ACCOUNTING QUALITY AND CORPORATE LIQUIDITY MANAGEMENT

by

Wu-Lung Li

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To my family

ACCOUNTING QUALITY AND CORPORATE LIQUIDITY MANAGEMENT

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In this paper I examine whether accounting quality is associated with corporate liquidity management. The theory suggests that firms should substitute bank credit lines for cash holdings since holding cash incurs certain costs. I argue that this substitution depends on the firm's accounting quality. Good accounting quality facilitates debt contracting and helps firms access bank credit lines. As a result, firms with better accounting quality should be capable of obtaining more credit lines for their liquidity needs, while firms with worse accounting quality have to rely more on cash holdings. Empirically, I find that the portion of total liquidity needs provided by credit lines increases in accounting quality. I also find that this substitution is determined more by innate accruals quality, which is driven by the firm's business fundamentals, than by discretionary accruals quality, which is driven by managerial discretion in accounting. Overall, the findings suggest that poor accruals quality prohibits firms from accessing the debt market and causes firms to deviate from a better liquidity policy.

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CHAPTER 1

INTRODUCTION

Accounting serves an important role in communicating information between firms and outsiders. It has been argued that accounting numbers are particularly important in debt contracting. In this paper I study the role of accounting in debt contracting by examining the association of accounting quality with the firm's liquidity policy. Specifically, I examine whether or not accounting quality is related to the firm's liquidity policy of substituting between holding cash and maintaining bank credit lines.[1]

Liquidity management is an important corporate finance policy. Precautionary demand motivates firms to manage liquidity to safeguard against unexpected shocks or capture investment opportunities. Firms can choose to hold cash to meet liquidity demands or obtain bank credit lines as an alternative liquidity source (Holmstrom and Tirole, 1998; Martin and Santomero, 1997). In fact, the empirical and survey studies show that credit lines account for an average of 16% to 24% of total assets, suggesting that they represent an important liquidity source (Campello et al., 2010; Sufi, 2009). Although holding cash has no explicit cost, it can lead to the liquidity premium and the agency cost of free cash flow that causes overinvestment (Jensen, 1986). On the other hand, credit lines have an explicit cost but offer desirable flexibility. With credit lines firms can withdraw funds within the bank's pre-committed amount when they

1 Credit lines are also known as lines of credit, revolvers, revolving loans, or loan commitments.

have liquidity needs, and pay no interest if funds are not used. The theory suggests when facing a moral hazard problem and uncertain future cash demand, firms must reserve sufficient liquidity buffers to motivate managers to maintain the optimal investment level, and obtaining credit lines to meet liquidity demands is better than holding cash due to the liquidity premium on holding cash (Holmstrom and Tirole, 1998). In spite of the theoretical application suggesting that firms should substitute credit lines for cash holdings to meet their liquidity demands, in the real world firms still maintain a high level of cash on hand that reached an average of 23.2% of total assets in 2006 (Bates et al., 2009). This suggests that credit lines may not provide sufficient liquidity for firms. In order to resolve the puzzle of why firms do not fully rely on credit lines, research in the finance literature has shown that firms opt for cash holdings instead of credit lines when they have low profitability (Sufi, 2009), when they are more likely to encounter correlated shocks simultaneously with other firms, i.e., higher aggregate risk (Acharya et al., 2010), and when they have worse cash hedging (Disatnik et al., 2010). In a review paper by Armstrong et al. (2010), they find little research on whether accounting attributes affect firm's access to debt markets. This leads to my research question of whether accounting quality is related to firms' abilities to substitute credit lines for cash holdings.

Specifically, I predict that firms with high accounting quality are more capable of substituting credit lines for cash holdings. On the other hand, firms with poor accounting quality should rely more on cash holdings for their liquidity needs due to their limited access to credit lines. It is suggested that accounting is particularly important in debt contracting (Watts and Zimmerman, 1986; Holthausen and Watts, 2001; Ball et al., 2008; Ball and Shivakumar, 2008). Ex ante, debt suppliers rely on accounting information to assess a borrower's ability to repay debts, evaluate collaterals, and set up financial covenants and performance pricing provisions in debt agreements; ex post, debt holders use accounting numbers to evaluate a borrower's performance and gauge any violation of financial covenants (Asquith et al., 2005; Beatty et al., 2002; Costello and Wittenberg-Moerman, 2010; Dichev and Skinner, 2002; Graham et al., 2008). In other words, good accounting quality should help firms access debt markets (Bharath et al., 2008; Francis et al., 2005; Graham et al., 2008). Compared to firms with lower accounting quality, firms with higher accounting quality should therefore be more likely to use credit lines to meet their liquidity needs and hold less cash on hand.

I measure accounting quality using accruals quality from Dechow and Dichev's (2002) model modified by McNichols (2002). A firm's accruals quality is calculated as the standard deviation of abnormal accruals, i.e., the residual from the model, over five years. Lower volatility of abnormal accruals indicates higher accruals quality. I further separate overall accruals quality into innate accruals quality and discretionary accruals quality since the literature suggests that these two sources of accruals quality have different implications (Ball, 2008; Francis et al, 2005; Hirbar and Nichols, 2007). The innate part of accruals quality captures the accruals quality affected by the firm's operating risk, while the discretionary part captures the accruals quality affected by managerial discretion in accounting. Francis et al. (2005) argue that it is difficult for firms to change their business fundamentals, and the innate part of accruals quality should therefore be persistent. Consequently, the poor accruals quality caused by the innate part is difficult to improve. For the discretionary part of accruals quality, on the other hand, managers can use accounting discretion to manage earnings opportunistically, which leads to low accounting quality, or use accounting discretion to enhance the ability of earnings to reflect performance, which results in high accounting quality. As a result, these conflicting effects should lead to a smaller effect of discretionary accruals quality than that of innate accruals quality on debt contracting. Therefore, I predict that the association between accruals quality and the substitution of credit lines for cash holdings is more driven by innate accruals quality than discretionary accruals quality and thus business fundamentals have a greater impact on the substitution of credit lines for cash holdings than does managerial discretion in accounting. This discrimination between these two sources of accruals quality is particularly important in this study since firms operating in riskier business environments tend to have more volatile cash flows, and cash flow volatility is an important reason that firms reserve higher buffers for their liquidity demands (Almeida et al., 2004; Bates et al. 2009; Han and Qiu, 2007; Opler et al., 1999).

