

Tenant Quality and REIT Liquidity Management

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Abstract Property values depend upon quality tenants and consistency (Smith: *The RMA Journal* 50-60, 2009). REIT firms are only as strong as their properties. In this research I examine how tenant quality affects REIT firm liquidity management (i.e. cash holdings and utilization of line of credit). I find that 1) tenant Altman Z-score and size are inversely related to total liquidity (cash plus unused credit line) and unused credit lines of REIT firms; 2) tenant size is inversely related to the total corporate liquidity and unused credit lines of REIT firms, but has no affect on REIT cash holdings; 3) tenant credit ratings are negatively related to total credit available and unused credit lines; 4) tenant book-to-market ratio and tenant profitability are negatively related to REIT cash holdings, but positively correlated to the total available credit lines and unused credit lines of REIT firms; 5) these effects vary across different property types. These results suggest that the analysis of tenant quality can offer insights into the firm policy and decision makings of REIT firms.

Keywords REIT · Liquidity management · Cash holding · Credit line · Tenant quality

JEL Codes · G00 · G30 · G32 · D92

Introduction

Property values depend upon quality tenants and consistency (Smith, 2009). Real Estate Investment Trust (REIT) firms are only as strong as their properties. Per regulatory requirements, REIT firms are required to hold at least 75 % of their assets in real property. At least 75 % of the REIT gross income must be derived from rents, mortgage interest or sales of real property. As a result, REIT firms care a great deal about the quality of their tenants who pay rent regularly and periodically. In this

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research I examine the effects of tenant quality on REIT corporate liquidity management (i.e. cash holdings and utilization of bank lines of credit).

As U.S. corporations hold more and more cash (Bates, Kahle, and Stulz, 2009), the REIT industry seems to maintain an unusually low percentage of cash holding as noted by Damodaran (2005).¹ While previous studies have focused on the influences of firm characteristics on liquidity management of non-REIT firms (see, for example, Opler, Pinkowitz, Stulz, and Williamson, 1999) and REIT firms (see, for example, Hardin et al., 2009), my research effort extends to the characteristics of the source of the cash flow: the tenants. Leases are often referred to as the engines of property values (Liu, Liu, and Zhang, 2016). The risk arises in the collection of rent. Thus the quality of leases depends on the quality of tenants as well as rate and maturity. Tenants with better financial health and higher creditworthiness reduce the amount of risk in collecting rent. The financial health and creditworthiness of tenants are critical to the cash flow and cash flow volatility of REIT firms. Cash holdings are a precautionary savings motive for REIT firms with lower tenant quality. REIT firms with higher tenant quality have less incentive to save more liquid assets because they are not as concerned with the rental income uncertainty.² Thus I expect that the characteristics of the tenants play an important role in the corporate liquidity management decisions of REIT firms. I hypothesize that, in general, REIT corporate liquidity is inversely related to the financial health and quality of the tenants.

I test this hypothesis by empirically analyzing the data from SNL Financial on REITs and their publicly-traded tenants from 2000 to 2013. I investigate the lead-lag relationship between tenant quality and REIT liquidity management because REIT firms tend to use the tenants' financial information prior to when leases are signed. I expect that tenant quality from the previous year also has an impact on REIT liquidity management for the subsequent year. The empirical analysis results confirm my expectation. I find that, in general, tenant quality (as measured by Altman Z-score, credit rating, size, book-to-market ratio, and ROA) is negatively correlated with total liquidity holdings (as measured by the sum of cash holding³ and unused credit line⁴ scaled by total assets, following Hardin and Hill (2011)) of REIT firms.

First, tenant size plays a significant role in the liquidity management decisions of the REIT firms. Larger tenants lead to a lower level of total liquidity and unused credit lines for REIT firms in the subsequent year. Tenant size can be considered as a proxy for information asymmetry (see, e.g. Atiase 1985, Collins et al., 1987, and Freeman, 1987). Large tenants tend to have more analysts following (see, e.g. Bhushan, 1989; Barth, Kasznik, and McNichols, 2001; Chang, Dasgupta, and Hilary, 2006), and thus, have higher level of information transparency in their financial performance (e.g. profitability, earnings quality, and etc.) (Hong, Lim, and Stein, 2000). Therefore, REIT firms which have such large tenants have lower level of incentive for precautionary savings. Tenant size can also be considered as a proxy for financial flexibility. Larger

¹ According to Damodaran (2005), REIT firms hold, on average, 1.57 % of total assets in cash, whereas non-REIT firms hold almost 18.5 % of total assets in cash.

² The impacts of tenant quality on the REIT firm liquidity management may vary by property types. Later in the research, I will present the results on different property types.

³ Cash holding includes cash and cash equivalents (including short-term investments, such as Treasury bills and money market funds) from SNL database.

⁴ Hill, Kelly, and Hardin (2012) suggest that firm shareholders benefit from both cash and unused credit lines.

firms are less likely to have borrowing constraints than smaller forms because they have better capital market access (Fazzari and Petersen, 1993). Thus, the fact that their tenants have fewer financial constraints tend to ease the corporate liquidity requirements within the REIT landlord firms.

Second, I find that the tenant's Z-score in the prior year is negatively related to REIT total liquidity and unused credit lines. Even though insignificant, tenant credit ratings in a year prior are inversely related to REIT cash holdings. Third, highly profitable tenant firms (i.e. tenants with high ROA) reduce the landlord REIT firms' pure cash holdings, and increase their total credit lines and unused credit available in the subsequent year. All of these findings seem to indicate that the market sees through the REIT firms and understands the financial position of their tenants. These effects remain after I control for the REIT firm characteristics identified by Hardin et al. (2009).

Hardin et al. (2009) suggest that the structure and length of the REIT property leases affect underlying cash flows. As these lease features vary by property type, I continue the investigation by studying the REIT liquidity management within different property types.⁵ I find that, for office REITs, tenant size is significantly negatively associated with total liquidity holdings and unused credit lines. Tenant ROA is inversely related to office REIT pure cash holdings, but positively related to total credit available and unused credit lines. Tenant credit ratings are negatively correlated to total credit available and unused credit lines. Tenant size also plays an important part in the liquidity management of retail REITs. I show that tenant size is negatively correlated with both total liquidity holdings and unused credit lines. Tenant credit ratings are negatively associated with the total liquidity holdings of retail REITs. I find similar and consistent results with other REITs. For industrial REITs, I find mixed results. Industrial tenant Altman-Z and tenant size are both negatively correlated with total credit available and unused credit lines. However, I also find that both tenant Altman-Z and tenant size are positively related to the industrial REIT cash holdings.

To the best of my knowledge, this research effort is the first attempt to examine tenant quality on REIT corporate liquidity management, such as cash holdings, credit line availability and utilization. However, it is not the first paper to investigate the relations between tenants and REIT corporate behavior, even though the REIT literature on the role of tenant quality is substantially limited. Liu, Liu, and Zhang (2016) find that asset quality, as measured by tenant financial stability (i.e. tenant Altman Z-score), determines the liquidation value of real estate and a firm's financing choices. Liu and Liu (2013) examine landlord firms' stock return reactions to the tenant firm's bankruptcy announcements. My research contributes to the existing real estate literature by linking the tenant characteristics to REIT firm decisions. This study provides evidence that it is important to consider tenant quality, which is often ignored, when we study the firm behavior of REIT firms.

The remainder of the paper is organized as follows: "Related Literature and Hypothesis Development" Section reviews related literature and develops hypotheses; "Data and Research Design" Section introduces the data and research models;

⁵ Multi-family REITs and lodging REITs are excluded from the sample in this study. Therefore, I examine mainly four property types: office, retail, industrial and others. Others mostly are diversified REITs, self-storage REITs, specialty REITs, and healthcare REITs.

“Empirical Results and Analysis” Section discusses the empirical results; “Conclusion” Section concludes.

Related Literature and Hypothesis Development

REIT Liquidity Management

Corporate liquidity management has been a focal point in corporate finance. Corporate liquidity management is usually referred as the combination of cash holdings and bank lines of credit.⁶ Cash and unused lines of credit are traditionally considered as substitutes for corporate liquidity.

Many previous researches have concentrated on cash holdings. Opler, Pinkowitz, Stulz, and Williamson (1999) examine the determinants of cash holdings for U.S. public firms during 1971–1994. Their study excludes financial firms and REIT firms. They conduct both time-series and cross-section tests. They find that firms with high growth opportunities (as measured by market-to-book ratio) and riskier activities hold more cash assets. Firms with higher credit ratings and greater access to the capital markets hold less cash. Dittmar and Mahrt-Smith (2007) find that firms with weaker corporate governance use cash more quickly than those with stronger governance. Similarly, Harford, Mansi, and Maxwell (2008) focus on corporate governance effects on U.S. firms’ cash holdings. They show that firms with poorer corporate governance structure have lower cash reserves. Palazzo (2012) develops a model that suggests that riskier firms tend to hold more cash due to precautionary savings motive as these firms have higher correlation between cash flows and aggregate shocks.

