Idiosyncratic Corporate Liquidity and Equity Returns

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This paper examines the effect corporate liquidity may impose on the equity returns. We find that firms with more cash have higher expected stock returns because they are riskier. In general, firms with higher corporate liquidity tend to be smaller, financially distressed, have higher beta, more volatile cash flows and more financial constraints. In addition, the positive impact of corporate liquidity on stock returns is stronger for firms with volatile cash flows and financial constraints. We also show that corporate liquidity contains risk information different from that in size and value factors. The paper provides empirical evidence to support the precautionary motive of holding cash, and suggests that corporate liquidity may serve as a proxy for the cash flow risk and financial constraint risk of the firms.

JEL classification: G12; G30
Keywords: Equity Returns, Corporate Liquidity

1. Introduction

Corporate liquidity is an important issue widely studied in corporate finance and followed by financial media. Although a vital resource for business, corporate liquidity varies substantially among companies. Some firms hold large sums of liquid assets such as cash and marketable financial securities. In 2004, Ford held $32.9 billion and Microsoft held $60.6 billion in cash and marketable securities[1]. Other firms like Wal-Mart and DuPont tend to keep a low level of financial slack. Over time, the average cash holdings for U.S. firms doubles from 1980 to 2006, as documented in Bates *et al*. (2009).

Existing literature has established several motives for corporate liquidity holding, including transaction motive, precautionary motive and speculative motive. Meanwhile, it is costly to keep cash due to opportunity costs and tax disadvantage. Although corporate finance literature has intensively studied cash holding as an internal source of capital, not enough attention has been given to the impact of cash holding on expected equity returns. This is particularly important because there are both benefits and costs associated with holding cash, and managers choose liquidity level accordingly. If investors understand the importance of cash to a firm, these benefits and costs should be incorporated in the firm's market value and its equity returns. Therefore corporate liquidity should contain information that will affect stock returns.

A substantial body of asset pricing literature addresses the issue of financial liquidity. However, there has been little focus on corporate liquidity, which leaves a gap between corporate liquidity and its asset pricing implications. If firms hold liquidity to avoid high transaction costs of accessing external financial market, to prevent financial distress risk, or to invest in value-enhancing investments, this corporate liquidity effect should be reflected in the stock prices as well as the expected stock returns. If companies keep cash for the precautionary purposes, due to the asymmetric information, investors would take the higher level of cash holdings as an indication of future volatile cash flows or decreasing profitability, therefore require a higher return on equity. In addition, when a company is financially constrained, cash holding is even more important. Given investors are rational and information is asymmetric, a high level of financial liquidity will signal the constraint risk and is associated with a greater required return.

[1] The figures reported here are obtained from Compustat Industrial Annual Files.

Given the understanding of the firm characteristics that determine the level of liquid assets that a firm keeps, it is tempting to further explore how the market values can be affected by the firm cash holdings, and how the expected equity returns are related to corporate liquidity. It is interesting to seek answers to questions such as: How do liquidity positions of large and small firms affect their expected returns? Do firm cash holdings have different implications for value firms and growth firms? How does corporate liquidity relate to stock market anomalies like the size and value effect? Does corporate liquidity explain stock return variations beyond the size and value effects?

This study intends to bridge the corporate finance aspects and asset pricing aspects of an important firm characteristic, corporate liquidity. We investigate the effect of individual corporate liquidity on the stock returns, whether the level of corporate liquidity indicates various sources of risks such as cash flow volatility and financial constraint, whether corporate liquidity contributes to beta, and whether corporate liquidity contains different information than that is in the common risk factors such as size and BEME (Book-to-market equity). First, stocks are sorted into quintiles by corporate liquidity, size or BEME, then average stock returns and firm characteristics such as leverage, cash flow level and volatility, financial constraint measures are calculated. The sorting results show that firms with more liquidity have higher expected returns than firms with low liquidity, which seems to be counter to the standard risk-based theory at the first glance, where lower cash holding indicates financial distress. However, those firms' whose future cash flows are more volatile tend to hold more cash and have higher stock returns than firms with more stable cash flows. In addition, firms with more corporate liquidity are subject to more financial constraints. Therefore firms with more liquid assets might be riskier, and investors thus demand higher equity returns. The corporate liquidity effect holds up well when we further sort firms into quintiles by corporate liquidity controlling for size or BEME.

Next, to formally test the impact corporate liquidity imposes on expected equity returns, Fama-MacBeth two-pass regressions are performed for all the individual firms in the sample. In the first pass, a time series of excess portfolio returns are regressed on market factor, *SMB* and *HML*. In the second pass, excess stock returns of individual firms are regressed on their factor betas, as well as other firm characteristics variables such as corporate liquidity level, squared corporate liquidity level, the interaction term of corporate liquidity and cash flow volatility, and interaction term of corporate liquidity and financial constraint measures. The regression results show that corporate liquidity is positively related to beta, implying that a higher level of financial slack indicates higher risks and might serve as a risk factor. In addition, the positive relationship between equity returns and corporate liquidity is more pronounced for firms with financial constraints and volatile cash flows, suggesting corporate liquidity contains risk information. Finally, formal regression results suggest that corporate liquidity contains different information than that contained in size and BEME.

This paper contributes to the existing literature by examining the asset pricing implications of corporate liquidity. Specifically, the paper studies the impact of corporate liquidity on stock returns, and provides empirical evidence to support the precautionary motive of holding cash, as firms with volatile cash flows and financial constraints tend to hold more cash. In addition, the paper suggests that corporate liquidity can serve as a risk factor as it contains risk information that is different than that in common risk factors such as size and BEME. It is important to understand the asset pricing implications of corporate liquidity as it is documented by Bates *et al.* (2009) that the cash holding for U.S. industrial firms more than doubles from 1980 to 2006 due to riskier cash flows and changing firm characteristics. Such an understanding is essential as the elevated importance of corporate liquidity should be taken into consideration when examining financial condition, assessing risk exposure, and evaluating financing policies of a company.

The remainder of the paper is organized as follows: section 2 provides the literature review; section 3 discusses the hypotheses to be tested in the empirical estimation; section 4 describes the data and variables; section 5 discusses the empirical findings, and section 6 concludes.

2. Literature Review

Existing literature has long established that firms have various motives for holding cash. (1) Transaction cost motive: Firms need financial slack for daily operation without having to frequently raise funds from external capital markets, saving transaction costs (Miller and Orr (1966), Faulkender (2004)). (2) Precautionary motive: Firms stock cash in case they are forced to liquidate assets to make payments during hard times, reducing the probability of financial distress. Specifically, firms hold financial slack when general economy is volatile (Custodio *et al.* (2005), Baum *et al.*, (2006)), when cash flows are unpredictable and volatile (Kim *et al.* (1998), Opler *et al.*, (1999), and Bates *et. al* (2009)), and when financial leverage is relatively high given operating cash flow (Kim *et al.* (1998), Opler *et al.*, (1999)). (3) Speculative motive: Firms hold liquidity in order to quickly take advantage of future profitable investment opportunities when future investments are uncertain (Acharya *et al.*, (2007)), when internal financial sources are insufficient while external sources of funding are expensive or unavailable (Baskin (1987), Pinkowitz and Williamson (2001)), and when it is difficult to raise capital at a fair price due to information asymmetry problem (Myers and Majluf (1984)). Moreover, agency theory says the separation of management and ownership creates additional incentives for the managers to hold cash since liquidity can increase managers' discretion and shield management from market discipline (Jensen (1986), Opler *et al.*, (1999)).

However, maintaining asset liquidity can be costly: (1) Opportunity cost: liquid assets yield low returns, and firms might forgo more profitable investment opportunities. (2) Holding cash equivalents has tax disadvantages. Interest income earned on liquid assets is double taxed both at the corporate and individual level as it is paid to investors as dividends (Opler *et al.*, (1999)).

Corporate finance has developed theories and models of companies' motives and behavior concerning liquid assets and their relationship with the firm's capital structure. Tradeoff theory proposes an optimal level of liquid asset holdings that can maximize the stockholder's value. Kim *et al.*, (1998) predict that the optimal level of liquidity increases with external financing cost, the variance of future cash flows, and the return on future investment opportunities; while decreases with the return differential between the firm's physical assets (ROA) and the liquid assets (Treasury securities' returns). Han and Qiu (2007) find that cash holding increases with cash flow volatility for financially constrained firms. Riddick and Whited (2009) show that cash holding is positively related to a firm's risk. Opler *et al.*, (1999) find evidence to support the static tradeoff model of cash holdings. Yet companies tend to accumulate more cash than the level predicted by tradeoff theory at which the shareholders' wealth is maximized, which provides evidence of an agency problem.

According to agency theory, managers prefer holding more liquid assets since it can reduce the firm's risk and increase their discretion, which leads managers to emphasize on the precautionary motive, thus provides an explanation for why firms do not keep cash at the level that could maximize the shareholders' wealth (Jensen (1986), Opler *et al.*, (1999)). Dittmar *et al*. (2003) find that firms in countries with more agency problems tend to hold more cash. On the other hand, asymmetric information theory suggests that a higher degree of information asymmetry results in a higher cost of external finance, and hence more cash holdings (Myers and Majluf (1984)).