I obtain data on credit lines from the DealScan provided by the Loan Pricing Corporation (LPC). LPC primarily collects loan data from SEC filing. Thus, most of the firms covered in DealScan are publicly held companies. The majority of the loans in the database are credit lines and term loans. The database provides information on the terms of credit lines such as the amount, spread, maturity, covenant, performance pricing provision, collateral, lender, etc. I use U.S. public firms covered in DealScan as my base sample, and then merge these firms with Compustat to obtain required accounting data.[2] The final sample contains 24,398 firm-year observations (Full Sample hereafter) represented by 3,381 firms from December 1994 to 2008; 45% of Full Sample (11,076 observations) have no credit lines. Following Sufi (2009), I use the

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2 I thank Michael Roberts for sharing the link of DealScan and Compustat databases used in Chava and Roberts (2008).

sum of credit lines and cash holdings to proxy for a firm's total liquidity needs, and calculate the ratio of credit lines to total liquidity needs to measure a firm's capability to substitute credit lines for cash holdings in its liquidity management. This ratio represents the portion of the total liquidity needs provided by credit lines. A larger ratio implies that the firm substitutes more credit lines for cash holdings. In Full Sample the average ratio of credit lines to total liquidity needs is 39.5%. Among the observations with credit lines (With-CL Sample hereafter), the average ratio of credit lines to total liquidity needs is 72.4%. Using Sufi's (2009) model as the benchmark, I regress this ratio on ranked accruals quality measures and control variables.[3] I expect that better accruals quality is associated with a higher ratio of credit lines to total liquidity needs.

Consistent with my predictions, the empirical results show that accruals quality is significantly and positively related to the ratio of credit lines to total liquidity needs, suggesting that the higher the firm's accruals quality, the more the firm relies on credit lines for liquidity needs. In Full Sample, when accruals quality increases from the lowest to the highest decile, the portion of total liquidity needs provided by credit lines increases by 4.9%. In With-CL Sample, the portion provided by credit lines increases by 6.9% for an increase in accruals quality from the lowest to the highest decile. I then separate accruals quality into innate accruals quality and discretionary accruals quality in the regression. I regress accruals quality on five variables that are argued to be associated with innate accruals quality, namely, size, cash flow volatility, sales volatility, operating cycle, and the incidence of negative earnings. The fitted value of the

3 In addition to the explanatory variables from Sufi's (2009) model, I also control for size square and cash flow volatility. See the research design section for details.

regression is innate accruals quality, and the residual is discretionary accruals quality. The results in Full Sample suggest that an increase in innate accruals quality from the lowest to the highest decile increases the portion provided by credit lines by 12.8%, while an increase in discretionary accruals quality from the lowest to the highest decile only increases the portion by 2.1%. The effect of innate accruals quality on the increased portion is significantly larger than that of discretionary accruals quality. In With-CL Sample, an increase in innate accruals quality and in discretionary accruals quality from the lowest to the highest decile increases the portion by 18.2% and 3.4%, respectively, and the difference in increases is significant. This is consistent with the prediction that the firm's business fundamentals have a greater impact on the substitution of credit lines for cash holdings than does managerial discretion in accounting. I also find that the spreads of credit lines are higher when overall accruals quality, innate accruals quality, or discretionary accruals quality are lower. Since higher costs of credit lines should make credit lines less attractive as an instrument for liquidity needs and keep firms from using them, the adverse effect of accruals quality on costs of credit lines can be one (but not the only) channel through which the positive association between accruals quality and the substitution of credit lines for cash holding is determined.

One should observe from the previous paragraph that the association between accruals quality and the use of credit lines is weaker in Full Sample than in With-CL Sample. To further look into this issue, I run multinomial logit models in which I compare the accruals quality of firms with no credit lines to the accruals quality of firms with less credit lines, as well as the accruals quality of firms with no credit lines to the accruals quality of firms with more credit lines in their total liquidity needs. The cutoff between more and less credit lines is the median of the ratio of credit lines to total liquidity needs of With-CL Sample, which is equal to 82.2%. The results suggest that, holding all other independent variables at the mean values, when accruals quality, innate accruals quality, and discretionary accruals quality increase from the lowest to the highest decile, the probability of firms using less credit lines over using no credit lines decreases by 3.6%, 0.6%, and 2.1%, respectively. However, none of them are statistically significant. On the other hand, when accruals quality, innate accruals quality, and discretionary accruals quality increase from the lowest to the highest decile, the probability of firms using more credit lines over using no credit lines statistically significantly increases by 10.5%, 26.9%, and 7.0%, respectively. The analysis of the multinomial logit models suggests that accruals quality does not matter when firms choose to use either less credit lines or no credit lines, but does matter if firms want to keep more credit lines within total liquidity needs. This explains why the association between accruals quality and the use of credit lines becomes weaker when firms with no credit lines are added into With-CL Sample.

I further do three additional analyses. First, one may argue that it is possible that the five variables that are associated with innate accruals quality are also related to the substitution of credit lines for cash holdings, causing a mechanical association between innate accruals quality and the ratio of credit lines to total liquidity needs. To resolve this concern, I include these five variables in the regression and test if the variable of innate accruals quality remains significant. Second, like credit lines, cash holdings can also be affected by accruals quality since accounting helps shareholders monitor the manager's behavior and thus mitigate the agency cost of free cash flows. To control for the possible confounding effect of accruals quality on cash holdings, I replace actual cash level with expected cash level when calculating the ratio of credit lines to total liquidity needs. Third, I use continuous values of accruals quality measures instead of ranked ones. The results of these additional tests hold. [4]

This paper contributes to the literature in the following ways. First, the finance literature suggests that firms should substitute credit lines for cash holdings to meet their liquidity demands. However, we observe that firms still hold a high level of cash on hand. Prior studies provide insights into this puzzle and show that firms substitute more credit lines for cash holdings when they have higher profitability (Sufi, 2009), smaller aggregate risk (Acharya et al., 2010), and better cash hedging (Disatnik et al., 2010). My findings add to this literature by showing that a firm's accounting quality is also an important factor for obtaining credit lines as well as substituting them for cash holdings.

Second, I add to the literature on the role of accounting in debt contracting. Conditional on access to debt markets, prior research studies how accounting quality affects the firm's choices between public and private debts (Bharath et al., 2008), as well as the debt contract terms (Bharath et al., 2008; Francis et al., 2005; Graham et al., 2008). However, there has been little research on the role of accounting to obtain debt. In the review paper by Armstrong et al. (2010), they find no published papers in the previous ten years examining whether accounting affects firms' ability to access the debt markets, and call for research on this line. A firm's liquidity choices between maintaining credit lines (i.e., access to the debt market) and holding cash (i.e., no access to the debt market) is a good setting for examining this research question.

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4 Wysocki (2009) suggests that Dechow and Dichev's (2002) model cannot distinguish between high quality accruals that are correlated to operating cash flows and manipulated accruals that are also correlated to operating cash flows. Therefore, the results in this paper should be interpreted with caution.

