This table presents fixed-effects regression results examining the influence of deviations from the estimated optimal cash holdings on future stock returns. The sample consists of 661 firm-years from 1998 to 2007. The dependent variable is $return_{i,t+1}$, defined as the stock returns of firms at time t+1. Deviations are estimated residuals from the cash holding predicted by the panel least squares model with fixed effects, where deviations have three measures. $DEV_{i,t}$ is the residuals from the estimated optimal model. $ABS(DEV_{i,t})$ is the residuals from the estimated optimal model in the absolute form, and $DUM(DEV_{i,t})$ is a dummy variable coded 1 if the residuals is positive and 0 otherwise. $P/E_{i,t}$ is the price-to-earnings ratio. The standard errors are White's (1980) heteroskedasticity consistent standard errors. Statistical significance is indicated by one (5%) or two (1%) asterisks.

statistically significant at the 5% level. This result suggests that any divergence from the estimated optimal cash holdings would be harmful and diminish stock performance, supporting hypotheses *H1a* and *H1b*. Either an excess or insufficiency of cash holdings reduce the future stock returns in our sample of REIT firms. The estimated results are consistent with the findings of Li (2008) and Oler and Picconi (2010).

Model 3 in Table 5 compares the influences of excess and insufficient cash. A dummy variable coded 1 for the positive residual from the estimated optimal model is used to examine the effects on future stock returns. The estimated coefficient for DUM(DEV) suggests that REIT firms that hold too much cash would cause their stock prices to drop, and the extent of this decline is more severe than for those firms that hold insufficient cash. However, the estimated coefficient for DUM(DEV) is not statistically significant. The estimated result does not provide strong evidence for hypothesis *H2*, suggesting that the adverse effect of cash holdings above an estimated optimal level on future stock returns is stronger than that of negative deviations. The results in Table 5 suggest that deviations from optimal cash holdings indeed have effects on market returns. Any deviation from the estimated optimal cash level is significantly detrimental to future market returns, supporting hypotheses *H1a* and *H1b*. Nevertheless, the detrimental effects of deviations above the estimated optimal cash levels are insignificantly stronger than those of deviations below the optimal level.

Table 5 infers that the agency problems of free cash flow (Jensen 1986), the abandonment of investment opportunities (Myers and Majluf 1984), and the likelihood of bankruptcy will decrease REIT firms' stock returns. REIT managers elect to hold little cash[7] to reduce the agency costs of cash flow (Hardin et al. 2009), but the divergence from the expected optimal cash holdings still worsens the firm's price performance. Nevertheless, our estimated results may suffer from sampling bias, specification bias, and estimation bias, thereby altering the estimated consequences and relationships.

Table 6 summarizes the average annual stock returns and abnormal stock returns[8] in the different categories of deviations discriminated by the Wald test. We separate the estimated residuals of expected optimal cash level into five categories: Positive, Negative, Deviation, Neutral, and Total. "Positive" indicates a deviation that is significantly larger than zero. "Negative" indicates a deviation that is significantly smaller than zero, and "Neutral" indicates a deviation that does not differ from zero. "Deviation" includes both the "Positive" and "Negative" classifications, and "Total" includes the "Neutral" and "Deviation" classifications. Except from 2003 to 2006, Panel A shows that the stock returns of the deviations close to the estimated optimal cash level are higher than those of large departures from estimated expectations, whether positive or not. The abnormal returns in Panel B present similar results, implying that deviations worsen price performance.

Conclusions

This paper examines the determinants of expected optimal cash holdings in REIT firms from 1998 to 2007 and explores the effect of deviations from their expected optimal cash holdings on the stock returns of REIT firms. Following Hardin et al. (2009) and Oler and Picconi (2010), this study contributes to linking the deviations from the estimated optimal cash holdings to future stock returns.

We test the influences of an excess or shortage of cash on stock performance. These results show that in the REIT industry, cash holdings are inversely related to leverage and credit line access, but growth opportunities and improved capital market access lead REIT managers to hold more cash. Thus, after controlling for the dividend payout ratio and business conditions, firms with fewer financial constraints may hold less cash. These findings echo those of Kim et al. (1998), Opler et al. (1999), and Hardin et al. (2009) in showing that REIT managers tend to hold little cash to reduce the agency problems of cash flow. Once REIT firm hold too much or too little cash, stock returns diminish. These results suggest that the agency conflicts inherent in free cash flow (Jensen 1986), the abandonment of investment opportunities (Myers and Majluf 1984), and the likelihood of bankruptcy decrease REIT firms' stock returns. Deviations from the expected optimal cash level further worsen price performance, whether because of an excess or insufficiency of cash.