Previous literature also examines how firm characteristics are related cash holding. In general, small firms are more likely to face financial constraints while large firms have easier access to capital markets. Gertler and Hubbard (1989) and Whited (1992) show that small firms are likely to face more stringent constraint for raising funds. Kim *et al.*, (1998) use size and market-to-book ratio as proxies for external financing costs. Furthermore, Vogel and Maddala (1967) find that cash ratios are generally lower for larger manufacturing firms, and that cash holdings decline over time, which is interpreted as evidence of economies of scale in transaction costs of cash holding. Large firms often have lower fixed costs of issuing securities due to economies of scale as well as fewer borrowing constraints, so they tend to hold less cash. Small firms shall have higher asset liquidity, as well as a lower leverage ratio than large firms. In addition, pecking order theory says that the primary determinant of the corporate financing decision is the information asymmetry between insiders and

outsiders. In this sense, small firms suffer more from the information asymmetry problem and have to keep more cash for precautionary purposes. In general, it is expected that there is a negative relationship between firm size and liquid asset holdings.

Book-to-market equity (BEME) is another widely studied characteristic. Asset pricing literature documents that book-to-market equity could proxy for the financial distress and value firms earn higher returns (Fama and French (1995), Chen and Zhang (1998), Griffin and Lemmon (2002)) because they are riskier. These firms tend to keep a relatively large proportion of liquid assets to reduce the financial distress cost. In addition, due to the existence of risky debt financing, managers have the incentive to underinvest in growth options and keep excess liquid assets to reduce the financial distress (Myers (1977)). All these views support a positive relation between the BEME and liquid asset holdings if a higher BEME proxies for higher financial distress costs. On the other hand, growth firms tend to be young, risky, and have more growth opportunities on average, and therefore have limited debt capacities that are easily exhausted. As a result, these firms hold more cash due to financial constraint and investment motive. Then we would observe a negative relationship between BEME and cash holding. However it remains unclear that whether the information contained in the book-to-market equity is the same as that is included in the cash reserve.

A limited number of papers look at the importance of cash holding for a firm's investment and operation. Mikkelson and Partch (2003) find that in the long run, firms that retain high cash reserves grow faster and undertake high levels of investment, and conclude that conservative financial policy can enhance the operating performance. Some recent literature estimates the value of cash holding. Faulkender and Wang (2006) find that the market rewards firms holding internal cash with higher values, while the marginal market value of cash declines as the level of cash increases. They also find that on average, the market value of cash is higher for financially constrained firms than those that are not constrained. Pinkowitz and Williamson (2007) show that cash holding is more valuable for financially constrained companies, firms with better growth opportunities and more volatile investment opportunities. Denis and Sibilkov (2010) find that cash holdings are more valuable for financially constrained firms, partly because constrained firms use cash more efficiently to invest in more valuable projects than financially unconstrained firms. Pinkowitz *et al.* (2006) and Dittmar and Mahrt-Smith (2007) show that cash is less valuable for firms with greater agency problems.

3. Hypothesis

The previous literature has shown that certain firm characteristics, such as size, book-to-market ratio, leverage and financial constraint, are closely related to the future stock returns. Whether corporate liquidity, an important characteristic for individual firms, represents an idiosyncratic risk and affects the equity returns remains unclear.

If a company accumulates a high level of financial slack for precautionary purpose because the managers know that the firm's cash flow risks will be greater in the future, expected equity returns will be higher for this company if information is symmetric. Even if information is asymmetric, rational investors would know that the observation of large financial reserves signals future cash flow fluctuations and will require higher returns on the firm's stocks. This leads to the first hypothesis:

Hypothesis 1: Higher corporate liquidity is associated with higher expected stock returns if future cash flows are more volatile.

Another important motive for holding liquid assets is to speculate on profitable investment opportunities, which is especially important when the firm is financially constrained. Previous literature has provided evidence that firms hold more cash if they have difficulty in accessing capital market (Pinkowitz and Williamson (2001), Almeida et al. (2004)). Furthermore, Lamont et al. (2001) find that stock returns of financially constrained firms tend to move together, which indicates that these firms are subject to common shocks. Campello and Chen (2005) and Whited and Wu (2006) show that constrained firms earn higher returns and external financial constraints represent a priced

risk factor. If financially constrained firms are riskier, which is the reason for these firms to maintain a high level of liquidity, such firms will have higher expected stock returns. The relationship between corporate liquidity and equity returns should be more pronounced for companies that are financially constrained, hence the second hypothesis:

Hypothesis 2: Higher corporate liquidity is associated with higher expected stock returns if a firm is financially constrained.

From the asset pricing point of view, idiosyncratic risk is the portion of the variability in stock returns not related to overall movements in the general market or economy. This risk is unique to a particular security and is associated with such factors as business and financial risk as well as liquidity risk. According to the capital asset pricing model, beta is a measure of the systematic risk of a security. A firm characteristic unique to a specific company would represent a risk if it is correlated with the market factor. If higher cash holding indicates possible higher risks for firms in the future, such as financial constraint risk or cash flows risk, then corporate liquidity is positively related to future betas.

Hypothesis 3: Corporate liquidity is positively correlated with firm beta if liquid asset holding signals a higher level of future risk for the firm.

Finally, although empirical research in general agrees that size and value effects are real, there is no agreement on what kind of underlying risk that firm size and BEME proxy for. Previous literature also discusses the relationship between cash holding level and size or BEME. If the information incorporated in the corporate liquidity is similar to that in firm size and BEME, corporate liquidity effect will disappear after size and value effects are controlled for. Otherwise, we would expect the corporate liquidity effect remains even when the size and value effects are removed.

Hypothesis 4: If corporate liquidity contains information different from that in firm size and book-to-market equity, corporate liquidity will exist even after size and book-to-market equity are controlled for.

The above four hypotheses are tested through statistics obtained from portfolio construction as well as formal regressions. The results are presented in part V.

4. Data

To examine the effect of corporate liquidity on stock returns, a sample of firms for the empirical tests is constructed by merging the COMPUSTAT annual files and the stock and indices databases from the Center for Research in Security Prices (CRSP) for the period 1962:1 to 2005:12. The CRSP returns cover all NYSE, AMEX and NASDAQ stocks. Financial firms with Standard Industrial Classification (SIC) codes between 6000 and 6999 are excluded because they usually hold substantial inventories of marketable securities, which are included in cash. Transportation and public utility firms having SIC codes between 4000 and 4999 are excluded as well because cash holdings of these firms are subject to regulatory supervision. Individual firms' monthly stock returns are taken from CRSP. Monthly observations of the one month Treasury bill rate and market excess returns are obtained from Professor Kenneth French's webpage (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/).

We follow Kim *et al.* (1998) to measure corporate liquidity (*CL*) as the ratio of cash and marketable securities (Compustat item #1) to total assets (Compustat item #6):

$$CL_{it} = \frac{Cash_{it}}{Total\ \ Assets_{it}} \tag{1}$$

A firm with a high cash-to-asset ratio has more liquid assets to serve interest payments, reduce the financial distress, and postpone bankruptcy; or has more freedom to invest in profitable projects without incurring transaction costs. Alternatively, corporate liquidity is measured by the ratio of cash to net assets, where net assets equal total assets less cash (Dittmar *et al.* (2003), Faleye (2004), etc.). Following Campbell *et al.* (2008), we also measure corporate liquidity as cash, marketable

securities and short term investment ratio to total assets, since short term investment is often quite liquid as well. The results are similar when the two alternative measures of corporate liquidity are used.

The size of a firm is measured by the market value of equity, which equals the stock price of the stock at the end of June of year *t* times the total shares outstanding. Following Fama and French (1992), the book-to-market equity ratio (BEME) at time *t* is calculated by dividing book equity (BE) at the fiscal ending of year *t-1* by market equity (ME) at December of year *t-1*. BEME at time *t* are matched by the stock returns from July of year *t* to June of year *t+1*. Therefore there is at least a 6 months' lag between accounting data and market data in order for the firms' accounting information to be released and understood by the public. The book value of firm equity is defined as in Cohen *et al.* (2003).[2] Following Opler *et al.* (1999), we calculate leverage as (long-term debt (Compustat item #9) + short-term debt (Compustat item #5))/book value of assets. Following Almeida *et al.* (2004), cash flow is calculated as "earnings before extraordinary items and depreciation after dividends", specifically, as income before extraordinary items (Compustat item #18), plus depreciation and amortization (Compustat item #14), minus preferred dividends (Compustat item #19) minus common dividends (Compustat item #21). Cash flow volatility is measured as the standard deviation of cash flow over total assets.