This study shows that accounting quality is negatively associated with firms having credit lines in their total liquidity reserves and the probability of obtaining credit lines, suggesting firms with bad accounting quality deviate from a better liquidity policy, i.e., substituting credit lines for cash holdings. This association also suggests that while the private communication of proprietary information between banks and firms mitigates information asymmetry originating from poor accounting quality and thus allows firms to borrow from banks (Bharath et al., 2008), this channel of private communication does not completely replace the importance of accounting quality.

The remainder of the paper proceeds as follows. Chapter 2 reviews the literature on firm liquidity management. Chapter 3 develops the testable hypotheses. Chapter 4 discusses the research design and descriptive statistics. Chapter 5 documents the empirical results. Chapter 6 presents additional analyses. Chapter 7 concludes and discusses future research.

CHAPTER 2

REVIEW OF LITERATURE ON LIQUIDITY DEMANDS

In an uncertain operating environment, firms often experience unexpected cash needs to deal with operating shocks or capture investment opportunities. In a frictionless world, firms do not need to reserve liquidity since they can satisfy these cash needs by financing funds externally when liquidity needs arise. However, the availability of future external financing depends on the firm's creditworthiness at that time, meaning that the firm may not be able to meet its cash needs through external financing when needed. Hence, firms reserve liquidity today to avoid future financing frictions. Two sources of liquidity are cash holdings and bank credit lines. Sections 2.1 and 2.2 review the cash holdings literature and credit line literature, respectively.[5]

2.1 Cash Holdings as a Source of Liquidity

Several papers in the finance literature study cash holdings as a source of liquidity when firms face financing frictions. Opler et al. (1999) show that the ratio of cash to non-cash assets is increasing in growth opportunities and riskier cash flows. This suggests that precautionary demand motivates firms to hold more cash. They also find that the ratio of cash to non-cash assets is decreasing in firm size and credit ratings. This is because large firms and firms with high credit ratings have greater access to external capital markets, and therefore these firms keep

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5 Demiroglu and James (2010) review the literature on corporate liquidity management.

less cash to avoid costs of holding cash. In the similar vein, Kim et al. (1998) theoretically and empirically show that cash holdings are higher when the firm is smaller, when the firm has higher information asymmetry (both are proxies for costs of external financing), when the firm has higher cash flow variability, and when the forecast of future economic conditions is more promising (a proxy for the return on future investment opportunities).

Almeida et al. (2004) examine a firm's propensity to save cash out of cash flows. They first model that firms anticipating potential financing constraints in the future hold more internally generated cash to meet liquidity demands. However, holding cash today comes at the cost that firms must reduce current valuable projects. Hence, financially constrained firms choose their cash levels by trading off between the cost of reducing investments today and the profitability of future investment opportunities. On the other hand, financially unconstrained firms do not face this tradeoff. Empirically, they find that financially constrained firms (proxied by low payout ratio, small asset size, no bond rating, and no commercial paper rating) have a positive relationship between cash flows and change in cash holdings, while unconstrained firms do not display this propensity.

While cash can be a source of liquidity demands, holding cash incurs implicit costs such as the liquidity premium or the agency cost of free cash flows that leads to overinvestment (Jensen, 1986). The extant literature examines the consequence of holding cash. The empirical evidence suggests that: (1) entrenched managers dissipate cash quickly (Dittmar and Mahrt-Smith, 2007; Harford et al., 2008); (2) holding cash leads to a lower future ROA (Dittmar and Mahrt-Smith, 2007; Li, 2007; Oler and Picconi, 2009); (3) cash-rich firms are more likely to make value-destroying acquisitions (Harford, 1999); and (4) stock prices negatively react to increases in cash when firms' cash levels are already high (Faulkender and Wang, 2006). These studies point out the drawbacks of holding cash as a source of liquidity needs.

2.2 Bank Credit Lines as a Source of Liquidity

In this section, I discuss the finance theoretical literature on credit lines as a source of liquidity that collectively argue that firms use credit lines to overcome the problem of financing frictions similar to the role that cash holdings play.

A credit line is the bank's pre-committed amount of a loan from which the borrower can draw down and repay the fund any time before it matures. The borrower only pays interest at a pre-determined rate for the portion of funds actually used. The interest rate is usually a fixed markup over benchmarks such as prime or LIBOR. In addition to interest on the used portion of credit lines, the bank charges a commitment fee on the unused portion and a one-time up-front fee. These fees are relatively small compared to the interest. These features contrast with term loans or bonds that require borrowers to withdraw funds fully at inception and have strict repayment schedules. In other words, credit lines give firms flexibility in managing liquidity needs and have low costs when they are not used. Since the interest rate of the credit line is pre-determined, the firm actually enjoys a lower cost of debt if interest increases in the future due to the deterioration of its credit or macroeconomic factors.

Martin and Santomero (1997) model how a risk neutral firm under perfect competition utilizes credit lines to pursue future investment opportunities. Under their model, investment opportunities arrive randomly over time. The opportunities are short lived; if the firm does not capture them immediately when they arrive, they either disappear or are captured by competitors. The firm's objective function is to choose a credit line that maximizes the expected profitability of the investment and borrowing activities. They show that the optimal demand for credit lines is decreasing in the commitment fee and up-front fee, and increasing in the differential surcharge of the interest rate if the firm has insufficient unused lines of credit.[6]

Boot et al. (1987) model how firms demand for credit lines in a setting where the agency problem exists. In the first period the borrower chooses a high- or low-effort action, and decides whether to invest in the second period. The bank cannot observe the effort level the borrower inputs. The interest rate in the spot market is stochastic in the second period and captures a liquidity shock. They first show that if the firm borrows from the spot market in the second period and the interest rate is high, the efficient action of high effort is unattainable, leading to welfare losses for the borrower. This is because the interest is so high that the borrower's net payoff from the project is too low to induce a high-effort action in the first period. To mitigate the problem, the bank offers a credit line with a fixed rate in the first period that is low enough to induce a high effort level. The bank compensates for the low interest rate by charging an up-front fee. This up-front fee is paid when the contract is initiated so that the borrower's effort level is independent of the fee.

Holmstrom and Tirole (1998) theoretically show that using credit lines as the source to meet the firm's liquidity needs is better than holding cash. They model that a firm invests in a positive NPV project at date 0, and the payoff realizes at date 2. The investment is subject to a moral hazard problem because the firm can choose to behave or shirk, leading to a different probability of project success. At date 1, the firm experiences a liquidity shock and requires an

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6 This differential surcharge is equivalent to the extra interest rate that the firm would have to pay for a spot loan if it exceeds its credit lines.

additional uncertain amount of cash. If the firm can raise funds to meet the cash demand, the project continues; if not, the project terminates and the initial investment is wasted. Under this circumstance, the entrepreneur would not maintain the optimal investment level unless he has sufficient liquidity buffers at date 0 to meet future uncertainty on cash demands. They then further show that using credit lines to resolve liquidity needs is better than holding cash since holding cash incurs the cost of the liquidity premium (a lower return on cash holdings). As such, firms should substitute credit lines for cash holdings when facing liquidity choices.