[7] Damodaran (2005) points out that REITs carry cash and equivalents equal to only 1.57% of total assets, which is considerably less than the 18.48% average reported for the full sample of public firms.

[8] The annual abnormal returns are calculated by the annual stock returns minus the annual market return of the All-REITs index.

Table 6 Comparison of the average annual stock returns and abnormal returns across the different categories of deviations

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean	St. Dev
Panel A: Annual stock returns												
Positive	0.061(1)	0.302(1)	− (0)	0.088(4)	0.329(3)	0.213(4)	0.135(3)	0.377(3)	−0.193(5)	−0.402(2)	0.101(26)	0.256
Negative	−0.506(1)	−0.428(2)	0.128(3)	− (0)	0.632(3)	− (0)	0.054(2)	0.552(2)	−0.138(1)	−0.724(1)	−0.054(15)	0.490
Deviation	−0.222(2)	−0.185(3)	0.128(3)	0.088(4)	0.480(6)	0.213(4)	0.102(5)	0.447(5)	−0.184(6)	−0.510(3)	0.036(41)	0.312
Neutral	−0.086(77)	0.099(85)	0.213(82)	0.088(75)	0.363(72)	0.251(75)	0.095(84)	0.306(89)	−0.221(92)	−0.532(93)	0.058(824)	0.272
Total	−0.089(79)	0.089(88)	0.210(85)	0.088(79)	0.372(78)	0.249(79)	0.088(89)	0.313(94)	−0.219(98)	−0.531(96)	0.057(865)	0.273
Panel B: Annual abnormal stock returns												
Positive	0.128(1)	0.072(1)	− (0)	0.038(4)	0.003(3)	−0.053(4)	0.055(3)	0.081(3)	0.003(5)	0.065(2)	0.044(26)	0.053
Negative	−0.439(1)	−0.658(2)	−0.016(3)	− (0)	0.307(3)	− (0)	−0.026(2)	0.257(2)	0.058(1)	−0.257(1)	−0.097(15)	0.334
Deviation	−0.155(2)	−0.415(3)	−0.016(3)	0.038(4)	0.155(6)	−0.053(4)	0.023(5)	0.152(5)	0.012(6)	−0.042(3)	−0.030(41)	0.164
Neutral	−0.019(77)	−0.131(85)	0.069(82)	0.037(75)	0.038(72)	−0.015(75)	0.016(84)	0.011(89)	−0.024(92)	−0.064(93)	−0.008(824)	0.058
Total	−0.022(79)	−0.141(88)	0.066(85)	0.037(79)	0.047(78)	−0.017(79)	0.009(89)	0.018(94)	−0.022(98)	−0.063(96)	−0.009(865)	0.060

This table presents the average annual stock returns and abnormal returns over the 1999 to 2008 period in the different categories of deviations, employing the Wald test to distinguish the significantly positive or negative deviations from the estimated residuals of expected optimal cash level. "Positive" indicates a deviation that is significantly greater than zero. "Negative" indicates a deviation that is significantly less than zero, and "Neutral" includes deviations that do not differ from zero. "Deviation" includes the "Positive" and "Negative" classifications, and "Total" includes the "Neutral" and "Deviation" classifications. The annual abnormal returns are calculated as the annual stock returns minus the annual market returns of the All-REITs index. The firm numbers are shown in parentheses.

Our goal is to explore the influences of the deviations from the expected optimal cash level on future market returns. Our results support the hypotheses that suggest that any deviation (positive or negative) from the estimated optimal cash level is significantly detrimental to future market returns. The average market returns of large deviations from the optimal value are relatively lower than those resulting from small deviations. The findings imply that if too much or too little cash is held, the possibility of agency conflict or underinvestment will worsen the firm's future performance. Nevertheless, our estimated results may suffer from sampling bias, specification bias, and estimation bias, thereby altering the estimated consequences.

The main implication of this study is that REIT managers determine the firm's cash policy based on growth opportunities and external costs of capital. Holding excess or insufficient cash relative to the optimal cash holdings for REIT firms increases the possibility of agency conflict or underinvestment, thus worsening the firm's future market performance.

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