With data on bank lines of credit becoming publicly available, Sufi (2007) empirically examines the factors that affect firms’ decisions to use bank lines of credit or cash in corporate liquidity management. He finds that firms with low cash flow tend to rely heavily on cash, and they are less likely to obtain or granted a line of credit. Bank lines of credit are a viable liquidity substitute for firms with high cash flow. Yun (2009) finds that corporate governance affects firms’ choices between cash and lines of credit. When the threat to takeover is weak, firms tend to hold onto more cash relative to their lines of credit. Lins, Servaes, and Tufano (2010) conduct an international survey on CFOs from 29 countries. They suggest that the purposes of lines of credit and cash are different. Cash is to protect against future cash flow shocks in downturns; lines of credit are used mainly for future business growth opportunities. Though, theoretically, lines of credit are considered to be more efficient liquidity buffers than cash (see, for example, Holmstrom and Tirole, 1998), Demiroglu and James (2011) argue that lines of credit are imperfect substitute for cash as the access to lines of credit depends on the credibility of the borrowers and banks’ lending standards. Campello, Giambona, Graham, and Harvey (2011) specifically study the corporate liquidity management during the recent 2008–2009 financial crisis. They show how firms substitutes credit lines and cash when facing a severe credit shortage. They find that credit lines are

⁶ Commercial papers are not common among REITs for liquidity. Simon Property Group (SPG) is the first U.S. REIT to establish a commercial paper program in 2014. Source: <http://www.sidley.com/en/news/sidley-participates-in-simon-property-groups-first-us-reit-global-commercial-paper-program-11-06-2014>

associated with corporate spending when the firm is not cash strapped. They provide evidence that lines of credit ease the impact of financial crisis on spending.

For the REIT industry, there are a few studies on the liquidity management of REIT firms. Hardin, Highfield, Hill, and Kelly (2009) examine the determinants of REIT cash holdings. They study equity REIT firms over the period 1998 to 2006. After controlling for property types, they find that REIT cash holdings are significantly negatively related to funds from operation (FFO), leverage, size, internal advisement, accessibility to lines of credit, and used lines of credit. Market-to-book ratio is significantly positively related to REIT cash holdings. Chen, Wang, and Shyu (2012) show that REIT managers determine the cash holding policies accordingly to future growth opportunities and external cost of capital. They also find evidence that REIT managers choose to hold less cash to reduce agency problems, supporting the pecking order theory.

As in the general corporate finance literature, with the data for lines of credit becoming more publicly available for research, studies on REIT liquidity management have shifted to examine the interaction and choices between cash and bank lines of credit. Hardin and Hill (2011) specifically discuss the trend of credit line availability and utilization in REIT industry. They find that the availability and utilization has become more and more popular during the sample period of 1999 to 2009. REIT firms, during the same sample period, tend to maintain precautionary liquidity through lines of credit rather than holding cash. Hill, Kelly, and Hardin (2012) investigate the market value of REIT corporate liquidity. They find that during the recent financial crisis, the stock market apparently values cash more than unused credit line capacity.

An, Hardin, and Wu (2012) examine the effects of information asymmetry on a REIT firm's choice between cash and credit lines. They find that information asymmetry, as measured by analyst forecast errors and dispersions, is inversely related to the use of credit lines. More transparent REIT firms are more likely to use bank lines of credit relative to cash for liquidity management. In their paper, information asymmetry is directly related to borrowing costs. If a firm has more information asymmetry, the cost of monitoring and due diligence is higher for the lenders. Therefore, lenders (usually banks) would pass on the high costs to the borrowers. Furthermore, lines of credit may be rationed towards more transparent firms. Thus, less transparent firms may have to rely on cash for liquidity.

REIT Tenant Quality

Conventional wisdom in real estate industry emphasizes tenant quality. In housing market, Benjamin, Chinloy, and Sirmans (2000) study the landlord decisions regarding whether to accept subsidized and unsubsidized tenants in Washington DC apartment market. Subsidized tenants tend to reduce overall tenant quality and to induce higher operating costs. They find that accepting HUD Section 8 tenants improves revenues, but marketing for them reduces revenues. Subsidized tenants may eventually crowd out unsubsidized tenants. In commercial real estate markets, Smith (2009) advocates that "property is only as strong as the tenant". However, there is limited academic literature on impacts of tenant quality on commercial real estate markets and real estate firms' behavior.

Giambona, Harding, and Sirmans (2008) use lease maturity structure as one proxy for the liquidation value of assets⁷ in REIT firms. They argue that leases with shorter maturity structure are associated with greater value because of the real option value attached to them. The studies by Liu, Liu, and Zhang (2016) and Liu and Liu (2013) are the closest works to include tenants as part of real estate studies. Liu et al. (2016) examine the impact of asset liquidation value on REIT financing choices. Tenant quality is one of the measurements for asset liquidation value in their research. They suggest that tenant financial stability (as measured by Altman Z-score) has a positive effect on the asset liquidation value of real estate. REIT firms with higher quality of tenants tend to issue debt over equity. Liu and Liu (2013) offers perspective in retail real estate industry. Liu and Liu (2013) examine landlord firms' stock return reactions to the tenant firm's bankruptcy announcements. They show that a tenant bankruptcy has a less negative or more positive effect of a landlord's stock returns in a good economic condition. Their story is consistent with growth option theory that, in the event of a tenant's bankruptcy, the landlord firm can exercise the growth option associated with the departure of the tenant, and thus generate higher stock returns.

Hypothesis Development

The role of tenant quality is substantially understudied in real estate literature. My research contributes to this side of REIT literature and bridges the gap between tenant quality and REIT liquidity management. The financial health and credibility of tenants matter to the cash flow and cash flow risk in REIT firms. Higher tenant quality mitigates the lease counterparty risk and improves asset quality (Liu, Liu, and Zhang, 2016). If REIT firms are motivated by precautionary savings, high tenant quality and tenant credibility may reduce the incentive for REIT firms to hold additional liquidity. High tenant quality may also imply that it is less likely for REIT firms to incur additional collection/searching costs and re-contract for a new tenant across their investment horizons.

REIT firms tend to use the tenants' financial information from previous period when the lease agreements are signed. Therefore, the relation between tenant quality and REIT corporate liquidity management may be a lead-lag relation. REIT liquidity management may depend on the financial health and creditworthiness of the tenants from previous period. Once a REIT firm leases with a reputable and quality tenant firm, the REIT firm may adjust their expectations positively for the near future regarding cash flows and cash flow volatility. It may reduce its corporate liquidity to mitigate potential agency problems associated with free cash. It may also utilize its corporate

⁷ Shleifer and Vishny (1992) is one of the first studies to link liquidation value to debt capacity (leverage) of a firm. Liquidation value is associated with asset illiquidity. When a firm is financially distressed, the firm decides to liquidate its assets. If there is an industry-wide shock, the assets are likely to be sold to investors outside the industry at a discount. Thus, asset illiquidity is a potential cost to creditors and affects the firm's capital structure. They predict that firm leverage falls as liquidation value falls. Their model also predicts that debt maturity and liquidation value are positively correlated. Giambona, Harding, and Sirmans (2008) argue that lease maturity is negatively related to the liquidation value of the REIT firm. They show evidence that lease maturity is negatively associated to leverage and debt maturity, which, in turn, confirms the predictions from Shleifer and Vishny (1992).

liquidity to fund growth or investment opportunities. Thus, my first and main hypothesis is as follows:

Hypothesis 1 REIT firms with better quality tenants tend to hold lower liquidity relative to the total assets in the subsequent year, *ceteris paribus*.

Because recent literature on liquidity management has been focusing on the choices between cash and lines of credit, my research continues with this direction. Lins et al. (2010) suggest that cash is to protect against future shocks; while lines of credit are used mainly for future business growth opportunities. If firms use cash and lines of credit according to different business purposes, their liquidity management decisions between cash and lines of credit may react differently to tenant quality as well. If REIT firms with high tenant quality tend to grow or expand rapidly, these REIT firms may tend to use lines of credit to fund their growth/expansion opportunities. Thus, my second hypothesis is as follows:

Hypothesis 2 REIT firms with better quality tenants tend to use more of their lines of credit and have lower portion of unused credit lines relative to their total assets and/or total liquidity.