We use three alternative measures suggested by the literature to proxy for financial constraints. (1) Asset size. Small firms are more likely to be financially constrained because they are usually young and less well known, hence have limited access to external capital market. (2) *KZ* index, which is a linear index of firm financial constraints constructed based on Kaplan and Zingales (1997). Following Lamont *et al.* (2001), the *KZ* index is calculated as follows[3]:

$$KZindex = -1.002 \times Cash\ Flow + 0.283 \times Q + 3.319 \times Leverage - 39.368 \times Dividends - 1.315 \times Cash\ Holdings \quad (2)$$

The *KZ* index measures the likelihood of being financially constrained. The higher the *KZ* index, the less the cash flow, the higher the leverage and the lower the dividend distribution, and therefore the more constrained the firm is. (3) Dividend payout, calculated as the ratio of total dividends distributions to operating income. Fazzari *et al*. (1988) find that firms with financial constraints distribute significantly less dividends. As a robustness check, we follow Almeida *et al.* (2004) and use the total payout to shareholders measure as a proxy for the financial constraint. The "Total payout" variable is defined as the sum of dividends and stock repurchases divided by operating earnings.

Firm characteristics and other dependent variables are winsorized at the 1 percent tails of the entire sample to reduce the impact of outliers. Firms with negative total assets, book value and market value of equity as well as with fewer than 36 monthly observations are deleted from the sample. There are 6908 firms and 528 months in the combined COMPUSTAT and CRSP dataset. Summary statistics are provided in Table 1.

5. Empirical Results

5.1 Firm Characteristics and Corporate Liquidity

In this section, we first present the relationships between firms' characteristics. Table 2 exhibits the correlations between size, book-to-market ratio, liquidity holdings, leverage, cash flows and financial constraint measures of the firm. In order to remove the effect of industry differentials, we

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[2] Book equity is defined as the stockholders' equity, plus balance sheet deferred taxes (Compustat item #74) and investment tax credit (Compustat item #208), plus postretirement benefit liabilities (Compustat item #330), minus the book value of preferred stock. Depending on availability, they measure the book value of preferred stock by the order of redemption (Compustat item #56), liquidation (Compustat item #10), or par value (Compustat item #130). Stockholders' equity is measured by Compustat item #216 or the book value of common equity (Compustat item #60), plus he par value of preferred stock, or the book value of assets (Compustat item #6) minus total liabilities (Compustat item #181).

[3] Tobin's Q, calculated as the market value of assets divided by book assets. Cash flow, dividends and cash holdings are all standardized by total capital.

also calculate the deviation of firms' cash holdings and financial leverage from the industry norm. Each firm is assigned to one of the Fama-French 17 industries based on its CRSP four-digit SIC code, then firm liquidity and leverage deviation are estimated as the difference between liquidity and leverage of that firm and the mean level of the industry that the firm belongs to. If the firm holds more liquid assets than the industry average, the firm may hoard too much cash, possibly because it is expecting good investment opportunities while having difficulty raising external fund, or because it cannot spend the cash it has accumulated due to slow growth. If a firm has a higher leverage ratio than industry average, the firm could be facing financial problem.

Table 1
Summary Statistics for the 1962.1 – 2005.12 Sample

Variable	Mean	1st	2nd	3rd	4th	5th	Std. Dev.
Return	1.143	-18.809	-5.811	0.068	6.350	23.920	16.289
SIZE	837.380	10.294	35.743	97.215	307.910	3735.700	3209.500
BEME	1.158	0.151	0.377	0.593	0.907	3.762	4.020
CL	0.158	0.010	0.035	0.078	0.175	0.491	0.195
Leverage	0.418	0.128	0.291	0.411	0.523	0.739	0.222
CL deviation	0	-0.194	-0.082	-0.039	0.031	0.281	0.175
Leverage deviation	0	-0.309	-0.132	-0.019	0.091	0.307	0.232
Cash Flow	0.018	-0.284	0.032	0.071	0.103	0.168	0.234
Cash Flow Volatility	0.220	0.024	0.050	0.086	0.163	0.779	0.504
Total Assets	1267.141	15.865	52.879	138.170	422.950	5704.920	5069.896
KZ index	-2.411	-16.902	-3.699	0.368	1.516	6.663	13.827
Dividend Payout	0.101	-0.108	0.000	0.016	0.137	0.461	0.344
Total payout	0.177	-0.244	0.000	0.059	0.206	0.862	0.712

Note: Stocks are sorted into quintiles on the basis of monthly stock returns, size, BEME, CL, Leverage, CL deviation and Leverage deviation. Sample mean and standard deviation, and average of each quintile are displayed. Return is monthly stock returns in percentage. SIZE denotes the market value of the stocks, measured in June of each year. BEME denotes the book-to-market equity. CL is corporate liquidity, measured as the ratio of cash and marketable securities to total assets. Leverage is the debt-to-asset ratio. In order to remove the effect of industry differentials, CL deviation and Leverage deviation denote the deviation of firms' cash holdings and financial leverage compared to the industry average based on the Fama-French 17 industries. Financial constraint measures include total assets, *KZ* index and dividend payout. Total assets is the book value of total assets. *KZ* index is a linear index of firm financial constraints constructed based on Kaplan and Zingales (1997). Dividend payout is calculated as the ratio of total dividends distributions to operating income. Total payout is defined as the sum of total dividends and stock repurchases divided by operating income.

Table 2 shows the overall correlation between firms' characteristics. The size and book-to-market ratio are only weakly correlated with cash position, leverage, and deviations of cash holdings and leverage from industry standard. Firm liquidity is negatively correlated with leverage ratio, indicating that the more cash a firm keeps, the less debt it has. In addition, firms that generate more cash flows tend to accumulate more cash. In general, financially constrained companies keep higher level of liquid assets.

Next, all the stocks are sorted into quintiles based on corporate liquidity, size and BEME, then the average firm characteristics are obtained for each portfolio. Panel A of Table 3 exhibits the average monthly returns, cash position, firm size and BEME, leverage, cash flow, cash flow volatility, and three measures of financial constraints of the five portfolios sorted by firm's cash holdings. Average stock returns increase monotonically with the cash holdings of the firm. The average monthly stock returns for the most illiquid portfolio is only 0.731 percent, significantly lower than

the most liquid portfolio. The monthly return differential between the most liquid portfolio and the least liquid portfolio is 1.269 percent, which is economically significant. At first glance, this seems to contradict the risk-based story, according to which firms holding less liquid assets are more vulnerable to financial distress and therefore have higher required rates of return. However there are several alternative possible explanations for the negative relationship between average stock return and firm liquidity. First, due to precautionary motive, it is possible that those firms that hoard more liquid assets because they have riskier cash flows or higher betas, and therefore high risk is associated with higher expected returns. Second, since firms hold more cash instead of investing or paying dividends, investors might think these firms lack growth opportunities, lowering the current stock prices. Third, the companies hold more liquid assets because the managers expect high costs of external capital due to limited access to the capital market and investors would require higher returns to hold these liquid firms' equity.

Table 2
Firm Characteristics and Corporate Liquidity

		1	2	3	4	5	6	7	8	9	10	11
1	SIZE	1	-0.0043	0.0123	-0.0013	-0.0394	-0.0020	0.0438	0.5594	-0.0315	0.0371	0.0480
2	BEME		1	-0.0039	-0.0002	-0.0021	-0.0001	0.0268	0.2649	-0.0376	0.0360	0.0137
3	CL			1	-0.3065	0.9032	-0.3300	0.2863	-0.0762	0.0655	-0.0833	-0.0449
4	Leverage				1	-0.2831	0.9995	-0.1212	0.0475	0.0888	-0.0322	-0.0185
5	CL deviation					1	-0.0331	0.1936	-0.0877	0.0215	-0.0426	-0.0389
6	Leverage deviation						1	-0.1486	0.0009	0.1290	-0.0901	-0.0496
7	Cash Flow							1	0.0497	-0.1091	0.0723	0.0748
8	Total Assets								1	-0.0682	0.0727	0.0606
9	*KZ* index									1	-0.9798	-0.6792
10	Dividend Payout										1	0.6918
11	Total payout											1

Note: This table shows the overall correlation between firms' characteristics. SIZE denotes the market value of the stocks, measured in June of each year. BEME denotes the book-to-market equity. CL is the corporate liquidity, measured as the ratio of cash and marketable securities to total assets. Leverage is debt-to-asset ratio. In order to remove the effect of industry differentials, CL deviation and Leverage deviation denote the deviation of firms' cash holdings and financial leverage from the industry average based on the Fama-French 17 industries.

Except for the most liquid firms, average firm size increases with cash holding proportion, probably because large firms are usually more mature, already in the stable stage of their life cycles, and hence have fewer investment opportunities to spend cash. Firms with the highest cash holdings are actually the smallest firms, probably due to financial constraint. Average BEME increases along with the corporate liquidity except for the most liquid portfolio. The most illiquid firms have the lowest BEME ratio equal to 1.498. BEME increases substantially and reaches its peak at 3.949, and then declines. Firms with higher BEME tend to be more mature, generate stable revenue but do not have many growth opportunities. Those firms may pay dividends, but accumulate cash after making all the payments. Although they have easier access to the capital market, they could also retain a substantial amount of cash because of a lower opportunity cost of cash holding, which explains why BEME increases along with corporate liquidity. However, those most liquid firms tend to have lower BEME, indicating that growth firms need to hold more cash due to financial constraint or for investment purpose.