Although the theory suggests that firms should rely on credit lines to meet liquidity needs, empirical studies document that firms can substitute credit lines for cash holdings only when they possess certain characteristics. Sufi (2009) is the first study to jointly examine a firm's liquidity choices between credit lines and cash holdings. He finds that firms' credit lines are positively associated with cash flows (proxied by profitability). He further shows that this positive correlation is associated with the use of cash flow-based covenants contracted in credit lines. Poor cash flows would trigger violations of such covenants, and banks would prohibit firms from further accessing unused credit lines or renewing credit lines after covenant violations. Therefore, firms must maintain high cash flows to comply with covenants and ensure that banks will supply credit lines. In all, his results suggest that only firms that maintain high cash flows can substitute credit lines for cash holdings, and firms with low cash flows need to rely more heavily on cash holdings.

Disatnik et al. (2010) study the interaction between corporate hedging and liquidity policy as a means of addressing cash flow risks. They examine how the firm's ability to hedge cash flows affects its choices between credit line and cash holdings. They find that firms with better cash flow hedging reduce cash flow risks and the probability of violating cash flow-based covenants. Therefore, cash flow hedging enables a firm to pursue a more efficient liquidity policy, namely, greater reliance on credit lines and less on cash holdings. Since cash flow hedging reduces the liquidity premium associated with cash holdings, they also find a positive effect of the ability to hedge cash flow on firm value.

Acharya et al. (2010) argue from the perspective of banks' fund supplies that while banks must provide funds under pre-committed agreements when borrowers have liquidity needs, they may not be able to do so when borrowers who suffer from correlated shocks (i.e., aggregate risk) draw down credit lines simultaneously since the aggregate demand for funds from these borrowers would be greater than banks' fund supplies. As a result, firms that are more subject to aggregate risk are charged higher costs of credit lines, and they therefore rely less on credit lines and more on cash holdings. The effect of aggregate risk on liquidity management is more pronounced for financially constrained firms. Taken together, these papers show the trade-offs between holding cash and credit lines, and highlight that firms cannot always substitute credit lines for cash.

CHAPTER 3

HYPOTHESIS DEVELOPMENT

3.1 Accruals Quality and Liquidity Management

Accounting provides verified information to all participants during the negotiating and contracting processes. It has been suggested that accounting numbers are particularly important in debt contracting (Watts and Zimmerman, 1986; Holthausen and Watts, 2001; Ball et al. 2008; Ball and Shivakumar, 2008). High accounting quality is required to efficiently define debt agreements between firms and lenders. For example, before debt contracts are entered, debt suppliers need accounting numbers to evaluate the borrower's performance, as well as assess its future cash flows and ability to repay debts. Also, verified accounting information is needed to assess the value of collaterals. In addition, some debt terms are directly contracted based on accounting numbers. For instance, debt suppliers incorporate financial covenants into contracts that require borrowers to maintain a certain level of financial performance, or use accounting-based performance pricing provisions to adjust interest rates (Asquith et al., 2005; Beatty et al., 2002; Bharath et al., 2008; Costello and Wittenberg-Moerman, 2010; Dichev and Skinner, 2002 Graham et al., 2008). After contracts are entered, debt holders use accounting information to determine whether borrowers have breached financial covenants (Dichev and Skinner, 2002). These attributes of the debt contracting process highlight the importance of the role of accounting. As discussed in the previous section, in order to meet their liquidity needs, firms can substitute bank credit lines for cash holdings. A credit line is a form of debt, and therefore also requires verified accounting information during the contracting process. Since high accounting quality facilitates debt contracting between firms and banks, I expect that firms can substitute more credit lines for cash holdings when they have better accounting quality, as measured by accruals quality from Dechow and Dichev's (2002) model modified by McNichols (2002). This leads to my first hypothesis (in alternative form):

H1: The substitution of credit lines for cash holdings is positively associated with accruals quality, ceteris paribus.

3.2 Innate Accruals Quality, Discretionary Accruals Quality and Liquidity Management

Several studies highlight the importance of discriminating between the sources that influence accruals quality. Dechow and Dichev (2002) argue that in addition to managerial discretion in accounting as a source that affects accruals quality, firms operating within a volatile environment are more likely to have low accruals quality since the operation in such an environment typically leads to volatile cash flows. This makes it more difficult for accruals to adjust the recognition of cash flows over time. Hence, accruals quality is also influenced by the firm's operating risk. Similarly, Hribar and Nichols (2007) and Ball (2008) also argue that part of residuals from discretionary accruals models are caused by the firm's business fundamentals, and using residuals to examine whether managers opportunistically use accounting discretion to manipulate earnings without controlling for operating risk would bias the result in favor of the evidence of earnings management. Therefore, while accruals quality as a whole is expected to be associated with the firm's substitution of credit lines for cash holdings, it is interesting to examine within overall accruals quality whether banks treat two sources differently in debt contracting, i.e., the firm's fundamentals (*innate* accruals quality) versus managerial discretion (*discretionary* accruals quality), and therefore the substitution of credit lines for cash holdings is influenced differently by innate and discretionary parts accordingly.

I expect that the association between accruals quality and the substitution of credit lines for cash holdings is more driven by innate accruals quality than discretionary accruals quality. That is, innate accruals quality has a greater impact on the substitution of credit lines for cash holdings than does discretionary accruals quality. Since business fundamentals are not easily altered within a short period of time, Francis et al. (2005) argue that it would be more difficult for firms with poor accruals quality caused by the innate part to improve their accruals quality than firms with poor accruals quality caused by the discretionary part. They find that the percentage year-to-year change in innate accruals quality is significantly smaller than the percentage year-to-year change in discretionary accruals quality, meaning that the effect of operating risk on accruals quality is more persistent over time than that of managerial discretion. On the other hand, managers can use accounting discretion to either manage earnings opportunistically or enhance the ability of earnings to reflect performance. The former should worsen accruals quality, while the latter should increase accruals quality. As a result, these conflicting effects should result in a smaller effect of discretionary accruals quality on debt contracting than the effect of innate accruals quality. This leads to my second hypothesis (in alternative form):

H2: The substitution of credit lines for cash holdings is more positively associated with *innate* accruals quality than with *discretionary* accruals quality, ceteris paribus.