Data and Research Design

Tenant Quality Information

From SNL Financial, I obtain the company names of the Top Five Tenants⁸ for U.S. REIT firms for the period of year 2000 to 2013. By hand-collecting and manually searching the information on these tenants, I am able to classify the tenants into three categories: publicly-traded firms,⁹ government agencies/state-owned enterprises,¹⁰ and private firms. Because only publicly traded firms have publicly available financial information, I focus on these tenants in this study. In other words, a REIT firm that has at least one of their top five tenants being a public firm is included in the sample. Our whole sample includes 171 unique REIT firms. Table 1 shows the brief summary of the number of REIT firms by year in our sample.

Next, I retrieve the financial information of these publicly-traded tenants from Compustat. Important financial statement data, such as total assets, cash holdings, working capital, retained earnings, EBIT, sales, net income, long-term debt, market capitalization, and book value, are retrieved from the database.

⁸ The decision to take the Top 5 tenants is arbitrary. An expansion and extension of this research is underway to include Top 25 tenant firms for US REIT firms.

⁹ If a tenant firm is a subsidiary of a publicly-traded parent firm, the financial information of the parent firm is used to proxy for the financial health of the subsidiary firm.

¹⁰ One would consider that the federal government has the highest credibility, and the state governments have relatively high credibility as well due to their tax powers. However, in this research, it is difficult to quantify their quality, such as size, growth opportunity, credibility, and profitability, comparable to a typical tenant firm.

Table 1 Number of REIT Firms by Year

Year	Number of REITs
2000	53
2001	60
2002	73
2003	77
2004	77
2005	79
2006	69
2007	68
2008	80
2009	94
2010	102
2011	107
2012	112
2013	79

This table shows the number of REIT firms in the sample by year. There are total of 171 unique REIT firms in the sample for the period 2000–2013

To quantitatively measure tenant quality, I use the following measurements of the tenants:

a. Altman Z-score¹¹

Altman Z-score is a straightforward measurement using a firm’s 10-K filings to proxy for a firm’s financial health. The higher the Z-score is, the better financial shape a firm is considered to be. In this research, I follow Altman (1968) to calculate the Altman Z-score:

$$Z\text{-score} = 1.2 \times WC/TA + 1.4 \times Retained/TA + 3.3 EBIT/TA + 0.6 \times LEVERAGE + 1.0 \times sales/TA \tag{1}$$

Where, WC is working capital; TA is total assets; Retained is retained earnings; EBIT is earnings before interest and taxes; LEVERAGE is defined as the ratio between market capitalization of common equity and the book value of the total debt.

b. Tenant S&P long-term credit rating

Alternatively to Altman Z-score, I also obtain the monthly S&P credit ratings of the tenants if available. The credit ratings for the tenants in my sample range from AAA to BB-, with 12 different ratings. To quantify these ratings, I assign the value of 0 to “BB-”, 1 to “BB”, 2 to “BB+”, and all the way up to 12 assigned to “AAA” rating. For a given year, the average of the monthly ratings is used to represent the credit rating of the tenant for that year. Certainly, the higher the credit rating, the better quality the tenant firm is considered to be.

¹¹ Alternative Altman Z-score proposed by Altman (2000) is also calculated. The main results are very similar to the results from the original Z-score. Results are available upon request.

c. Tenant Size

The size of tenants is measured by the logarithm of total assets. Tenant size can be considered as a crucial proxy for the tenant's information asymmetry (see, e.g. Atiase 1985, Collins et al., 1987, and Freeman, 1987), market power (Barla, 2000), capital accessibility (see, e.g. Slovin, Johnson, and Glascock, 1992; Chittenden, Hall, and Hutchinson, 1996), and industry reputation (Roberts and Dowling, 2002). Large tenants tend to provide more transparent information on their financial situations. Thus, REIT firms which sign with these large tenants tend to have lower expected volatility in their future cash flows, hence, lower demand for liquidity.

d. Tenant Book-to-Market ratio

Tenant Book-to-Market ratio (B/M, henceforth) is measured as the logarithm of the ratio between the book value per share and the market value per share at the end of each fiscal year. This measure is related to the growth opportunities and maturity of tenants.

e. Tenant ROA

Tenant ROA is measured by net income divided by total assets. Return on assets (ROA) is considered to be an efficient measurement of a firm's profitability and financial performance. Generally, tenant firms with higher profitability are treated as better quality firms.

REIT Firm Information

Define Liquidity Management

Liquidity management is related to how firms manage the liquid assets on their balance sheet. In this research, I define REIT corporate liquidity management in the following ways:

- a. Total Liquidity = (Cash + Unused Credit)/Total Assets
- b. Cash = Cash and Equivalents/Total Assets
- c. UC/TA = Unused Credit/Total Assets
- d. Total Credit = Total Credit Available/(Total Credit Available + Cash)
- e. UC/TLQ = Unused Credit/(Unused Credit + Cash)

Measure (a), total liquidity (aka, Total LIQ), referring to Hardin and Hill (2011), is the sum of cash and unused credit line, scaled by total assets. Measures (b) and (c) are decomposed from Measure (a) as Hill et al. (2012) suggest that market values differently between pure cash and unused credit line. The first three measures are all scaled by total assets. Measures (d) and (e) are borrowed from Sufi (2009) and An et al. (2012). Total Credit reduces concerns that certain REIT firms consistently draw on their lines of credit. UC/TLQ measures the fraction of liquidity available to a REIT firm from bank lines of credit.

REIT Firm Characteristics

Hardin et al. (2009) suggest that the determinants of REIT cash holdings include FFO, M/B, Size, Leverage, Advisement Type, and Property Type. Following their research, I

use these determinant variables¹² as control variables for REIT firm characteristics. FFO is calculated as funds from operation divided by total assets. M/B is the logarithm of the ratio of market value of equity plus total liabilities minus credit line drawn to total assets. Size the natural logarithm of total revenues. Leverage is calculated as the ratio of total debt minus credit line drawn to total assets. Advisement Type (ADV) is an indicator variable equal to 1 if the REIT firm is self-advised, and 0 otherwise. Property type is classified into seven categories: office, retail, industrial, and others. The type “Others” include Diversified, Self-storage, Health Care, and Specialty. I report the results by property types separately in the result section.

Research Design

The financial information of tenants and REIT firms collected from WRDS and SNL are merged for the period of 2000 to 2013. Table 2 shows the summary statistics of all the variables used in the empirical tests. Cash ratio, on average, is around 2.42 %, which is comparable to the cash ratio of 2 % presented in Damodaran (2005). Total liquidity is around 11.38 % of total assets on average, among which 8.98 % comes from unused credit line capacity. This result is consistent with the documented fact that credit line utilization is more and more popular among REIT firms in recent years (Hardin and Hill, 2011). Also, I find that the majority (over 88 %) of the REIT firms in the sample are self-advised, which is consistent with the findings in Hardin et al. (2009).

I use the following model to test the main hypothesis that REIT firms with better quality tenants tend to hold lower liquidity relative to the total assets in the subsequent year (i.e. a lead-lag relation between tenant quality and REIT liquidity management):

$$Liquidity\ Management_{i,t} = \alpha + \beta_1 Zscore_{i,t-1}^T + \beta_2 Size_{i,t-1}^T + \beta_3 B / M_{i,t-1}^T + \beta_4 ROA_{i,t-1}^T + \beta_5 FFO_{i,t-1} + \beta_6 Size_{i,t-1} + \beta_7 M / B_{i,t-1} + \beta_8 Lev_{i,t-1} + \beta_9 ADV_{i,t-1} + \varepsilon_{i,t} \tag{2}$$

The rationale behind Model (2) is that, when a tenant firm and a REIT firm sign a lease agreement, the REIT firm, as the landlord, examines the tenant information from the previous fiscal year. Thus, the tenant quality from the previous period may subsequently have an implication on the corporate liquidity management of REIT firms.

¹² Please refer to Hardin et al. (2009) for elaborative explanations for these determinants. FFO is considered as a proxy for REIT cash flows. Cash and cash flows are expected to have an inverse relation (Opler et al., 1999). M/B (market-to-book) ratio is a proxy for growth opportunities for REIT firms (Giambona et al., 2007). One expects that there is a positive relation between cash and market-to-book ratio either because the REIT firms need to have more cash to fund their growth or because REIT firms have to hold more cash due to increased cost of external finance. Size is considered to be a proxy for capital market access. The larger the firm is, the easier it is to borrow or issue new equity. Therefore, I expect a negative relation between cash and size. Leverage can be used as a mechanism to reduce the agency costs caused by free cash flow problem (Jensen, 1986). I expect an inverse relation between corporate liquidity and leverage. Self-advised (i.e. internally-advised) REITs have fewer agency problems than externally-advised REITs because internal advisers have an ownership in the REIT firm they advise. Ambrose and Linneman (2001) find that externally-advised REITs are more financial constrained than internally-advised REITs. Capozza and Seguin (2000) document that the agency problems associated with external advisement cause the underperformance of these REITs compared to their self-advised peers.