Cash flow increases with corporate liquidity first but drops later, while the cash flow volatility rises with cash holding level monotonically, implying that liquid firms stock financial slack for precautionary purposes due to lower cash flows and more volatile cash flows. The results also

indicate that firms with more corporate liquidity are subject to more financial constraints, consistent with the speculative motive hypothesis.

Table 3
Quantile Average Sorted by Firm Characteristics

Panel A. Portfolios Sorted on the Basis of Corporate Liquidity							
	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Return*	0.731	0.961	1.283	1.706	2.000	1.269	22.105
CL **	0.010	0.035	0.078	0.175	0.495	0.485	
Size***	1095.10	1141.60	1250.50	1276.70	952.71	-142.39	
BEME	1.498	1.750	3.094	3.949	1.695	0.197	
Leverage	0.554	0.493	0.451	0.382	0.334	-0.220	
CF†	0.005	0.036	0.041	0.023	-0.161	-0.166	
CF_sigma††	0.158	0.224	0.264	0.368	0.493	0.335	
Total Assets	1373.67	1281.92	1530.84	1268.73	465.82	-907.85	
KZ index	-2.228	-3.039	-3.285	-2.781	-0.722	1.506	
Div Payout	0.103	0.121	0.123	0.105	0.046	-0.058	
Total Payout	0.183	0.195	0.196	0.185	0.120	-0.063	
Panel B. Portfolios Sorted on the Basis of Firm Size							
	Small 1	2	3	4	Big 5	Small – Big	t-statistic
Return*	2.212	2.165	1.562	1.078	-0.335	2.547	48.561
CL **	0.130	0.157	0.182	0.185	0.139	0.008	
Size***	10.25	35.74	97.22	307.91	5265.50	5255.25	
BEME	6.968	1.963	1.373	1.061	0.623	-6.345	
Leverage	0.580	0.445	0.403	0.383	0.403	-0.178	
CF†	-0.154	-0.027	0.003	0.041	0.081	0.234	
CF_sigma††	0.436	0.345	0.303	0.253	0.171	-0.264	
Total Assets	112.12	204.13	354.99	755.05	4494.70	-4382.58	
KZ index	-0.407	-1.517	-2.260	-3.294	-4.576	4.169	
Div Payout	0.049	0.077	0.094	0.120	0.157	-0.107	
Total Payout	0.084	0.129	0.159	0.198	0.308	-0.224	
Panel C. Portfolios Sorted on the Basis of BEME							
	Low 1	2	3	4	High 5	High - Low	t-statistic
Return*	-0.835	0.509	1.328	2.278	3.401	4.236	72.522
CL **	0.238	0.187	0.142	0.121	0.105	-0.133	
Size***	2730.70	1556.20	782.68	438.83	208.15	-2522.55	
BEME	0.193	0.357	0.576	0.891	10.355	10.162	
Leverage	0.607	0.382	0.394	0.405	0.426	-0.181	
CF†	-0.241	0.045	0.055	0.049	0.035	0.276	
CF_sigma††	0.650	0.297	0.223	0.179	0.158	-0.492	
Total Assets	1245.32	1192.49	994.68	804.64	1684.42	439.10	
KZ index	-0.007	-2.362	-3.102	-3.452	-3.131	-3.124	
Div Payout	0.061	0.095	0.112	0.119	0.109	0.049	
Total Payout	0.146	0.190	0.191	0.192	0.159	0.013	

Note: From 1962.1 to 2005.12, at the beginning of each month, stocks are sorted into 5 portfolios on the basis of corporate liquidity, size and BEME. The equally weighted averages of return, corporate liquidity, size and BEME are reported. "Liquid-Illiquid" is the differences in return, corporate liquidity, size and BEME between the most liquid and illiquid portfolios. "Small-Big" is the differences in return, corporate liquidity, size and BEME between the smallest and biggest size portfolios. "High-Low" is the differences in return, corporate liquidity, size and BEME between the highest BEME and lowest BEME portfolios.

*Average return is reported in per month percentage terms. **_CL_ stands for corporate liquidity, which is measured by the proportion of cash and cash equivalents in the firm's total assets. ***Firms size is in millions of dollars. †CF is cash flow. ††CF_sigma is the cash flow volatility

Panel B shows the average portfolio characteristics for size quintiles. Average stock returns decrease along with size. Liquidity increases with the firm size except for the biggest companies. This might be because they have easy access to the capital market and do not need to hold excess liquidity. Larger companies have higher and more stable cash flows than smaller firms, and they are less likely to have financial constraint problems. Panel C shows that when portfolios are sorted by BEME, stock returns increase from low to high BEME, which is consistent with the value effect. The return differential between the firms with the highest BEME and the lowest BEME is statistically significant. Corporate liquidity declines monotonically with the BEME, which supports the view that growth firms need to hold more cash to take advantage of good investment opportunities because they often have limited access to the external capital market and a higher cost of capital. This negative relationship is also consistent with Myers (1977). If the BEME serves a proxy for growth options or asset tangibility, then firms with more growth opportunities or intangible assets tend to hold more liquid assets in order to reduce financial distress costs. Value firms generate higher and less volatile cash flows than growth firms. Panel A has shown that cash flows of liquid firms are more volatile, hence it seems that BEME may proxy for different risk other than cash flow risks. Finally, all the four financial constraint measures show that value firms are less constrained relative to growth firms.

5.2 The Corporate Liquidity Effect

In order to separate the effects of size, BEME and liquidity on the firm's characteristics, we examine the size effect and value effect controlled by corporate liquidity Untabulated results show that size effect and value effect remain exist when corporate liquidity is controlled for, implying size and BEME contain some different information than corporate liquidity does. Will the relationship between corporate liquidity and equity returns disappear when firm size and BEME are controlled for? Table 4 and Table 5 display variations of firms' characteristics across liquidity sub-portfolios when firm size or BEME are controlled for. Firms are first sorted into five portfolios by size or BEME, and further sorted into five liquidity subgroups. If corporate liquidity does affect the expected equity returns, we should expect to observe a clear relationship between corporate liquidity and equity returns even after firm size and BEME are controlled for.

5.2.1 The Corporate Liquidity Effect Controlled by Size

Table 4 exhibits the firm liquidity effect when firm size is controlled for. Panel A shows that within each size cohort, returns steadily rise with cash position. The more liquid assets a firm holds, the higher average returns it generates relative to firms of similar size, indicating that firm size does not explain liquidity effect. Furthermore, return differentials between liquid and illiquid companies are much larger for smaller firms than for bigger firms, which implies that corporate liquidity effect is stronger for smaller companies. Since small firms are considered to be riskier than large firms, it is not surprising that corporate liquidity effect is more pronounced for small firms if higher cash holdings can signal higher risks. Panel C shows that except for the largest firms, firms' equity size is fairly stable across liquidity sub-groups. Panel D displays the relationship between BEME and corporate liquidity. Across the size portfolios, more liquid firms tend to have higher BEME, except for the most liquid group. It seems that firms hold more financial slack due to financial distress risk, if BEME ratio contains some information about the distress risk. On average, for each size portfolio, firms holding more cash and cash equivalents tend to have lower leverage, which also tends to deviate negatively from industry norm, as shown in Panel E and Panel G. Panel H exhibits the cash flow pattern across firms with different cash positions. On average, the smallest firms generate negative cash flows. For smaller companies, cash flows tend to be lower for those accumulate more cash, except for the most liquid firms. This pattern is reversed for larger firms, where cash flows are higher for more liquid companies. Moreover, Panel I indicates that firms with more liquid assets have more volatile cash flows, regardless of their size, which is consistent with the precautionary saving motive. Panel J shows that within each size group, the more liquid a firm is, the higher beta

coefficient that firm has. This suggests that more liquid firms have higher market risk. Moreover, average beta of the most liquid companies is significantly higher than the most illiquid ones for each size portfolio. To partially test Hypothesis 3, we conduct F-test for differences in β. More specifically, F-tests are performed to test the following two null hypotheses (i) beta differences of all liquidity-size quintiles are not significant; (ii) beta differences of the most liquid and most illiquid-size quintiles are not significant. The *F-statistics* are displayed at the bottom of Panel J. The *F-statistic* for beta difference of all the liquidity-size quintiles is 57.37 with *p-value* almost equal to zero, and therefore we conclude that betas of the firms within each size quintile are statistically different across liquidity portfolios. In addition, *F-test* is performed to identify whether firm betas are statistically different between the most liquid firms and the most illiquid firms, and the *p-value* is equal to 0.0007. We conclude that given firm sizes, beta is statistically different across corporate liquidity portfolios, and liquid firms have higher beta on average.

Finally, in order to test whether financial constraint risk plays a role in determining the level of financial slack, financial constraint measures across the 25 size-corporate liquidity portfolios are summarized in Panel K through Panel N.