CHAPTER 4

RESEARCH DESIGN AND DESCRIPTIVE STATISTICS

4.1 Accruals Model

To construct the measure of accruals quality, I use Dechow and Dichev's (2002) model modified by McNichols (2002):

$$CA_{it} = \alpha_0 + \alpha_1 CFO_{it-1} + \alpha_2 CFO_{it} + \alpha_3 CFO_{it+1} + \alpha_4 \Delta Rev_{it} + \alpha_5 PPE_{it} + \varepsilon_{it} \quad (1)$$

where CFO is operating cash flows taken from the statement of cash flows, CA = current accruals = income before extraordinary items from the statement of cash flows – CFO + depreciation expenses in year *t*, ΔRev is change in revenues between year *t* – 1 and year *t*, and PPE is the gross value of PPE in year *t*. All variables are deflated by average total assets. I run Regression (1) using all firms in CRSP/Compustat Merged Database. Extreme values are winsorized at the 1^{th} and 99^{th} percentiles. Equation (1) is estimated annually for each of Fama and French's (1997) 48 industries with at least 20 firms in each regression. Accruals quality (AQ) for firm i in year t is calculated as the standard deviation of firm i's residuals from Equation (1) over the years t – 4 to *t*. As Dechow and Dichev (2002) interpret, large standard deviations of residuals are considered as poor accruals quality. Yet if a firm consistently has large residuals over time, the standard deviation is small, and its accruals quality is high. In order to ease the interpretation, I multiply the standard deviations of the residuals by -1 so that a larger AQ implies higher accruals quality.

To test Hypothesis 2, I follow Francis et al. (2005) to further separate AQ into $InnateAQ$ and $DiscretionaryAQ$ using annual estimations of the following model:

$$AQ_{it} = \beta_0 + \beta_1 Size_{it} + \beta_2 CFOVol_{it} + \beta_3 SalesVol_{it} + \beta_4 OperCycle_{it} + \beta_5 NegEarn_{it} + \omega_{it} \quad (2)$$

where AQ is the standard deviation of firm *i*'s residuals from Equation (1) over the years *t* – 4 to *t*, $Size$ is the log of total assets in year *t*, $CFOVol$ is the standard deviation of CFO over the past 10 years, $SalesVol$ is the standard deviation of sales over the past 10 years, and $NegEarn$ is the proportion of reporting negative annual earnings before extraordinary items over the past 10 years. $OperCycle$ is the log of operating cycle, calculated as 360/(sales/average accounts receivable)+360/(cost of goods sold/average inventory). When calculating $CFOVol$, $SalesVol$, and $NegEarn$, I require that data be available at least five out of the previous ten years. These explanatory variables are argued to be associated with the firm's business environment and thus affect accruals volatility. Specifically, firms with smaller size, higher cash flow volatility, sales volatility, longer operating cycles and higher incidence of negative earnings face higher uncertainty and operate in a more volatile environment, leading to larger estimation errors and accruals volatility. $InnateAQ$ is the predicted value of Equation (2), and $DiscretionaryAQ$ is the residual. $InnateAQ$ and $DiscretionaryAQ$ are multiplied by -1 so that larger numbers imply higher quality.

4.2 Liquidity Management Model

The benchmark model is obtained from Sufi (2009). I add the variable of accruals quality to test Hypothesis 1:

$$CL\ to\ liquidity_{it} = \gamma_0 + \gamma_1 AQ_{it-1} + \gamma_2 Profitability_{it-1} + \gamma_3 CFOVol_{it-1} + \gamma_4 Tangibility_{it-1} + \gamma_5 Size_{it-1} + \gamma_6 Size2_{it-1} + \gamma_7 NetWorth_{it-1} + \gamma_8 Tbobin'sQ_{it-1} + \gamma_9 IndSalesVol_{it-1} + \gamma_{10} ProfitVol_{it-1} + \gamma_{11} Age_{it-1} + \gamma_{12} OTC_{it} + \gamma_{13} S\&P_{it} + \sum Year + \sum Industry + \epsilon_{it} \quad (3)$$

where $CL\ to\ liquidity$ is the ratio of credit lines to total liquidity needs, measured as the sum of cash and credit lines (the calculation of credit lines is discussed below). This ratio denotes the fraction of total liquidity needs provided by credit lines. AQ is the standard deviation of the residuals from Equation (1). I rank AQ into deciles and standardize it to be between (0,1). Hence, the coefficient estimates of AQ represent the marginal difference in $CL\ to\ liquidity$ between the lowest and highest AQ deciles. Hypothesis 1 suggests a positive γ_1, meaning firms with higher accruals quality have a larger portion of their total liquidity needs provided by credit lines. $Profitability$ measures the firm's cash flows, calculated as operating income before depreciation deflated by non-cash total assets. $Tangibility$ is net PPE deflated by non-cash total assets. $Size$ in this equation is the log of non-cash total assets. $NetWorth$ is non-cash total assets less total liabilities, dividend by non-cash total assets. $Tbobin'sQ$ is defined as non-cash total assets less the book value of equity plus the market value of equity, divided by non-cash total assets. $ProfitVol$ is the firm-level standard deviation of annual changes in operating income before depreciation over a lagged four-year period, deflated by average non-cash total assets in the lagged period. All of above financial variables are from annual Compustat. Industry sales volatility, denoted as $IndSalesVol$, is calculated as follows: I first calculate the within-year standard deviation of quarterly changes in sales for each firm deflated by average assets over the year. I then take the median value across all firms in the same three-digit SIC code in a given year from quarterly Compustat. Age is the log of 1 plus the years since the first year when the firm was included in Compustat. OTC is an indicator variable taking the value of 1 if the firm is traded over the counter, and 0 otherwise. $S\&P$ is an indicator variable taking the value of 1 if the firm is included in S&P 500, S&P Midcap 400 or S&P Smallcap 600, and 0 otherwise. OTC and $S\&P$ are proxies for information asymmetry. Year and one-digit SIC industry dummies are included in the model. In addition to the above control variables used in Sufi (2009), I add $CFOVol$ and $Size2$ into the model. $CFOVol$ is defined in Regression (2), and $Size2$ is the square of $Size$. The cash holdings literature shows that cash flow volatility is positively correlated to cash level (Bates et al. 2009; Han and Qiu, 2007; Opler et al., 1999). Since cash flow volatility is also associated with accruals quality, I add cash flow volatility to avoid the mechanical relationship between accruals quality and the ratio of credit lines to total liquidity needs. In my sample, size has an inverse U shape in its association with the ratio of credit lines to total liquidity needs, as suggested in the summary statistics section. Therefore, I add the square term to capture this effect. While Sufi (2009) estimates standard errors by clustering at the firm level only, in my tests standard errors are clustered at both the firm and year levels. All financial variables from Compustat are winsorized at the 5^{th} and 95^{th} percentiles.