Table 2 Summary Statistics of REITs and Their Tenant Firms

Panel A: Summary Statistics of REITs					
Variable	N	Mean	Std Dev	Minimum	Maximum
Total Liquidity (TLQ)	3648	0.1138	0.0975	0.0026	1.9270
Cash	3677	0.0242	0.0440	0.0000	0.6261
UC/TA	3656	0.0898	0.0888	0.0000	1.8019
Total Credit (TC)	3655	0.8098	0.2705	0.0000	1.0000
UC/TLQ	3648	0.7475	0.2907	0.0000	1.0000
FFO	3536	0.0496	0.0218	0.0000	0.1965
Size	3685	12.5236	1.4007	3.4012	15.6643
M/B	3116	0.2326	0.1971	0.0003	1.0878
Leverage	3124	0.4231	0.1431	0.0000	0.9933
ADV	3713	0.8847	0.3194	0.0000	1.0000
Panel B: Summary Statistics of Tenant Firms					
Variable	N	Mean	Std Dev	Minimum	Maximum
TA	3073	134323.1100	411207.9600	46.7640	3771199.8500
NI	3072	2586.6100	4843.2600	0.1460	104821.0000
EBIT	3069	4823.6200	8740.2600	0.0800	80053.0000
Leverage	2999	2.4058	3.4753	0.0001	62.2762
WC/TA	2713	0.1632	0.1494	0.0000	0.8688
Sales/TA	3072	1.3740	1.0278	0.0008	16.5158
Retained/TA	3004	0.3614	0.4062	0.0000	10.3523
Z-score	2585	3.9868	2.6500	0.0232	37.5326
Credit Rating	2374	5.2462	2.8122	0.0000	12.0000
LNTA	3073	9.6927	1.9499	3.8451	15.1429
LNBM	2826	1.0047	0.6662	0.0032	7.6199
ROA	3072	0.0753	0.0802	0.0000	2.2012

This table shows the summary statistics of the variables used in the empirical analysis. Panel A shows the summary statistics of REIT firms in the sample; Panel B shows the summary statistics of tenant firms in the sample. Variable definitions can be referred to Table 8

Alternatively, tenant credit rating variable serves as a substitute variable to Z-score variable in the empirical setting. Because of the high correlation between tenant credit rating and tenant size (shown in Table 3), I exclude tenant size when I test the models with tenant credit ratings.

Empirical Results and Analysis

Before the regression analysis, I show the correlation matrix among all the variables used in the empirical tests in Table 3. Tenant Altman Z-score is negatively correlated with total liquidity, though insignificantly. Pure cash holding is negatively correlated with tenant Z-score and tenant credit ratings as expected, though insignificantly. Also, tenant Z-score is positively correlated with total credit line available.

Table 3 Correlation Matrix

Pearson Correlation Matrix														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
TLQ	Cash	UC/TA	TC	UC/TLQ	Z	Rating	LNTA	LNBM	ROA	FFO	Size	M/B	Lev	ADV
1	1.00	0.41***	0.89***	0.05***	0.16***	-0.03	-0.01	-0.03*	-0.01	0.10***	-0.30***	0.14***	-0.44***	-0.08***
2		1.00	-0.04**	-0.55***	-0.02	-0.02	0.05***	-0.05**	-0.04**	-0.17***	-0.31***	0.08***	-0.18***	-0.28***
3			1.00	0.36***	0.45***	0.01	-0.03*	-0.01	0.00	0.19***	-0.17***	0.11***	-0.41***	0.05***
4				1.00	0.92***	0.02	-0.04*	0.07***	0.06***	0.29***	0.23***	-0.03*	-0.05**	0.44***
5					1.00	0.01	-0.03	0.08***	0.07***	0.30***	0.22***	-0.01	-0.18***	0.41***
6						1.00	0.14***	0.35***	0.24***	0.03	-0.04*	0.02	0.03	0.03
7							1.00	0.26***	0.03*	-0.02	0.00	-0.10***	-0.05**	0.01
8								1.00	-0.15***	-0.07***	0.10***	-0.05***	0.03	0.06***
9									1.00	0.44***	0.00	-0.01	-0.11***	0.01
10										1.00	-0.03*	0.08***	0.01	0.01
11											1.00	0.32***	-0.43***	0.12***
12												1.00	0.04**	0.35***
13													1.00	-0.30***
14														1.00
15														

This table shows the Pearson correlation matrix among the variables in the main empirical analysis. The Table 8 shows the variable definitions. *** indicates 1 % significance, ** indicates 5 % significance, * indicates 10 % significance

Now, in this section, I report the regression results for Model (2). All regressions include year dummies to control for time fixed effects. Standard errors are clustered by firm to calculate the t-statistics for all regression results (Petersen, 2009).

Pooled Regressions

Table 4 shows the results for the pooled OLS regressions for Model (2). Model (2) intends to test the effects from previous-year tenant quality on the REIT liquidity management. The reason to examine the lead-lag relationships between REIT corporate liquidity and tenant quality is that REIT firms will look at the former period financial information of potential tenants when they decide to sign the lease agreements. As expected, I show that tenant quality has a significant impact on the corporate liquidity management of REIT firms in the subsequent year.

Panel A in Table 4 shows that the tenant Z-score is significantly negatively related to the total corporate liquidity holdings of REIT firms. When a tenant firm has higher level of financial health, REIT firms decide to hold less liquid assets relative to total assets. These REIT firms achieve this lower level of corporate liquidity by leaving lower portion of unused credit lines relative to their total assets.

Tenant size also plays a crucial role in the corporate liquidity management of REITs. Larger tenants lead to a lower level of total liquidity and unused credit lines for REIT firms in the subsequent year. REIT firms with larger tenant firms also tend to have lower total credit available and more account receivables. As size is often considered as a proxy for information asymmetry (see, e.g. Atiase 1985, Collins et al., 1987, and Freeman, 1987), large tenant firms tend to have more transparency in their financial health, and thus, better quality in their reported earnings. Size can also be considered as a proxy for capital market accessibility (see, e.g. Slovin, Johnson, and Glascock, 1992; Fazzari and Petersen, 1993; Chittenden, Hall, and Hutchinson, 1996). Large tenant firms tend to have more financial flexibility and fewer borrowing constraints. Alternatively, size can be considered as a proxy for industry reputation (Roberts and Dowling, 2002). Large tenant firms tend to be more reputable, and thus, less likely to default on their rental commitments. Therefore, REIT firms with these large tenants have lower expected volatility in their future cash flows. This results in lower level of precautionary saving and lower demand in corporate liquidity.

Moreover, I find that REIT firms with value tenant firms (high B/M ratio) tend to hold less cash. This may be the consequence that value firms are usually well-established firms, and REIT landlords manage their cash holdings based on the tenant firms' reputation and maturity. Tenant firm profitability (Tenant ROA) shows the correct but insignificant signs on the coefficients.

Panel B tells a similar, yet a bit different, story. Tenant credit ratings from the previous year are negatively correlated to the pure cash holdings of REIT firms in the subsequent year, even though insignificantly. Higher credit ratings lead to lower cash and cash equivalent holdings relative to total assets of REIT firms. REIT firms whose tenant firms have higher book-to-market ratios tend to have less cash in the subsequent year. If one considers book-to-market ratio as a proxy for firm maturation, then this result is expected. More mature tenants tend to reduce payment uncertainty, and thus, cash flow volatility of the REIT firms. Therefore, these REIT firms tend to hold less cash on their books. These REIT firms also tend to have more total credit available and