Table 4
Corporate Liquidity Effect Controlled by Size

Panel A. Average Return*							
	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Small 1	1.671	1.936	2.287	2.752	3.162	1.492	2.631
2	0.689	0.976	1.061	1.617	1.858	1.169	2.418
3	0.690	0.867	1.066	1.343	1.511	0.820	1.771
4	0.791	0.815	1.184	1.255	1.382	0.590	1.362
Big 5	0.779	0.785	0.986	1.029	1.316	0.537	1.418
Panel B. Average Corporate Liquidity							
	Illiquid 1	2	3	4	Liquid 5		
Small 1	0.014	0.036	0.074	0.151	0.374		
2	0.016	0.042	0.090	0.182	0.403		
3	0.017	0.044	0.095	0.189	0.408		
4	0.016	0.041	0.085	0.168	0.379		
Big 5	0.015	0.036	0.069	0.130	0.297		
Panel C. Average Size**							
	Illiquid 1	2	3	4	Liquid 5		
Small 1	12.001	12.149	12.272	12.603	12.926		
2	39.919	40.208	40.189	40.853	40.870		
3	103.680	104.050	104.220	103.970	103.100		
4	299.880	299.350	300.850	298.050	290.260		
Big 5	2957.000	4195.300	4133.100	4683.900	3694.800		
Panel D. Average BEME							
	Illiquid 1	2	3	4	Liquid 5		
Small 1	3.083	3.021	6.521	7.659	2.390		
2	1.104	1.438	2.078	2.115	0.798		
3	0.986	1.258	1.349	1.558	1.048		
4	0.828	0.984	1.251	1.136	0.630		
Big 5	0.660	0.637	0.716	0.678	0.478		

Table 4 - continued

Panel E. Average Leverage Ratio							
	Illiquid 1	2	3	4	Liquid 5		
Small 1	0.706	0.551	0.522	0.469	0.491		
2	0.525	0.496	0.465	0.400	0.305		
3	0.487	0.476	0.430	0.379	0.296		
4	0.462	0.450	0.414	0.369	0.295		
Big 5	0.447	0.437	0.401	0.370	0.314		
Panel F. Average Cash Holding Deviation from Industry Norm							
	Illiquid 1	2	3	4	Liquid 5		
Small 1	-0.112	-0.093	-0.060	0.010	0.222		
2	-0.106	-0.085	-0.044	0.037	0.244		
3	-0.102	-0.081	-0.037	0.046	0.247		
4	-0.101	-0.083	-0.043	0.028	0.220		
Big 5	-0.102	-0.085	-0.056	-0.007	0.143		
Panel G. Average Leverage Deviation from Industry Norm							
	Illiquid 1	2	3	4	Liquid 5		
Small 1	0.228	0.117	0.084	0.033	-0.095		
2	0.086	0.062	0.033	-0.031	-0.122		
3	0.054	0.043	-0.004	-0.053	-0.128		
4	0.029	0.017	-0.019	-0.058	-0.125		
Big 5	0.014	0.006	-0.027	-0.051	-0.101		
Panel H. Average Cash Flow							
	Illiquid 1	2	3	4	Liquid 5		
Small 1	-0.124	-0.019	-0.032	-0.077	-0.228		
2	0.037	0.035	0.024	0.013	-0.050		
3	0.062	0.045	0.055	0.047	0.001		
4	0.078	0.078	0.080	0.079	0.060		
Big 5	0.087	0.088	0.092	0.100	0.113		
Panel I. Average Cash Flow Volatility							
	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Small 1	0.372	0.297	0.338	0.370	0.878	0.506	13.002
2	0.302	0.308	0.347	0.331	0.615	0.313	11.286
3	0.237	0.233	0.271	0.388	0.515	0.278	8.772
4	0.206	0.245	0.267	0.334	0.574	0.368	12.922
Big 5	0.232	0.234	0.225	0.349	0.511	0.279	9.386
Panel J. Average Beta							
	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Small 1	0.934	1.051	1.071	1.294	1.352	0.418	12.297
2	0.929	0.948	1.199	1.239	1.412	0.483	16.805
3	0.957	0.990	1.062	1.341	1.447	0.490	18.594
4	0.855	0.907	0.998	1.299	1.419	0.564	17.985
Big 5	0.850	0.868	0.896	1.138	1.289	0.439	15.012

Table 4 - continued

F-stat for Beta difference of all Liquidity-size quintiles: F-value=57.37; p value=2.7622e-009
F-stat for Beta difference of most Liquid and illiquid-size quintiles: F-value=92.16; p value=0.0007

Panel K. Average Total Assets

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Small 1	62.003	112.361	227.382	172.031	39.614	-22.389	-6.201
2	133.610	220.264	318.583	165.832	58.101	-75.509	-13.661
3	276.611	454.123	429.181	379.054	189.732	-86.87	-6.939
4	672.692	969.914	1043.428	669.625	290.593	-382.1	-14.930
Big 5	3874.335	4722.146	4472.523	3892.813	1948.212	-1926.1	-14.759

Panel L. Average *KZ* index

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Small 1	0.261	-0.863	-0.368	-0.910	-1.989	-2.251	-12.767
2	-2.339	-2.408	-1.911	-2.316	-2.684	-0.345	-1.644
3	-3.432	-3.712	-3.619	-3.412	-4.002	-0.570	-2.230
4	-4.581	-4.456	-4.982	-4.465	-4.873	-0.292	-1.253
Big 5	-6.765	-6.581	-6.964	-6.708	-5.361	1.404	6.889

Panel M. Average DivPayout

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Small 1	0.045	0.056	0.054	0.055	0.072	0.026	6.243
2	0.096	0.097	0.089	0.088	0.087	-0.008	-1.883
3	0.126	0.133	0.128	0.120	0.116	-0.011	-1.937
4	0.154	0.152	0.167	0.145	0.149	-0.005	-0.904
Big 5	0.211	0.211	0.217	0.208	0.171	-0.040	-7.948

Panel N. Average Distribution to Shareholders

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Small 1	0.068	0.094	0.092	0.085	0.100	0.031	5.428
2	0.141	0.160	0.136	0.149	0.123	-0.018	-2.983
3	0.177	0.191	0.187	0.184	0.164	-0.012	-2.109
4	0.210	0.207	0.241	0.209	0.212	0.002	0.286
Big 5	0.299	0.302	0.323	0.308	0.269	-0.030	-4.763

Note: From 1985.7 to 2003.12, at the beginning of each month, stocks are sorted into 5 size portfolios. Within each size portfolios, stocks are subsequently sorted into 5 portfolios on the basis of corporate liquidity. The equally weighted averages of return, corporate liquidity, size, BEME, leverage, deviations of corporate liquidity and leverage from industry norm, beta and alternative financial constraint measures are reported. "Liquid-Illiquid" is the differences in the returns between the most liquid and illiquid portfolios.
** Average return is monthly stock returns measured in percentage terms. **Firms size is in millions of dollars*

Total assets increases first with corporate liquidity and declines as firms hold more cash, which indicates that both extremely liquid and illiquid companies are financially constrained. The other three proxies for financial constraints – the KZ index, dividend payout, and total payout display a more linear relationship across liquidity portfolios. Within each size groups except the smallest ones, firms that hold high level of cash and cash equivalents tend to be more financially constrained, which supports the speculative motive of saving since they have difficulty in accessing external capital market. Smallest firms seem to have the opposite pattern, firms that are hoard more liquid assets are less constrained. This might be because smallest firms as a group tend to have financial constraint problem, but those with more liquid assets suffer less.

5.2.2 The Corporate Liquidity Effect Controlled by BEME

Table 5 summarizes the effect of cash holdings controlled for the BEME ratio. Panel A displays the average return of stocks. We observe a monotonically positive relationship between the liquidity and return. No matter whether a firm is a growth firm or a value firm, as long as it holds a higher level of liquid assets, it will bring shareholders a higher rate of return. The return differentials between most liquid firms and most illiquid firms are significantly different, with the narrowest monthly spread equal to 1.059 percent and the widest spread equal to 1.65 percent. Panel C shows the average size when BEME and liquidity are held constant. Within each BEME cohort, more liquid firms tend to be smaller firms. Compared to large firms, smaller firms are less mature, subject to information asymmetry problem, and face more financial constraints and higher transaction costs, therefore they need to hoard more liquid assets to survive through hard times and exploit profitable investment projects. As shown in Panel D, the relationship between liquidity and the BEME exhibits no clear pattern except for the value firms, where more liquid firms tend to have higher BEME ratios, indicating that they are subject to distress risk.