To construct the firm's credit line measure, I rely on the DealScan database provided by the Loan Pricing Corporation that covers the terms of credit lines such as the amount, spread, maturity, covenant, performance pricing provision, and collateral. The following three types of loan identified in DealScan are defined as credit lines: "364-Day Facility," "Revolver/Line < 1 Yr," and "Revolver/Line >= 1 Yr." Firms in SIC codes from 4900 to 5000, 6000 to 7000, or equal to or greater than 9000 are deleted. Following Acharya et al.'s (2010) calculation of the amount of credit lines, for each firm *i* in year *t*, I first sum up the contract amounts of all credit lines that have not yet matured in each quarter in year *t*, then average the amounts of all four quarters to derive the amount of credit lines in year *t*.

To test Hypothesis 2, I replace AQ in (3) with $InnateAQ$ and $DiscretionaryAQ$:

$$CL\ to\ liquidity_{it} = \gamma_0 + \gamma_{1a} InnateAQ_{it-1} + \gamma_{1b} DiscretionaryAQ_{it-1} + \gamma_2 Profitability_{it-1} + \gamma_3 CFOVol_{it-1} + \gamma_4 Tangibility_{it-1} + \gamma_5 Size_{it-1} + \gamma_6 Size2_{it-1} + \gamma_7 NetWorth_{it-1} + \gamma_8 Tbobin'sQ_{it-1} + \gamma_9 IndSalesVol_{it-1} + \gamma_{10} ProfitVol_{it-1} + \gamma_{11} Age_{it-1} + \gamma_{12} OTC_{it} + \gamma_{13} S\&P_{it} + \sum Year + \sum Industry + \epsilon_{it} \quad (4)$$

where $InnateAQ$ and $DiscretionaryAQ$ are derived from Equation (2). I also rank $InnateAQ$ and $DiscretionaryAQ$ into deciles and standardize them to be between (0,1). Hypothesis 2 predicts that the substitution of credit lines for cash holdings is more positively associated by innate accruals quality than by discretionary accruals quality. Hence, I expect that γ_{1a} is greater than γ_{1b}.

4.3 Descriptive Statistics

My sample is composed of U.S. publicly traded firms covered by the DealScan database. The sample period starts from December 1994, the earliest availability of the variable $S\&P$, and ends in 2008. After merging the DealScan and Compustat databases with the available data on all variables, I have 24,398 firm-year observations represented by 3,381 firms in the final sample. Some of the firms covered by DealScan have other types of loans but no credit lines, and therefore 45% (11,076) of the observations have a ratio of $CL\ to\ liquidity$ equal to 0. Since calculating accruals measures in Equations (1) and (2) requires at least seven years of data, the firms included in the sample tend to be more established.

Table 1 summarizes the descriptive statistics. The measures of accruals quality reported in Table 1 are volatility derived from Equations (1) and (2) and then multiplied by -1. Therefore, the larger the number is, the better the accruals quality is. Panel A reports the statistics using Full Sample and With-CL Sample. In Full Sample, the mean and median of $CL\ to\ liquidity$ are 0.395 and 0.250, respectively. This means for a median firm 25% of its liquidity is maintained in the form of credit lines and 75% is provided by cash holdings. AQ is skewed, as suggested by the values of mean (-0.060) and median (-0.044). The medians of $InnateAQ$ and $DiscretionaryAQ$ are -0.053 and 0.007, respectively. Since $DiscretionaryAQ$ is the residual of Equation (2) and then multiplied by -1, a positive $DiscretionaryAQ$ suggests the use of managerial direction in accounting improves overall accruals quality. In fact, the untabulated result shows that for the entire sample more than half (61%) of the observations have a positive $DiscretionaryAQ$. Francis et al. (2005) also report a similar result. However, the standard deviation of $DiscretionaryAQ$ (0.040) is large, suggesting that discretionary accruals quality varies significantly across firms. In With-CL Sample, the mean and median of $CL\ to\ liquidity$ are 0.724 and 0.822, respectively. The means and medians of AQ and $InnateAQ$ are larger than those in Full Sample, meaning that firms without credit lines have worse AQ and $InnateAQ$. We can see the difference across subsamples more clearly in Panel B.

Panel B reports the statistics of three subgroups. I separate With-CL Sample into two groups: observations with a $CL\ to\ liquidity$ smaller than the median (82.2%) (Less-CL Sample hereafter), and observations with a $CL\ to\ liquidity$ greater than the median (More-CL Sample hereafter). Each of these two groups has 6,661 observations. The third group has 11,076 observations that have no credit lines (No-CL Sample hereafter). As observed in the table, the average $CL\ to\ liquidity$ is 51.2% in Less-CL Sample, and reaches 93.6% in More-CL Sample. This implies that credit lines are an important liquidity instrument since some firms intensively rely on credit lines over cash holdings in managing their liquidity demands. The mean and median of AQ and $InnateAQ$ are -0.071 and -0.075 in No-CL Sample, -0.055 and -0.055 in Less-CL Sample, and -0.046 and -0.049 in More-CL Sample, respectively. The differences between groups are statistically significant, suggesting that firms with better accruals quality and innate accruals quality use more credit lines for liquidity needs. Interestingly, on average discretionary accruals quality is better in No-CL Sample (mean=0.000) than in Less-CL Sample (mean=-0.001). This suggests that certain firms with better discretionary accruals quality opt to use cash instead of credit lines as liquidity buffers. Comparing non-cash assets across three groups, we see that the average firm size ($505 million) of No-CL Sample is the smallest, the average firm size ($2,420 million) of Less-CL Sample is the largest, and the average size ($ 1,981 million) of More-CL Sample is in between. This suggests that size increases in $CL\ to\ liquidity$ from no credit lines to low $CL\ to\ liquidity$, but decreases in $CL\ to\ liquidity$ when $CL\ to\ liquidity$ is high. Therefore, I add the square term of size into Equations (3) and (4) to capture this inverse U-shaped effect.

Table 2 reports the univariate correlations. The measures of accruals quality reported in this table and the following empirical analyses are the volatility from the models multiplied by -1 so that a larger number of the accruals measure implies better accruals quality. From the positive coefficient of correlation of 0.25 between AQ and $CL\ to\ liquidity$, we can know the importance of accruals quality on the firm's liquidity management decisions: the better the firm's overall accruals quality, the more the firm can rely on credit lines for unexpected shocks. When AQ is further separated into $InnateAQ$ and $DiscretionaryAQ$, innate accruals quality shows a significantly more positive association with $CL\ to\ liquidity$ (0.338) than does discretionary accruals quality (0.035). This suggests that different sources of accruals quality have different impacts on a firm's decision to choose cash holdings or credit lines as buffers against future shocks, and highlights the importance of discriminating one source from the other.