Table 4 Lagged Tenant Quality and REIT Corporate Liquidity

Panel A: Tenant Z-score					
	TLQ	Cash	UC/TA	TC	UC/TLQ
Intercept	0.2650*** (4.76)	0.0293 (0.98)	0.2377*** (4.11)	0.8550*** (3.87)	0.7681*** (2.90)
Tenant Z _{t-1}	-0.0004** (-2.23)	-0.00002 (-0.37)	-0.0004** (-2.19)	0.0001 (0.21)	-0.0003 (-0.61)
Tenant Size _{t-1}	-0.0028* (-1.87)	0.0007 (0.97)	-0.0034** (-2.36)	-0.0095** (-2.00)	-0.0129** (-2.05)
Tenant B/M _{t-1}	0.0023 (1.04)	-0.0011* (-1.69)	0.0034 (1.51)	0.0128** (2.17)	0.0174** (2.27)
Tenant ROA _{t-1}	-0.012 (-0.66)	-0.005 (-1.34)	-0.0072 (-0.40)	0.005 (0.15)	0.0155 (0.27)
REIT FFO _{t-1}	0.4772** (2.22)	0.0247 (0.24)	0.4418** (2.18)	1.4869* (1.73)	1.3595 (1.33)
REIT LEV _{t-1}	-0.0823 (-8.27)	-0.0058 (-1.61)	-0.0763 (-7.79)	-0.0365 (-1.39)	-0.0758 (-1.99)
REIT M/B _{t-1}	0.0372** (2.29)	-0.0009 (-0.10)	0.0392** (2.55)	-0.0466 (-0.70)	0.0158 (0.21)
REIT Size _{t-1}	-0.0100** (-2.50)	-0.0005 (-0.24)	-0.0095*** (-2.76)	-0.0069 (-0.50)	-0.0011 (-0.06)
REIT ADV _{t-1}	-0.0537** (-2.05)	-0.0143 (-1.44)	-0.0394 (-1.41)	0.0861 (0.95)	0.06 (0.54)
Year	Yes	Yes	Yes	Yes	Yes
No. Obs	2105	2122	2110	2110	2105
RSQ	16.88	3.207	17.53	6.153	6.242
Panel B: Tenant Credit Rating					
	TLQ	Cash	UC/TA	TC	UC/TLQ
Intercept	0.3299*** (5.49)	0.0352 (0.91)	0.2974*** (5.42)	0.9771*** (4.57)	0.9694*** (3.90)
Tenant Rating _{t-1}	0.00001 (0.01)	-0.0007 (-1.40)	0.0008 (0.65)	0.0057 (1.39)	0.0051 (1.09)
Tenant B/M _{t-1}	-0.0019 (-0.79)	-0.0021** (-2.13)	0.0003 (0.13)	0.0151** (2.13)	0.0193** (2.34)
Tenant ROA _{t-1}	0.0114 (0.60)	-0.0145* (-1.95)	0.025 (1.40)	0.1434* (1.83)	0.1858** (2.17)
REIT FFO _{t-1}	0.0851 (0.35)	-0.0415 (-0.35)	0.1216 (0.54)	1.0137 (1.53)	0.8036 (0.92)
REIT LEV _{t-1}	-0.1289*** (-3.55)	-0.0201 (-1.32)	-0.1083** (-2.40)	-0.1797 (-0.78)	-0.2634 (-0.96)
REIT M/B _{t-1}	0.0408 (1.59)	-0.0044 (-0.38)	0.0457 (1.63)	-0.0361 (-0.32)	0.0269 (0.19)
REIT Size _{t-1}	-0.0091** (-2.10)	0.0012 (0.46)	-0.0104*** (-2.64)	-0.015 (-0.92)	-0.0132 (-0.71)
REIT ADV _{t-1}	-0.0610*** (-3.06)	-0.0109 (-1.16)	-0.0501*** (-2.74)	0.0194 (0.33)	-0.029 (-0.41)
Year	Yes	Yes	Yes	Yes	Yes
No. Obs	1710	1726	1714	1714	1710
RSQ	24.45	5.174	25.42	9.583	11.6

This table shows the regression results on the lead-lag effects of tenant quality on REIT corporate liquidity management after I control for REIT firm characteristics. Panel A shows the results with tenant Z-scores; Panel B shows the results with tenant credit ratings. The Table 8 shows the variable definitions. I control for year fixed effects for all the regression models. Standard errors are clustered by firm to calculate the t-statistics. *** indicates 1 % significance; ** indicates 5 % significance; * indicates 10 % significance

increased unused credit lines in the following period. Tenant ROA paints a similar picture as tenant book-to-market ratio. High profitable tenant firms reduce the landlord REIT firms' pure cash holdings, and increase their total credit lines and unused credit available in the subsequent year.

Regression Results by Property Types

Hardin et al. (2009) suggest that the structure and length of the REIT property leases affect underlying cash flows, and they vary by property type. However, Hardin et al. (2009) control for property fixed effects by creating property type dummies in their REIT cash holding study. This only shows the parallel shift in the intercepts of the regression results. In this research, I am more interested in the regression results within each different property type. Thus, in this section, I perform analysis based on Model (2) for each property type in my sample (i.e. office REITs, retail REITs, industrial REITs, and other REITs).

Table 5 and Table 6 report the lead-lag relation between tenant quality and REIT liquidity management based on Model (2), using tenant Z-score and tenant credit ratings, respectively, within each property type. For office REITs, tenants' Z-score and tenant size are significantly negatively related to total liquidity holdings and unused credit relative to total assets in the subsequent year as expected (see Panel A Table 5). Similarly, for other REITs (Panel D), tenant Z-score is significantly negatively related to unused credit relative to total liquidity in the subsequent year. For retail REITs (Panel B), both tenant Z-score and tenant size show consistent but insignificant signs on total liquidity and unused credit lines. For industrial REITs (Panel C) and other REITs (Panel D), tenant size is the most important tenant quality factor: larger tenant firms lead to lower total liquidity, lower unused credit, and lower total credit line available.

Panel A from Table 6 shows mixed results. I find that higher tenant ROA leads to lower cash holdings in office REITs in the subsequent year as expected. However, higher tenant credit ratings lead to higher total liquidity and higher unused credit within office REITs. For retail REITs (Panel B Table 6), higher tenant credit ratings lead to higher total credit available in the following year. Panel C shows that industrial REITs with tenants with higher credit ratings tend to hold less cash, more total credits, and more unused credits in the subsequent year. For other REITs (Panel D), tenant credit ratings are significantly negatively correlated to the total liquidity holdings and account receivables in the subsequent year.

Overall, I find differences in the impacts of tenant quality on the liquidity management policies across different property types. Tenant size seems to play quite an important role as a proxy for tenant quality to REIT liquidity management. These results are consistent with the findings in the pooled sample regressions.

Robustness Check

Giambona, Harding, and Sirmans (2008) suggest that REIT firms specializing in the most liquid assets use more leverage and longer debt maturities. They suggest that REIT firms consider debt maturity and leverage as substitutes. In their study, lease

Table 5 Lagged Tenant Quality (Z-score) and REIT Corporate Liquidity by Property Types

	Panel A: Office REITs				Panel B: Retail REITs				Panel C: Industrial REITs						
	TLQ	Cash	UC/TA	TC	UC/TLQ	TLQ	Cash	UC/TA	TC	UC/TLQ	TLQ	Cash	UC/TA	TC	UC/TLQ
Intercept	0.2398*** (3.05)	-0.0072 (-0.19)	0.2587*** (2.90)	1.1937*** (4.03)	1.0120*** (2.78)	0.3080*** (5.15)	0.0265 (0.60)	0.2822*** (5.28)	1.0809*** (4.55)	1.1762*** (3.71)					
Tenant Z _{t-1}	-0.0005** (-2.11)	-0.0001 (-1.42)	-0.0004* (-1.98)	0.0003 (0.81)	-0.0001 (-0.27)	-0.00001 (-0.02)	0.0001 (0.23)	-0.0001 (-0.09)	-0.0009 (-0.36)	-0.0013 (-0.35)					
Tenant Size _{t-1}	-0.0035* (-1.90)	-0.0008 (-0.81)	-0.0026** (-2.12)	-0.0012 (-0.31)	-0.0028 (-0.69)	-0.0022 (-1.12)	0.0005 (0.35)	-0.0027 (-1.40)	-0.0047 (-0.69)	-0.0095 (-1.08)					
Tenant B/M _{t-1}	0.0063** (2.23)	0.0012 (0.55)	0.0052 (1.52)	0.0082 (0.49)	0.0156 (0.84)	0.0012 (0.36)	-0.001 (-1.11)	0.0022 (0.63)	0.0125 (1.58)	0.0211* (1.81)					
Tenant ROA _{t-1}	-0.0011 (-0.05)	-0.0119 (-1.24)	0.0092 (0.61)	0.1008 (1.56)	0.1319* (1.90)	-0.0301 (-0.82)	0.0014 (0.07)	-0.0314 (-0.88)	-0.0407 (-0.30)	-0.0733 (-0.45)					
REIT FFO _{t-1}	0.8743* (2.03)	0.1231 (0.99)	0.7127* (1.96)	1.5006 (1.57)	0.8704 (0.56)	-0.1792 (-0.77)	-0.1004 (-0.60)	-0.0757 (-0.39)	0.8557 (1.00)	0.4802 (0.46)					
REIT LEV _{t-1}	-0.1315** (-2.42)	0.0106 (0.49)	-0.1412* (-2.00)	-0.7159* (-1.84)	-0.7703* (-1.77)	-0.1879*** (-5.76)	-0.0279* (-1.91)	-0.1597*** (-4.84)	-0.0164 (-0.13)	-0.2932 (-1.65)					
REIT M/B _{t-1}	0.0426 (1.44)	0.0267 (1.48)	0.017 (0.48)	-0.4033** (-2.04)	-0.3432* (-1.72)	0.0379** (2.33)	-0.0029 (-0.27)	0.0411*** (2.49)	-0.0237 (-0.28)	0.0264 (0.25)					
REIT Size _{t-1}	-0.0091 (-1.50)	0.0012 (0.39)	-0.0109 (-1.66)	-0.0087 (-0.43)	0.0081 (0.31)	-0.0079* (-1.72)	0.0003 (0.08)	-0.0082** (-2.32)	-0.0189 (-0.96)	-0.0181 (-0.78)					
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes					Yes
No. Obs	464	468	469	464	464	1082	1091	1082	1086	1082					1082
RSQ	36.79	11.13	33.33	27.34	23.93	37.71	5.90	39.82	7.31	13.88					
	Panel C: Industrial REITs				Panel D: Other REITs										
	TLQ	Cash	UC/TA	TC	UC/TLQ	TLQ	Cash	UC/TA	TC	UC/TLQ	TLQ	Cash	UC/TA	TC	UC/TLQ