Table 5
Corporate Liquidity Effect Controlled by BEME

Panel A. Average Return*							
	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Low 1	-0.352	-0.068	0.313	0.366	0.707	1.059	2.274
2	0.263	0.470	0.756	1.245	1.862	1.599	3.506
3	0.703	0.898	1.132	1.541	2.209	1.505	3.418
4	1.135	1.322	1.658	1.993	2.634	1.499	3.429
High 5	2.236	2.435	2.678	2.959	3.886	1.650	3.494
Panel B. Average Corporate Liquidity							
	Illiquid 1	2	3	4	Liquid 5		
Low 1	0.023	0.071	0.149	0.264	0.483		
2	0.017	0.046	0.097	0.187	0.398		
3	0.015	0.037	0.073	0.145	0.338		
4	0.015	0.033	0.064	0.127	0.314		
High 5	0.014	0.031	0.059	0.110	0.283		
Panel C. Average Size**							
	Illiquid 1	2	3	4	Liquid 5		
Low 1	2514.400	2974.600	2251.900	1646.800	1086.500		
2	1525.700	1652.500	1306.100	809.160	475.580		
3	711.250	962.610	834.770	536.650	256.770		
4	458.050	533.580	551.260	410.630	180.480		
High 5	246.300	230.910	264.000	248.800	119.990		
Panel D. Average BEME							
	Illiquid 1	2	3	4	Liquid 5		
Low 1	0.269	0.271	0.328	0.261	0.245		
2	0.505	0.505	0.500	0.496	0.487		
3	0.719	0.720	0.719	0.713	0.708		
4	1.002	1.000	0.995	0.995	0.984		
High 5	4.053	4.064	6.684	12.808	9.688		

Table 5 - continued

Panel E. Average Leverage Ratio

	Illiquid 1	2	3	4	Liquid 5
Low 1	0.535	0.480	0.418	0.345	0.275
2	0.519	0.461	0.416	0.363	0.288
3	0.472	0.459	0.427	0.377	0.299
4	0.473	0.461	0.432	0.384	0.305
High 5	0.470	0.461	0.447	0.410	0.328

Panel F. Average Cash Holding Deviation from Industry Norm

	Illiquid 1	2	3	4	Liquid 5
Low 1	-0.106	-0.069	0.001	0.108	0.314
2	-0.106	-0.084	-0.039	0.042	0.238
3	-0.105	-0.086	-0.057	0.008	0.186
4	-0.104	-0.088	-0.061	-0.006	0.167
High 5	-0.102	-0.089	-0.063	-0.017	0.140

Panel G. Average Leverage Deviation from Industry Norm

	Illiquid 1	2	3	4	Liquid 5
Low 1	0.103	0.051	-0.008	-0.075	-0.138
2	0.047	0.029	-0.013	-0.063	-0.134
3	0.039	0.026	-0.007	-0.053	-0.126
4	0.039	0.028	-0.002	-0.047	-0.122
High 5	0.036	0.028	0.013	-0.024	-0.104

Panel H. Average Cash Flow

	Illiquid 1	2	3	4	Liquid 5
Low 1	0.036	0.039	0.037	0.023	-0.047
2	0.038	0.074	0.075	0.072	0.030
3	0.071	0.072	0.069	0.068	0.042
4	0.059	0.061	0.061	0.061	0.038
High 5	0.039	0.045	0.045	0.045	0.028

Panel I. Average Cash Flow Volatility

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Low 1	0.677	0.650	0.697	0.786	0.881	0.204	12.363
2	0.291	0.294	0.335	0.389	0.475	0.183	16.992
3	0.244	0.238	0.231	0.240	0.377	0.132	18.742
4	0.171	0.191	0.204	0.207	0.329	0.158	17.300
High 5	0.155	0.127	0.187	0.181	0.238	0.084	10.953

Panel J. Average Beta

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Low 1	0.942	1.056	1.236	1.434	1.492	0.550	11.043
2	0.936	0.954	1.103	1.225	1.451	0.515	15.584
3	0.892	0.919	0.968	1.119	1.354	0.462	17.567
4	0.862	0.914	0.902	1.019	1.198	0.336	15.876
High 5	0.846	0.839	0.878	0.934	1.048	0.202	9.440

Table 5 - continued

F-stat for Beta difference of all Liquidity-BE/ME quintiles: F-value=47.84; p value=1.0527e-008
F-stat for Beta difference of most Liquid and illiquid-BE/ME quintiles: F-value=73.52; p value=0.001

Panel K. Average Total Assets

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Low 1	1201.411	1269.293	986.316	599.050	340.262	-861.140	-16.758
2	1489.823	1546.406	1100.109	657.953	342.413	-1147.390	-18.761
3	1125.348	1390.816	1111.067	668.044	306.124	-819.180	-23.496
4	983.152	1151.628	1083.351	741.831	300.962	-682.190	-20.105
High 5	854.530	1196.312	1987.549	2249.157	1102.396	247.470	5.599

Panel L. Average KZ index

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Low 1	-1.120	-1.593	-2.177	-2.483	-2.928	-1.808	-7.733
2	-3.226	-3.332	-3.392	-3.299	-3.783	-0.558	-2.653
3	-4.143	-4.183	-4.255	-4.166	-4.075	0.068	0.361
4	-4.034	-3.852	-4.552	-4.332	-4.908	-0.874	-4.342
High 5	-3.420	-4.062	-3.933	-4.139	-4.053	-0.633	-2.610

Panel M. Average DivPayout

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Low 1	0.092	0.099	0.106	0.112	0.116	0.024	4.437
2	0.127	0.128	0.126	0.116	0.116	-0.011	-2.019
3	0.146	0.147	0.146	0.137	0.121	-0.024	-4.970
4	0.143	0.137	0.150	0.139	0.137	-0.006	-1.130
High 5	0.119	0.128	0.129	0.134	0.117	-0.002	-0.421

Panel N. Average Distribution to Shareholders

	Illiquid 1	2	3	4	Liquid 5	Liquid – Illiquid	t-statistic
Low 1	0.158	0.179	0.164	0.158	0.144	-0.014	-2.105
2	0.203	0.203	0.191	0.180	0.169	-0.034	-6.078
3	0.207	0.216	0.214	0.201	0.185	-0.022	-3.730
4	0.191	0.190	0.229	0.204	0.210	0.019	2.760
High 5	0.150	0.164	0.182	0.193	0.164	0.014	2.197

Note: From 1962.1 to 2005.12, at the beginning of each month, stocks are sorted into 5 BEME portfolios. Within each size portfolios, stocks are subsequently sorted into 5 portfolios on the basis of corporate liquidity. The equally weighted averages of return, corporate liquidity, size, BEME, leverage, deviations of corporate liquidity and leverage from industry norm, beta and alternative financial constraint measures are reported. "Liquid-Illiquid" is the differences in the returns between the most liquid and illiquid portfolios.
** Average return is monthly stock returns measured in percentage terms. **Firms size is in millions of dollars*

Panel E shows the average leverage across the 25 BEME-liquidity portfolios. Within each BEME portfolio, firms with more liquidity tend to borrow less. Similar to Panel G of Table 4, on average, firms that hold more cash tend to use less debt, regardless whether they are growth firms or value firms.

According to Panel H, controlling for book-to-market ratio, liquid firms seem to generate less cash flows. The relationship between average cash flow volatility and corporate liquidity is presented in Panel I. Again we observe a positive relationship, implying that firms hold more financial slack because of higher cash flow risk. Cash flow volatility is significantly different between the most liquid and illiquid. Panel J summarizes the average beta across different liquidity groups.

Within each BEME portfolio, firm beta increases monotonically with the liquidity, indicating that higher liquidity firms are associated with higher risks measured by beta. The beta difference between the most liquid firms and the most illiquid firms is highly significant, supported by the *t-test*. Panel J of Table 5 also reports the *F-statistics* for beta differential across liquidity-BEME portfolios. Specifically, *F-statistic* for beta difference of all Liquidity-BEME quintiles is 47.84 with the *p-value* equal to zero; *F-statistic* for beta difference of most Liquid and illiquid-BEME quintiles equals to 73.52 and the *p-value* is 0.001.

Panel K through Panel N display the financial constraint measures for the BEME-corporate liquidity sorted portfolios. The results are mixed. Total assets and *KZ* index suggest that growth, liquid firms as well as value, illiquid firms tend to be financially constrained. The relationship between corporate liquidity and the dividend payout ratio or total payout is not monotonic. According to the dividend payout ratio, liquid firms are more likely to be constrained, except for the lowest BEME portfolio, where illiquid firms are more financially constrained. This pattern is similar when the total payout is used to measure financial constraint, except for the two portfolios of value firms.

Table 4 and Table 5 provide evidence that corporate liquidity is related to the individual firm beta, even if the important characteristic such as size or BEME is controlled for. To formally test whether corporate liquidity can serve as a proxy for firm beta, we regress beta on corporate liquidity, firm size and BEME. As Table 6 shows, corporate liquidity contributes to interpreting firm beta in all the three regressions. The coefficients on the corporate liquidity are positive and highly significant for all the three regressions. The *R-squareds* range from 9 percent to about 17 percent. Together with the information in Panel I of Table 4 and Table 5, we can conclude that corporate liquidity is positively correlated with firm beta, which makes it reasonable for cash holding to serve as a proxy for the underlying risks.