$Profitability$ is positively correlated to $CL\ to\ liquidity$ (0.116), similar to Sufi's (2009) findings. He argues that firms with worse profitability are more likely to violate financial covenants, and once covenants are violated they are prohibited from accessing or renewing credit lines. Therefore, firms with higher profitability are able to use more credit lines to deal with future uncertainty. $CFOVol$ is negatively associated with $CL\ to\ liquidity$ and accruals quality. Therefore, I add $CFOVol$ into Sufi's model to rule out the possibility that the association between $CL\ to\ liquidity$ and accruals quality in the regression is caused by cash flow volatility. Other control variables are all correlated to $CL\ to\ liquidity$. Univariate correlations, however, do not control for correlated omitted variables. Hence, the inference based on the simple correlation should be interpreted with caution.

CHAPTER 5

EMPIRICAL RESULTS

5.1 Accruals Quality and Liquidity Management

Table 3 reports the replications of Sufi (2009) using my sample. Since the sample contains 45% observations with no credit lines, I run the regression separately using the entire sample and the sample only containing the observations with credit lines. Columns (1), (3), and (5) report the results using Full Sample. In Column (1), I replicate Sufi's model: I include variables considered by Sufi and estimate standard errors by clustering at the firm level only. The coefficient on $Profitability$ is 0.055 and significant, consistent with Sufi's finding that the portion of liquidity needs provided by credit lines is increasing in profitability. Thus, high profitability allows firms to maintain more credit lines for their liquidity needs. In Column (3) I further cluster at both the firm and year levels, and the coefficient on Profitability becomes insignificant. Since Gow et al. (2010) show that accounting variables are often both cross-sectionally and serially correlated, and tests without controlling for both types of dependence may produce misspecified statistics, I therefore estimate standard errors by clustering at both the firm and year levels in my later tests. In Column (5), I further include $CFOVol$ and $Size2$ in the regression. $CL\ to\ liquidity$ is decreasing in $CFOVol$, consistent with the cash holdings literature suggesting that cash flow volatility increases the firm's cash holdings. Since accruals quality is also affected by cash flow volatility, I control for it to exclude the concern that the omitted correlated variable drives the significance of the association between accruals quality and the ratio of credit lines to total liquidity needs. Columns (2), (4), and (6) report the results using With-CL Sample. Again, the coefficient on $Profitability$ is significant when I strictly follow Sufi's model in Column (2). However, after I further cluster at both the firm and year levels in Column (4), the coefficient becomes insignificant. $Size$ is quite significant in Column (1) (t=17.37), and becomes insignificant in Column (2) (t=-1.11). As discussed in the summary statistics section, $CL\ to\ liquidity$ increases in $Size$ from $CL\ to\ liquidity$=0 to low $CL\ to\ liquidity$, and this positive association reverses when $CL\ to\ liquidity$ reaches a certain point at the higher level. As a result, the relationship between $Size$ and $CL\ to\ liquidity$ becomes insignificant in With-CL Sample. Hence, I add size square in the regressions. As observed in Columns (5) and (6), $Size$ is significantly positive, and $Size2$ is significantly negative, confirming this inverse U-shaped relationship.

Table 4 reports the results of Equations (3) and (4). Columns (1) and (2) test the hypothesis H1. H1 suggests that since accounting information facilitates debt contracting between firms and lenders, when the firm's accruals quality is better, it should allow the firm to substitute more credit lines for cash holdings. My findings support this hypothesis. In Full Sample (Column (1)), the coefficient of AQ (0.049) is significantly positive, suggesting that when AQ increases from the lowest to the highest decile, the portion of total liquidity needs provided by credit lines increases by 4.9%. In With-CL Sample (Column (2)), the coefficient becomes 0.069, representing an increase by 41% from 0.049 in Column (1). This coefficient also suggests that an increase in AQ from the lowest to the highest decile increases the portion of credit lines in total liquidity needs by 6.9%. The increase in the magnitude of the coefficient of

AQ from Full Sample to With-CL Sample implies that certain firms with relatively better accruals quality opt to reply fully on cash holdings rather than credit lines to manage their liquidity needs. This can be confirmed from Table 1, Panel B where on average firms in No-CL Sample have the worst accruals quality (0.071) but the standard deviation (0.051) is the largest among three subgroups. Consequently, the coefficient increases when observations without credit lines are excluded. In Chapter 6 I further analysize the effect of accruals quality on different groups of $CL\ to\ liquidity$. $CFOVol$ is insignificant in Full Sample, but significantly negative in With-CL sample. More importantly, the correlation between $CL\ to\ liquidity$ and AQ is not driven by cash flow volatility. Again, $CL\ to\ liquidity$ increases in $Size$ when $CL\ to\ liquidity$ is low, but decreases in $Size$ when $CL\ to\ liquidity$ is high. I also find that firms with smaller $NetWorth$, $Tbobin'sQ$, $ProfitVol$ and larger $IndSalesVol$ use more credit lines for their liquidity needs.

Columns (3) and (4) in Table 4 test the hypothesis H2. H2 hypothesizes that the association between accruals quality and the substitution of credit lines for cash holdings is more driven by innate accruals quality than discretionary accruals quality, and predicts that the firm's business fundamentals have a greater impact on the substitution of credit lines for cash holdings than does managerial discretion in accounting. Therefore, innate accruals quality should be more positively associated with the use of credit lines than discretionary accruals quality. Column (3) of Full Sample shows that the coefficient of $InnateAQ$ (0.128) is significantly and positively related to the substitution of credit lines for cash holdings, meaning higher innate accruals quality leads to more reliance on credit lines than cash holdings. However, the coefficient on $DiscretionaryAQ$ (0.021) is not significant. F test on the equality of the coefficients of

$InnateAQ$ and $DiscretionaryAQ$ shows F stat=4.24 at the 5% significance level, and t test on the coefficient of $InnateAQ$ > the coefficient of $DiscretionaryAQ$ suggests t stat=2.06 at the 5% significance level, indicating that $InnateAQ$ has a significantly greater influence on $CL\ to\ liquidity$ than does $DiscretionaryAQ$. This is consistent with the argument that the effect of business fundamentals on liquidity management is more persistent than that of managerial discretion, and that the conflicting effect of using accounting discretion for managerial opportunism or performance measurement reduces the impact of discretionary accruals quality on liquidity management.[7] Thus, the effect of accruals quality on liquidity management is more driven by innate accruals quality than discretionary accruals quality. These coefficients suggest that when $DiscretionaryAQ$ increases from the lowest to the highest decile, the portion of liquidity needs provided by credit lines increases only by 2.1%, while the same magnitude of increase in $InnateAQ$ increases the portion by 12.8%; that is 6.1 times as large as the effect of $DiscretionaryAQ$. Equation (3) constrains the coefficients of $InnateAQ$ and $DiscretionaryAQ$ to be equal and thus the coefficient of AQ shows the average effect of $InnateAQ$ and $DiscretionaryAQ$. Consequently, as observed in Column (1), the coefficient on AQ is 0.049, which is smaller (larger) than the coefficient of $InnateAQ$ ($DiscretionaryAQ$) in Column (3). This finding also speaks to the literature that emphasizes the importance of distinguishing between innate accruals quality and discretionary accruals quality among overall accruals quality (see Ball, 2008; Dechow and Dichev, 2002; Hribar and Nichols, 2007).