Table 5 (continued)

Intercept	0.0254 (0.25)	-0.0507 (-1.50)	0.0789 (0.72)	1.0047** (2.92)	0.7467 (1.21)	0.2865*** (4.45)	0.0442 (0.67)	0.2421*** (3.67)	0.7448 (1.42)	0.5983 (1.15)
Tenant Z_{t-1}	0.0010* (2.25)	0.0008** (2.78)	-0.0001 (-0.16)	-0.0078** (-2.43)	-0.0107 (-1.66)	-0.0021 (-1.17)	0.0006 (0.59)	-0.0027 (-1.54)	-0.011 (-1.64)	-0.0151* (-1.94)
Tenant Size $_{t-1}$	-0.0045* (-1.93)	0.0052*** (4.65)	-0.0102*** (-3.81)	-0.0534*** (-4.85)	-0.0848*** (-5.35)	-0.0109*** (-4.87)	0.0022* (1.98)	-0.0131*** (-5.24)	-0.0298*** (-3.23)	-0.0446*** (-3.93)
Tenant B/M $_{t-1}$	-0.0066 (-1.49)	-0.0009 (-0.30)	-0.0038 (-0.62)	0.0204 (1.37)	0.0069 (0.19)	-0.0054 (-1.64)	-0.0024* (-1.74)	-0.003 (-0.92)	0.009 (0.94)	0.0044 (0.41)
Tenant ROA $_{t-1}$	-0.059 (-1.81)	-0.0008 (-0.02)	-0.0876* (-1.97)	-0.2757 (-1.68)	-0.1828 (-0.44)	-0.0324 (-0.78)	-0.0045 (-0.44)	-0.0265 (-0.76)	-0.0273 (-0.38)	-0.1774 (-1.31)
REIT FFO $_{t-1}$	0.388 (1.25)	-0.0499 (-0.24)	0.3431 (0.85)	-0.0625 (-0.04)	1.3877 (0.50)	0.6305 (1.21)	0.015 (0.07)	0.6155 (1.47)	2.3023 (1.52)	1.6583 (1.11)
REIT LEV $_{t-1}$	-0.2878*** (-4.00)	0.0661 (1.51)	-0.3027*** (-4.00)	-0.4137 (-1.54)	-0.9877** (-2.42)	-0.073*** (-4.11)	-0.0399 (-0.69)	-0.069*** (-4.00)	-0.0667 (-1.64)	-0.0462 (-0.87)
REIT M/B $_{t-1}$	-0.0777** (-2.52)	0.0375* (1.90)	-0.0839** (-2.98)	-0.1351 (-1.54)	-0.3327* (-2.03)	-0.0274 (-0.72)	-0.0145 (-0.64)	-0.0129 (-0.49)	-0.029 (-0.19)	-0.0388 (-0.28)
REIT Size $_{t-1}$	0.0154* (1.98)	-0.0007 (-0.49)	0.0157* (1.97)	0.0489* (1.98)	0.1001** (2.60)	-0.0073 (-1.50)	-0.0023 (-0.46)	-0.005 (-1.06)	0.0199 (0.53)	0.0405 (1.05)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Obs	122	125	122	122	122	437	438	437	438	437
RSQ	35.63	37.75	35.23	41.74	50.68	18.94	8.06	25.00	20.19	22.62

This table shows the regression results on the lead-lag effects of tenant Z-scores and tenant quality on REIT corporate liquidity management after I control for REIT firm characteristics by property types. Panel A shows the results for office REITs; Panel B shows the results for retail REITs; Panel C shows the results with industrial REITs; Panel D shows the results with other REITs. The appendix shows the variable definitions. I control for year fixed effects for all the regression models. Standard errors are clustered by firm to calculate the t-statistics. *** indicates 1 % significance; ** indicates 5 % significance; * indicates 10 % significance

Table 6 Lagged Tenant Quality (Credit Rating) and REIT Corporate Liquidity by Property Types

	Panel A: Office REITs					Panel B: Retail REITs					Panel C: Industrial REITs					Panel D: Other REITs				
	TLQ	Cash	UC/TA	TC	UC/TLQ	TLQ	Cash	UC/TA	TC	UC/TLQ	TLQ	Cash	UC/TA	TC	UC/TLQ	TLQ	Cash	UC/TA	TC	UC/TLQ
Intercept	0.1543** (2.09)	-0.0647 (-1.24)	0.2327** (2.32)	1.1606** (2.49)	1.0279** (2.12)	0.3058*** (3.86)	0.0413 (0.66)	0.2655*** (5.20)	0.9581*** (3.45)	0.9806*** (2.87)	0.3058*** (3.86)	0.0413 (0.66)	0.2655*** (5.20)	0.9581*** (3.45)	0.9806*** (2.87)	0.3058*** (3.86)	0.0413 (0.66)	0.2655*** (5.20)	0.9581*** (3.45)	0.9806*** (2.87)
Tenant Rating _{t-1}	0.0040** (2.32)	-0.0003 (-0.34)	0.0045*** (2.82)	0.0144 (1.56)	0.0127 (1.23)	0.0002 (0.13)	-0.0012 (-1.43)	0.0013 (1.03)	0.0082* (1.82)	0.0077 (1.12)	0.0002 (0.13)	-0.0012 (-1.43)	0.0013 (1.03)	0.0082* (1.82)	0.0077 (1.12)	0.0002 (0.13)	-0.0012 (-1.43)	0.0013 (1.03)	0.0082* (1.82)	0.0077 (1.12)
Tenant B/M _{t-1}	-0.0002 (-0.06)	0.0005 (0.27)	-0.0008 (-0.19)	-0.0021 (-0.16)	0.0047 (0.30)	-0.0016 (-0.39)	-0.0003 (-0.21)	-0.0012 (-0.30)	0.0097 (0.86)	0.0143 (0.99)	-0.0016 (-0.39)	-0.0003 (-0.21)	-0.0012 (-0.30)	0.0097 (0.86)	0.0143 (0.99)	-0.0016 (-0.39)	-0.0003 (-0.21)	-0.0012 (-0.30)	0.0097 (0.86)	0.0143 (0.99)
Tenant ROA _{t-1}	-0.0026 (-0.12)	-0.0163* (-1.81)	0.0118 (0.66)	0.1388** (2.64)	0.2081** (2.50)	-0.0258 (-0.59)	-0.0014 (-0.09)	-0.0244 (-0.55)	-0.0598 (-0.72)	-0.0367 (-0.31)	-0.0258 (-0.59)	-0.0014 (-0.09)	-0.0244 (-0.55)	-0.0598 (-0.72)	-0.0367 (-0.31)	-0.0258 (-0.59)	-0.0014 (-0.09)	-0.0244 (-0.55)	-0.0598 (-0.72)	-0.0367 (-0.31)
REIT FFO _{t-1}	0.9695*** (3.35)	-0.0021 (-0.02)	0.9539*** (3.58)	1.5779** (2.14)	2.1917** (2.20)	-0.259 (-0.84)	-0.112 (-0.58)	-0.1437 (-0.61)	0.9083 (1.05)	0.7333 (0.74)	-0.259 (-0.84)	-0.112 (-0.58)	-0.1437 (-0.61)	0.9083 (1.05)	0.7333 (0.74)	-0.259 (-0.84)	-0.112 (-0.58)	-0.1437 (-0.61)	0.9083 (1.05)	0.7333 (0.74)
REIT LEV _{t-1}	-0.1013** (-2.25)	0.0271 (1.61)	-0.1262** (-2.41)	-0.8991** (-2.73)	-0.9275*** (-2.96)	-0.1860*** (-5.04)	-0.0197 (-1.43)	-0.1660*** (-4.63)	-0.0864 (-0.73)	-0.3583*** (-2.15)	-0.1860*** (-5.04)	-0.0197 (-1.43)	-0.1660*** (-4.63)	-0.0864 (-0.73)	-0.3583*** (-2.15)	-0.1860*** (-5.04)	-0.0197 (-1.43)	-0.1660*** (-4.63)	-0.0864 (-0.73)	-0.3583*** (-2.15)
REIT M/B _{t-1}	0.0610* (1.84)	0.0417** (2.46)	0.0197 (0.53)	-0.5106*** (-2.93)	-0.4454** (-2.68)	0.0451 (1.49)	0.002 (0.20)	0.0432 (1.52)	-0.0557 (-0.76)	-0.025 (-0.29)	0.0451 (1.49)	0.002 (0.20)	0.0432 (1.52)	-0.0557 (-0.76)	-0.025 (-0.29)	0.0451 (1.49)	0.002 (0.20)	0.0432 (1.52)	-0.0557 (-0.76)	-0.025 (-0.29)
REIT Size _{t-1}	-0.0093 (-1.40)	0.0049 (1.09)	-0.0149* (-1.82)	-0.0042 (-0.12)	-0.0002 (-0.00)	-0.0082 (-1.48)	-0.0002 (-0.06)	-0.0081* (-2.02)	-0.0188 (-0.98)	-0.0152 (-0.67)	-0.0082 (-1.48)	-0.0002 (-0.06)	-0.0081* (-2.02)	-0.0188 (-0.98)	-0.0152 (-0.67)	-0.0082 (-1.48)	-0.0002 (-0.06)	-0.0081* (-2.02)	-0.0188 (-0.98)	-0.0152 (-0.67)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Obs	544	551	548	544	544	823	832	823	827	823	832	832	823	827	823	832	832	823	827	823
RSQ	40.26	21.76	38.23	40.69	37.02	38.73	8.60	41.77	16.15	21.92	38.73	8.60	41.77	16.15	21.92	38.73	8.60	41.77	16.15	21.92
Intercept	0.1389 (1.01)	-0.0513 (-0.61)	0.1902 (1.58)	1.0642* (2.17)	1.4473 (1.36)	0.4019** (2.28)	0.0907 (0.67)	0.3113 (1.62)	0.7407 (0.85)	0.4803 (0.51)	0.4019** (2.28)	0.0907 (0.67)	0.3113 (1.62)	0.7407 (0.85)	0.4803 (0.51)	0.4019** (2.28)	0.0907 (0.67)	0.3113 (1.62)	0.7407 (0.85)	0.4803 (0.51)