Table 6
Regression of Individual Firm Beta on Firm Characteristics

	Time series average of cross-sectional regression	Pooled regression	Cross-sectional regression on Time series average
Constant	1.191***	1.079***	1.019
CL	0.296***	0.993***	1.506***
Size	-0.001***	-0.001***	0.001***
BEME	-0.051***	-0.010***	-0.009***
R^2	0.089	0.113	0.171

Note: This table shows the regression results of individual firm's market beta on corporate liquidity (CL), size and book-to-market ratio (BEME). The sample period is from 1962:01 to 2005:12.
** 90% significance level, ** 95% significance level, *** 99% significance level.*

5.3. Fama-MacBeth Two-Pass Regression

To examine the impact corporate liquidity imposes on expected equity returns, we run Fama-MacBeth two-pass regressions for all the individual firms in the sample. In the first pass, a time series of excess portfolio returns are regressed on market factor, *SMB* and *HML* using the following formula:

$$R_{i,t} - RF_t = \alpha_i + b_i(MKT_t - RF_t) + s_i SMB_t + h_i HML_t + \varepsilon_t \quad (3)$$

where *R* is the portfolio stock return, *RF* is the 3-month T-bill rate, *MKT-RF* is the market factor, *SMB* is the size factor and *HML* is the value factor specified by Fama and French (1993). In order to generate the portfolio returns, individual firms are sorted based on size and BEME independently to form 25 portfolios, or are sorted based on size, book-to-market and corporate liquidity independently to form 27 portfolios. Then individual firms are assigned the beta coefficients

(derived in the first pass regression) of the portfolio which they belong to. We assume that a firm's beta is stationary.

For the second pass, excess stock returns of individual firms are regressed on their factor betas, as well as other variables such as corporate liquidity level, squared corporate liquidity level, the interaction term of corporate liquidity and cash flow volatility, and interaction term of corporate liquidity and financial constraint measures. The baseline model is shown as follows:

$$R_i - RF = \alpha + \beta_1 b_i + \beta_2 s_i + \beta_3 h_i + \gamma\ CL_i + \varepsilon_i \quad (4)$$

where *b*, *s* and *h* are the loadings of market factor, size factor and value factor respectively in the first pass regression, and *CL* is the corporate liquidity. Several different models are estimated and the results are presented in Table 7.

The base model is estimated to test *Hypothesis 4*. If *Hypothesis 4* holds and corporate liquidity does contain information different from that in firm size and BEME and corporate liquidity effect exists even after size and BEME are controlled for, then we can expect that the coefficient on corporate liquidity to be significant. Furthermore, we would like to see whether corporate liquidity CL imposes a positive impact on equity returns, as suggested by the previous portfolio sorting.

In order to formally test *Hypothesis 1*, an interaction term of cash holding and cash flow volatility is included in the base model. If the impact of cash holding on equity return is stronger for firms with more volatile cash flows, we expect to see a significant and positive coefficient on the interaction term.

To test *Hypothesis 2*, base model is estimated with an additional interaction term of corporate liquidity and a financial constraint measure. If the positive relationship between corporate liquidity and equity return is more pronounced for financially constrained companies, the coefficient on the interaction term should be significantly positive.

Panel A of Table 7 presents the results of second pass regressions on individual firms with firm betas derived from time series regressions on 25 size-BEME portfolios in the first pass. Model 1 shows the result of the base model. It can be seen the coefficients on the individual firm's market beta and value beta are statistically significant, while size beta does not have a significant coefficient in the second pass regression. Model 2 formally tests the impact of corporate liquidity on the equity returns. The coefficient of corporate liquidity is positive and significant at 1 percent level. As a firm increases its cash holding by 10 percent, its monthly equity returns increase about 0.15 percent, which is about 1.8 percent per year. Market beta and value beta do not lose their significance while size beta is still insignificant. It seems that corporate liquidity contains some different information than market portfolio and the book-to-market ratio.

Tradeoff theory suggests that there should be an optimal cash level that will maximize the shareholders' value, thus the relationship between corporate liquidity and equity returns may not be linear. To test this, a squared corporate liquidity term is added to model 2 and the result is presented in Model 3. Regression results show that the squared corporate liquidity has a significantly negative sign, which provides support for the tradeoff theory, and the relationship between corporate liquidity and equity returns is concave.

Model 4 formally tests *Hypothesis 1*. The coefficients on both corporate liquidity and the interaction term between corporate liquidity and cash flow volatility are positive and significant, which supports the *Hypothesis 1*. Firms with more volatile cash flows tend to have a more pronounced relationship between cash holding and equity returns. Cash flow volatility plays an important role in explaining the positive impact of corporate liquidity on equity returns. As the previous evidence shows that firms that have highly volatile cash flows tend to hold more cash than those with stable cash flows, the positive link between corporate liquidity and stock returns can be attributed to the precautionary saving motive. Companies whose cash flows are not stable over time are subject to higher risks, thus managers may stock more cash as a cushion. High cash holdings therefore can signal the cash flow volatility risk and lead to a higher required return on stocks.

Table 7
Fama-MacBeth Second-pass Regression on Individual Firms

Panel A. 25 Size-BEME portfolios				
	Model 1	**Model 2**	**Model 3**	**Model 4**
constant	-4.482***	-4.709***	-4.900***	-4.660***
b (Market beta)	5.208***	5.293***	5.365***	5.252***
s (Size beta)	-0.057***	-0.008	-0.020	-0.003
h (Value beta)	2.513***	2.401***	2.389***	2.390***
CL	-	1.465***	3.459***	1.346***
CL squared	-	-	-4.948***	-
CL × CF_sigma	-	-	-	0.311*
Industry Dummy	No	No	No	No
R^2	0.047	0.052	0.053	0.054
	Model 5	**Model 6**	**Model 7**	**Model 8**
constant	-5.030***	-6.913***	-6.952***	-6.955***
b (Market beta)	5.528***	8.885***	8.931***	8.932***
s (Size beta)	-0.013	0.276	-0.171	0.175
h (Value beta)	2.402***	4.310***	4.305***	4.209***
CL	1.399***	1.073***	1.123***	1.005***
CL × CF_sigma	0.310*	-	-	-
CL × KZ Index	-	0.086***	-	-
CL × Dividend Payout	-	-	-2.922***	-
CL × Total payout	-	-	-	-1.883***
Industry Dummy	Yes	No	No	No
R^2	0.088	0.050	0.048	0.049
Panel B. 27 Size-BEME-Corporate Liquidity portfolios				
	Model 1	**Model 2**	**Model 3**	**Model 4**
constant	-4.934***	-5.016***	-4.892***	-4.821***
b (Market beta)	5.847***	5.885***	5.811***	5.383***
s (Size beta)	-0.089	-0.101	-0.087	-0.071
h (Value beta)	2.568***	2.393***	2.426***	2.111***
CL	-	1.640***	3.452**	1.245**
CL squared	-	-	-3.539**	-
CL × CF_sigma	-	-	-	0.305**
Industry Dummy	No	No	No	No
R^2	0.044	0.045	0.048	0.065
	Model 5	**Model 6**	**Model 7**	**Model 8**
constant	-5.335***	-5.674***	-4.891***	-4.506***
b (Market beta)	6.134***	6.495***	6.557***	5.753***
s (Size beta)	-0.119	0.198	-0.103	0.114
h (Value beta)	2.372***	2.492***	2.562***	3.015***
CL	1.922***	2.573***	2.667***	2.349***
CL × CF_sigma	0.879***	-	-	-
CL × KZ Index	-	0.094***	-	-
CL × Dividend Payout	-	-	-2.712***	-
CL × Total payout	-	-	-	-2.426**
Industry Dummy	Yes	No	No	No
R^2	0.084	0.052	0.050	0.056

Note: In the first pass, portfolio excess returns are regressed on market, *SMB* and *HML* factors. Each individual firm is assigned with betas of the portfolio that the firm belongs to. In the second pass, individual stocks' 1 year forward expected excess returns are regressed on factor betas from the first pass, corporate liquidity measures, liquidity constraint dummies or interaction terms of corporate liquidity and liquidity constraint dummies. Liquidity constraint dummies are defined as follows: D_low equals one if the time series average of individual firm's cash holdings falls below the bottom 30 percentile of the industry average level and zero otherwise. D_high equals one if the time series average of individual firm's cash holdings is higher than the top 30 percentile of the industry average level and zero otherwise. CF_sigma is the cash flow volatility. Financial

constraint measures include *KZ* index and dividend payout. Total assets is the book value of total assets. *KZ* index is a linear index of firm financial constraints constructed based on Kaplan and Zingales (1997). Dividend payout is calculated as the ratio of total dividends distributions to operating income. Total payout is defined as the sum of total dividends and stock repurchase divided by operating income.
** 90% significance level, ** 95% significance level, *** 99% significance level.*

Furthermore, industry is an important factor in determining the cash holdings. Some industries on average hold more liquid assets than others due to higher business risk or more financial constraints. Table 8 shows the distribution of firms across industries, average corporate liquidity and corporate liquidity variability for each industry. Those industries with higher average corporate liquidity are the ones with volatile cash holdings, such as drugs, machinery and business equipment. To control for industry effect, Model 5 include industry dummies, defined following Fama and French 17-industry classification. The coefficients do not vary much compared to the regression without industry dummies, but the explanatory power of the regression is enhanced substantially.

Model 6 through Model 8 test *Hypothesis 2* using different measures for financial constraints. If the financial constraint imposes additional risks, firms should have the incentive to save more liquid assets to lower down the cost of external financing. Previous empirical evidence from portfolio sorting shows that companies that face financial constraints tend to hold more cash than those are less constrained. In this case hoarding financial slack signals the financial constraint risk faced by a company, therefore the relationship between corporate liquidity and stock returns should be strengthened for constrained firms. As a result we should observe a significant coefficient on the corporate liquidity-financial constraint interaction term that indicates stronger relationship between cash holding and equity returns for financially constrained companies. Model 6 includes the interaction term between corporate liquidity and *KZ* index in the Fama-MacBeth second-pass regression. The coefficient on the interaction term is positive and significant. Financially constrained firms have higher *KZ* index values, and a positive coefficient on the interaction term is consistent with the *Hypothesis 2*. Model 7 uses dividend payout ratio as a proxy for financial constraint. Companies that are not financially constrained tend to distribute more after tax earnings as dividends to shareholders, so that a higher dividend payout ratio indicates less financial constraint. We observe a statistically significant and negative coefficient on the corporate liquidity-dividend payout ratio interaction term, providing evidence to support the view that firms with difficulty accessing capital market tend to save more cash to invest in the future or to prepare for the potential financial distress. As a robustness check, Model 8 uses total payout to shareholder as the financial constraint measure. The regression result is similar.

Panel B shows results of second pass regressions on individual companies with beta coefficients estimated from time series regressions on 27 size-BEME-corporate liquidity portfolios in the first pass. It can be shown that individual firms' cash holding strongly affects the expected stock returns. The coefficient of corporate liquidity is significantly positive for all the models in panel B, ranging from 1.245 to 3.452. Model 2 shows that when market beta, *SMB* beta and *HML* beta are included in the regression, individual firm's liquidity position still affects the firm's stock returns substantially. For every 10 percent increase in the firm's cash holding, average monthly stock return will rise by 0.164 percent. Put in another way, for 1 standard deviation[4] change in the firm's liquidity, monthly equity return changes for 0.31 percent on average. Model 3 shows that equity returns and corporate liquidity exhibit a quadratic relationship, with the coefficient on corporate liquidity variable positive and the squared corporate liquidity variable negative. Model 4 tests *Hypothesis 1* and provides empirical evidence that corporate liquidity is associated with higher equity returns if the firm has volatile cash flows. The result is similar to the regression based on betas derived from 25 Size-BEME portfolios. The relationship between corporate liquidity and equity returns is stronger for firms with cash flow risks. Model 5 controls for the industry effect and the coefficient on the interaction term becomes much greater.

[4] Standard deviation of corporate liquidity is 0.195, as shown in Table 1.

Table 8
Distribution of Firms across Industries and Corporate Liquidity / Corporate Liquidity Volatility Portfolios

Panel A. Numbers of Firms in 17 Industries and Corporate Liquidity Portfolios

	low CL 1	2	3	4	high CL 5	Average Cash-to-asset ratio
1	26	20	19	18	12	0.105
2	9	9	10	9	10	0.132
3	32	30	28	20	11	0.107
4	26	19	15	12	9	0.096
5	24	21	21	17	14	0.123
6	15	15	12	9	7	0.124
7	10	14	18	21	40	0.366
8	27	31	29	20	13	0.087
9	18	15	13	9	4	0.090
10	10	9	6	5	3	0.076
11	63	71	75	93	88	0.186
12	13	12	11	9	4	0.099
13	10	10	8	6	5	0.098
15	34	39	38	34	20	0.102
17	104	108	120	140	182	0.210

Panel B. Numbers of Firms in 17 Industries and Corporate Liquidity Volatility Portfolios

	low Volatility 1	2	3	4	high Volatility 5	Average Corporate Liquidity Volatility
1	27	24	22	13	8	0.095
2	6	10	13	11	8	0.128
3	32	39	26	15	10	0.082
4	26	20	15	12	8	0.085
5	25	26	16	17	12	0.102
6	12	24	11	5	4	0.093
7	8	18	24	27	25	0.210
8	29	41	30	13	6	0.088
9	16	20	15	6	2	0.069
10	9	11	8	3	2	0.080
11	52	80	86	87	85	0.141
12	13	16	12	7	2	0.081
13	9	11	8	7	4	0.091
15	35	47	44	27	12	0.102
17	84	118	130	154	167	0.159

Note: Each firm is assigned to one of the Fama-French 17 industries based on its CRSP four-digit SIC code. Deviation of the firm's liquidity and leverage to industry norm are estimated as the difference between liquidity and leverage of that firm and the mean level of the industry that the firm belongs to. Corporate liquidity volatility is measured as the time-series standard deviation of each firm. Stocks are sorted into quintiles on the basis of corporate liquidity and corporate liquidity volatility. Panel A shows the distribution of firms on the basis of corporate liquidity, which is measured as the ratio of cash and cash equivalents over total assets. Panel B displays the distribution of firms on the basis of corporate liquidity volatility. Industry average of corporate liquidity and corporate liquidity volatility. 1 Food, 2 Mining and Minerals, 3 Oil and Petroleum Products, 4 Textiles, Apparel & Footware, 5 Consumer Durables, 6 Chemicals, 7 Drugs, Soap, Prfums, Tobacco, 8 Construction and Construction Materials, 9 Steel Works Etc, 10 Fabricated Products, 11 Machinery and Business Equipment, 12 Automobiles, 13 Transportation, 14 Utilities, 15 Retail Stores, 16 Banks, Insurance Companies, and Other Financials, 17 Other.

* Industry 14 is utilities and 16 is banks, insurance companies and other financials, which are excluded from the sample because the liquid assets held by utility industry are under certain regulation while financial industry usually hold a substantial inventory of marketable securities.

Model 6 and model 7 use *KZ* index and dividend payout ratio respectively as financial constraint measures to test *Hypothesis 2*. The coefficient corporate liquidity-*KZ* index interaction term is significantly positive while the coefficient on corporate liquidity-dividend payout interaction term is significantly negative, consistent with the hypothesis that more constrained firms' cash position has greater impact on equity returns. Model 8 replaces the dividend payout ratio with total payout as a robustness check. The value and significance of the coefficients do not change appreciably.

Fama-MacBeth second-pass regressions on individual firms formally test the hypotheses in question. The empirical evidence shows that companies holding more cash tend to have higher equity returns on average. The effect of corporate liquidity imposes on stock returns is statistically significant, even after controlling for market, size and value effect. Equity returns are more sensitive to corporate liquidity holding for companies with more volatile cash flows and companies that are financially constrained, consistent with precautionary saving motive. Higher cash holding may signal higher cash flow risk and financial constraint risk. Investors consider corporate liquidity as a proxy for the relevant risks and require higher equity returns on more liquid companies.

6. Summary and Conclusion

This paper examines the effect corporate liquidity may impose on the equity returns. We ask how corporate liquidity is related to the expected equity returns and whether the information embedded in corporate liquidity the same as in size and BEME ratio. The results show that firms with higher cash have higher expected stock returns. These findings can be interpreted using asymmetric information and signaling theory. Firms stock higher financial slack since the inside managers know that future risks will increase, because information is asymmetric, rational investors will require higher future returns on liquid firms because they see higher level of corporate liquidity as a signal for riskier future cash flows and uncertain operating performance.

Furthermore, empirical evidence shows that even after controlling for size and value effect, corporate liquidity is positively related with firm beta. This implies that cash holding serves as a signal of higher level of future risk. Regression results show that corporate liquidity contributes to interpreting beta and can be used as a proxy for risks.

Models using the Fama-MacBeth two-pass regression approach and incorporating firm cash holding and its deviation from the industry average as an explanatory variable show that a higher level of firm liquidity than the average industry level will increase the expected stock returns. Empirical results show that corporate liquidity contains information different from that in firm size and BEME. Furthermore, the effect of corporate liquidity on equity returns differs across firms with various cash flow volatilities and financial constraints. Specifically, the positive impact of corporate liquidity on expected equity returns are stronger for firms with more volatile cash flows and financial constraints. Regression results support the precautionary saving motive for companies and signaling effect of corporate liquidity. Corporate liquidity may serve as a proxy for the potential volatile cash flow risk and financial constraint risk of the firms.

This study contributes to the existing literature by bridging the corporate finance aspects and asset pricing aspects of an important firm characteristic, corporate liquidity. By investigating the asset pricing implications of corporate liquidity, the paper offers some insight into the risk information contained in corporate liquidity, which can be useful when assessing a firm's financial condition, capital structure and risk exposure.

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