Table 6 (continued)

Tenant Rating _{t-1}	0.0015 (0.41)	-0.0068*** (-4.80)	0.0083* (2.30)	0.0369*** (3.58)	0.0692** (2.63)	-0.0021** (-2.19)	-0.0003 (-0.35)	-0.0018 (-1.20)	0.0009 (0.13)	-0.0014 (-0.21)
Tenant B/M _{t-1}	0.0212 (1.68)	0.0036 (1.11)	0.0177 (1.59)	0.0171 (0.82)	0.034 (0.84)	-0.0019 (-0.55)	-0.0030* (-1.97)	0.0011 (0.37)	0.0160* (1.77)	0.0197* (1.96)
Tenant ROA _{t-1}	-0.0992 (-0.67)	-0.0283 (-1.04)	-0.0708 (-0.50)	-0.308 (-1.09)	-0.3669 (-0.84)	-0.0026 (-0.06)	-0.0035 (-0.16)	0.0009 (0.02)	-0.0525 (-0.41)	-0.1935 (-1.22)
REIT FFO _{t-1}	0.4136 (1.21)	0.3553 (1.55)	0.0583 (0.13)	-0.6292 (-0.43)	-2.2173 (-0.87)	0.2684 (0.36)	-0.3912 (-0.73)	0.6596 (1.13)	3.9309 (1.41)	3.9673 (1.50)
REIT LEV _{t-1}	-0.1912 (-1.65)	-0.1269* (-1.97)	-0.0642 (-0.46)	0.474 (0.86)	0.7542 (0.76)	-0.036 (-0.35)	-0.0486 (-1.20)	0.0125 (0.14)	0.1422 (0.55)	0.3504 (1.12)
REIT M/B _{t-1}	-0.0511 (-0.78)	0.0229 (1.33)	-0.074 (-0.95)	-0.4421* (-2.04)	-0.3069 (-1.02)	-0.0101 (-0.35)	-0.0387 (-1.10)	0.0286 (0.88)	0.2469 (1.54)	0.2361 (1.33)
REIT Size _{t-1}	0.0007 (0.06)	0.0098 (1.32)	-0.0091 (-0.82)	-0.0405 (-0.88)	-0.0849 (-0.87)	-0.0197 (-1.47)	0.0008 (0.09)	-0.0205 (-1.47)	-0.0164 (-0.31)	-0.0124 (-0.21)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Obs	60	60	60	60	60	283	283	283	283	283
RSQ	60.96	86.27	66.98	84.98	82.25	19.18	14.66	21.72	29.68	19.44

This table shows the regression results on the lead-lag effects of tenant credit ratings and tenant quality on REIT corporate liquidity management after 1 control for REIT firm characteristics by property types. Panel A shows the results for office REITs; Panel B shows the results for retail REITs; Panel C shows the results with industrial REITs; Panel D shows the results with other REITs. The appendix shows the variable definitions. 1 control for year fixed effects for all the regression models. Standard errors are clustered by firm to calculate the t-statistics. *** indicates 1 % significance; ** indicates 5 % significance; * indicates 10 % significance

Table 7 Tenant Quality, REIT Liquidity Management, and REIT Debt/Lease Schedules

Panel A: Tenant Z-score					
	TLQ	Cash	UC/TA	TC	UC/TLQ
Intercept	0.3483*** (6.24)	0.0548 (1.55)	0.2946*** (6.77)	0.9082*** (4.19)	0.9158*** (3.75)
Tenant Z	-0.0014 (-1.42)	0.0001 (0.51)	-0.0015 (-1.61)	-0.002 (-1.00)	-0.0054 (-1.36)
Tenant Size	-0.0045*** (-3.21)	0.0008 (1.03)	-0.0053*** (-3.89)	-0.0098** (-2.01)	-0.0162** (-2.58)
Tenant B/M	0.0009 (0.38)	-0.0009 (-0.69)	0.0021 (0.83)	0.0143 (1.56)	0.0172 (1.60)
Tenant ROA	-0.0086 (-0.35)	-0.0082 (-0.82)	-0.0023 (-0.11)	-0.0008 (-0.01)	0.0421 (0.56)
Debt Due CY	-0.0266 (-1.18)	0.0154 (1.27)	-0.0386* (-1.70)	0.0017 (0.02)	-0.2162** (-1.98)
Debt Due NY	-0.0559** (-2.39)	-0.0081 (-1.06)	-0.0447** (-2.22)	0.074 (1.51)	-0.0614 (-0.83)
Lease Exp. CY	-0.126 (-1.26)	-0.0708 (-1.61)	-0.0561 (-0.82)	0.1095 (0.46)	0.0349 (0.14)
Lease Exp. NY	0.1039 (0.85)	0.1004* (1.74)	0.0028 (0.04)	-0.408 (-1.45)	-0.2783 (-0.91)
REIT M/B	0.0032 (0.15)	0.0061 (0.81)	-0.0021 (-0.11)	-0.0821* (-1.77)	-0.0977* (-1.76)
REIT Size	-0.0100** (-2.54)	-0.0027 (-0.99)	-0.0075** (-2.60)	0.0062 (0.37)	0.0159 (0.85)
REIT FFO	0.0701 (0.37)	-0.1379 (-1.36)	0.202 (1.09)	0.9559 (1.47)	0.522 (0.63)
REIT LEV	-0.2229*** (-6.32)	-0.022 (-1.38)	-0.1996*** (-6.09)	-0.1789 (-1.06)	-0.4168*** (-2.44)
office	0.0240** (2.13)	-0.0062 (-1.32)	0.0309*** (2.83)	0.0660* (1.92)	0.1079** (2.55)
retail	0.0093 (0.87)	-0.006 (-1.07)	0.015 (1.49)	0.0753** (2.16)	0.1066** (2.33)
industrial	-0.0054 (-0.31)	-0.007 (-1.18)	0.0015 (0.09)	0.0748 (1.49)	0.0855 (1.29)
Year	YES				
No. Obs	1703	1709	1708	1703	1703
RSQ	32.71	11.06	33.83	10.40	15.03
Panel B: Tenant Credit Ratings					
	TLQ	Cash	UC/TA	TC	UC/TLQ
Intercept	0.2926*** (4.62)	0.0734** (2.01)	0.2213*** (3.92)	0.6900*** (2.68)	0.6022** (2.19)
Tenant Rating	-0.0011* (-1.71)	0.0003 (0.75)	-0.0014* (-1.98)	-0.0048 (-1.59)	-0.0070* (-1.90)
Tenant B/M	-0.0006 (-0.21)	-0.0015 (-1.00)	0.0012 (0.39)	0.0174* (1.77)	0.0199* (1.73)
Tenant ROA	0.0188 (0.55)	-0.0233 (-1.56)	0.0417 (1.21)	0.1686 (1.30)	0.3093** (2.12)
Debt Due CY	-0.0291 (-1.32)	0.0126 (0.83)	-0.0384* (-1.95)	-0.0068 (-0.08)	-0.2155* (-1.92)

Table 7 (continued)

Debt Due NY	-0.0546** (-2.26)	-0.0113 (-1.17)	-0.0399** (-2.00)	0.0908 (1.23)	-0.0985 (-1.02)
Lease Exp. CY	-0.1753 (-1.31)	-0.0802* (-1.85)	-0.0955 (-0.81)	0.4964 (1.64)	0.3915 (1.04)
Lease Exp. NY	0.1222 (1.12)	0.1033** (2.01)	0.0182 (0.25)	-0.5478* (-1.88)	-0.3941 (-1.29)
REIT M/B	-0.0033 (-0.15)	0.0141 (1.53)	-0.0174 (-0.88)	-0.1731** (-2.47)	-0.2225*** (-2.82)
REIT Size	-0.0098** (-2.32)	-0.0031 (-1.22)	-0.0069* (-1.89)	0.0136 (0.79)	0.0223 (1.20)
REIT FFO	0.1911 (1.01)	-0.1771 (-1.37)	0.3665* (1.78)	1.4604 (1.48)	1.4885 (1.38)
REIT LEV	-0.2117*** (-5.78)	-0.0222 (-1.18)	-0.1892*** (-4.93)	-0.2425 (-0.97)	-0.4297* (-1.78)
office	0.0254** (2.08)	-0.006 (-1.10)	0.0322** (2.51)	0.0655 (1.51)	0.1071* (1.91)
retail	0.0077 (0.74)	-0.009 (-1.56)	0.0164 (1.60)	0.1087*** (2.81)	0.1321** (2.61)
industrial	-0.0023 (-0.11)	-0.0062 (-0.93)	0.0038 (0.19)	0.0772 (1.39)	0.078 (1.06)
Year	Yes				
No. Obs	1611	1620	1616	1611	1611
RSQ	32.49	12.89	31.66	13.18	15.97

This table shows the regression results on the effects of tenant quality on REIT corporate liquidity management after I control for REIT debt schedule, REIT lease schedule, and REIT firm characteristics. Panel A shows the results with tenant Z-scores; Panel B shows the results with tenant credit ratings. The appendix shows the variable definitions. I control for year and property type fixed effects for all the regression models. Standard errors are clustered by firm to calculate the t-statistics. *** indicates 1 % significance; ** indicates 5 % significance; * indicates 10 % significance

maturity and debt maturity are related to REIT firms' variation in capital structure.¹³ As leverage is one of the determinants in REIT cash holdings (Hardin et al., 2009), in this section, I perform a robustness check on the REIT liquidity management by including debt schedule and lease schedule in the empirical analysis.

I use two variables to proxy for REIT debt schedule: Debt Due Current Year (Debt Due CY) and Debt Due Next Year (Debt Due NY) scaled by total debt. I employ two variables to proxy for REIT lease schedule: Lease Expiring Current Year (Lease Exp. CY) and Lease Expiring Next Year (Lease Exp. NY) scaled by total revenue. Table 7 reports the regression results when I incorporate the debt schedule and lease schedule variables. I control for both year and property type fixed effects in all the regressions. The standard errors are clustered by firm to calculate t-statistics.

¹³ There is a rich body of literature on debt maturity, capital structure and liquidity risk in corporate finance, for example, Diamond (1991), Stohs and Mauer (1996), Barclay, Marx, and Smith (2003), Johnson (2003), Brown and Riddiough (2003), and etc.

Panel A and Panel B present the results with Tenant Z-score and Tenant credit ratings, respectively. I find that tenant size is a robust tenant quality factor in REIT liquidity management. REIT firms with larger tenants tend to have lower total liquidity and lower unused credit. Tenant credit ratings also have a negative effect on REIT total liquidity and unused credit lines. Debt due next year has a significant negative effect on REIT total liquidity and unused credit lines. It could be the result that REIT firms use more of their credit lines when more of their debt is due next year. I also find that lease payments expiring next year has a positive effect on REIT pure cash holdings. It appears that REIT firms hold more cash to prepare for the potential liquidity needs when more lease payments expire next year. Overall, the robustness check results indicate that tenant quality matters to REIT liquidity management after I control for REIT characteristics, REIT debt schedule, REIT lease schedule, and REIT property types.

Conclusion

In this research, I examine the effects of tenant quality on REIT firm liquidity management. I find significant evidence that the quality and creditworthiness of the tenants have an impact on REIT liquidity management. Specifically, tenant size plays an important role in liquidity management. I show that REITs with larger tenants have lower total liquidity and unused line of credit compared to those with smaller tenants. REIT firms could treat tenant size as a signal to their tenant quality if they consider size as a proxy for information transparency, financial flexibility or industry reputation. I find that REIT firms with higher tenant Z-scores and larger tenants hold lower total liquidity and lower unused credit in the subsequent year. I also show that REIT firms with more mature tenant firms (i.e. higher book-to-market ratios) and higher profitability (i.e. ROA) tend to have less cash in the subsequent year. All these relations remain statistically significant after I control for the REIT cash holding determinants suggested by Hardin et al. (2009).

Additionally, I find that tenant quality matters to REIT liquidity management within different property types. I show that tenant size has negative effects on total liquidity and unused credits for office REITs, retail REITs, and other REITs. Tenant credit ratings have positive effects on office REITs' total credit available and unused credit lines. Tenant credit ratings have negative effects on other REITs' total liquidity and unused credits. Office REITs, Industrial REITs and Other REITs with larger tenants hold lower total liquidity and lower unused credits in the subsequent year. Tenant credit ratings are negatively related to cash holdings in industrial REITs in the subsequent year. Moreover, I find that tenant quality factors, especially tenant size, have robust effects on REIT liquidity management after I control for REIT debt and lease schedules.

This study complements and extends the existing literature by examining REIT firm behavior from the viewpoint of REIT tenants. Instead of investigating the REIT liquidity management decisions within the REIT firms themselves, I expand the research to the financial health, quality, and characteristics of their tenants. The evidence found in this study supports the findings in Hill et al. (2012) and An et al. (2012) that there is a link and a difference between cash and lines of credit in REIT liquidity management. I believe that this research points out the importance of tenant quality analysis when we conduct an in-depth analysis of REIT firm behavior and firm decisions in the future.

Appendix

Table 8 Variable Definition

Variable	Definition
TLQ (Total Liquidity)	(Cash + Unused Credit)/Total Assets
Cash	Cash and Equivalents/Total Assets
UC/TA	Unused Credit/Total Assets
TC (Total Credit)	Total Credit Available/(Total Credit Available + Cash)
UC/TLQ	Unused Credit/(Unused Credit + Cash)
FFO	funds from operation divided by total assets
REIT Size	natural logarithm of total revenues
REIT M/B	the logarithm of the ratio of market value of equity plus total liabilities minus credit line drawn to total assets
REIT Leverage (LEV)	the ratio of total debt minus credit line drawn to total assets
REIT ADV	an indicator variable equal to 1 if the REIT firm is self-advised, and 0 otherwise
Debt Due CY	REIT debt due current year
Debt Due NY	REIT debt due next year
Lease Exp. CY	REIT lease payments expiring current year
Lease Exp. NY	REIT lease payments expiring next year
Tenant TA	Tenant total assets
Tenant NI	Tenant net income
Tenant EBIT	Tenant earnings before interests and taxes
Tenant Leverage	the ratio between the market value of the equity and book value of the total liabilities
WC/TA	Tenant working capital scaled by total assets
Sales/TA	Tenant sales scaled by total assets
Retained/TA	Tenant retained earnings scaled by total assets
Tenant Z	Tenant Altman Z-score, calculated by Equation (1)
Tenant Size (LNNTA)	the natural logarithm of tenant's total assets
Tenant B/M (LNBMM)	The natural logarithm of the ratio between book value and market value of the tenant firm at the end of the fiscal year
Tenant ROA	Tenant's return on assets
Tenant Rating	Tenant's S&P long term credit ratings

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