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7 While using different discretionary accruals models, Guay et al. (1996) also show that accounting discretion can be used for managerial opportunism or to enhance earnings as a better performance measure.

Column (4) testing With-CL Sample documents that both coefficient estimates on $InnateAQ$ and $DiscretionaryAQ$ are positive and significant at the 1% level. The coefficient of $InnateAQ$ is 0.182, approximately 42% larger than the coefficient of $InnateAQ$ (0.128) in the Full Sample test. The coefficient of 0.182 suggests that the use of credit lines in total liquidity needs increases by 18.2% when $InnateAQ$ increases from the lowest to the highest decile. On the other hand, the coefficient of $DiscretionaryAQ$ is 0.034, meaning that an increase in $DiscretionaryAQ$ from the lowest to the highest decile only results in a 3.4% increase in $CL\ to\ liquidity$. The coefficient of 0.034 also represents a 62% increase from 0.021 in Full Sample.

These findings highlight three points. First, for firms with credit lines, both $InnateAQ$ and $DiscretionaryAQ$ are positively associated with the substitution of credit lines for cash holdings. Second, the Tests on the equality of the coefficients of $InnateAQ$ and $DiscretionaryAQ$ show F stat=26.87 and t stat=5.18, both significant at the 1% level, confirming Hypothesis 2 that innate accruals quality and discretionary accruals quality have different influences on the choice of liquidity sources. Third, similar to the findings in Table 4 Columns (1) and (2), the coefficients of accruals quality measures increase from Full Sample to With-CL Sample. I further investigate the third point in Chapter 6.

5.2 Accruals Quality, Costs of Debt, and Liquidity Management

The trade-off between cash holdings and credit lines is essentially a choice of the lower cost between the two liquidity instruments. Holding the cost of holding cash constant, when the cost of using credit lines increases, firms should find it less attractive to substitute credit lines for cash holdings. Although firms pay relatively low costs for maintaining credit lines when they do not use the lines, they have to pay interest when they draw down the lines. Hence, if a firm must pay high interest to use credit lines, it may therefore avoid using credit lines as an instrument for liquidity demands. So far the empirical results show that a firm's liquidity management is associated with accruals quality. This section further examines whether this association is determined through poor accruals quality adversely affecting the cost of using credit lines.

The adverse selection problem exists when there is asymmetric information, causing the less informed to demand a premium to compensate for information risk, as suggested in Easley et al. (2004) showing that information risk affects the cost of capital. Since accounting reporting is to communicate information between firms and investors, high accounting quality should help alleviate information asymmetry (Bhattacharya et al., 2008) and reduce the premium originating from information risk. The existing literature establishes the link between accounting quality and costs of debt. Specifically, using discretionary accruals to measure accounting quality, Francis et al. (2005) and Bharath et al. (2008) find that firms with poorer accruals quality bear higher spreads.[8]

While Francis et al. (2005) and Bharath et al. (2008) document a negative relationship between accruals quality and costs of debt, their specifications are different from mine. Francis et al. (2005) measure costs of debt using interest expenses divided by outstanding debts. The sources of outstanding debts could be bonds, term loans, credit lines or others. As a result, their

8 Papers that examine how costs of debt are affected by accounting quality using specific events include Graham et al. (2008), who find the loan spread increases after the financial report is restated, and Costello and Wittenberg-Moerman (2010), who document that the loan interest rate increases after a material internal control weakness is disclosed on the report of quality of internal controls required under Section 302 of the Sarbanes Oxley Act.

measure averages the costs of different sources of debts. It is unclear, however, whether the influence of accruals quality on costs of debt would be different across types of debts. It is possible that the effect of accruals quality on costs of debt they document primarily comes from its impact on other types of debt, but has little impact on credit lines, or vice versa. If accruals quality has little effect on the spreads of credit lines, then liquidity management cannot be affected by accruals quality through the link between costs of using credit lines and poor accruals quality. Therefore, it is necessary to build the link between accruals quality and costs of credit lines. Similarly, Bharath et al. (2008) do not separate credit lines from other type of private loans in their test. In addition, their accruals quality measure does not distinguish between the effects of business fundamentals and managerial discretion, as criticized by Ball (2008) discussed in Section 3.2.

Using Costello and Wittenberg-Moerman's (2010) regression as the base model, I test the effect of accruals quality on the spreads of credit line as follows:

$$Spread = \delta_0 + \delta_1 AQ + \delta_2 Size + \delta_3 Profitability + \delta_4 Lev + \delta_5 Rating + \delta_6 Relation + \delta_7 FinCovenant + \delta_8 LoanSize + \delta_9 Maturity + \delta_{10} NubLender + \delta_{11} PP + \sum Year + \vartheta \quad (5)$$

The regression is run at the loan level. $Spread$ is All-In-Drawn-Spread reported in DealScan, which is the amount the borrower pays in basis points over LIBOR for each dollar drawn down. Therefore, All-In-Drawn-Spread represents the sum of the spread of the loan and annual fee paid to the bank. AQ is the measure of accruals quality, as defined above and estimated in the year prior to the loan being entered. I also separate AQ into $InnateAQ$ and $DiscretionaryAQ$. All accruals quality measures are ranked into deciles. $Size$ is the log of the firm's total assets in the year prior to the loan being entered. $Profitability$ is operating income before depreciation deflated by total assets, estimated in the year prior to the loan being entered. Lev is long-term debt to total assets, estimated in the year prior to the loan being entered. $Rating$ is the senior debt rating of S&P, Moddy's, Fitch or DPR. It is coded from 1 through 24, with 1 being the highest rating and 24 being the lowest rating. Firms without ratings are coded as 25. $Relation$ is an indicator value taking the value of one if at least one of the loan's lead arrangers had been the lead arranger of the loans the borrower had over the five years preceding the issuance date of the loan, and zero otherwise. $FinCovenant$ is the number of financial covenants in a loan. $LoanSize$ is the log of the loan amount. $Maturity$ is the maturity of the loan in terms of months. $NubLender$ is the number of lenders in the loan. PP is an indicator variable taking the value of one if at least one performance pricing provision exists in the loan, and 0 otherwise. The final sample contains 7,638 credit lines and 2,134 term loans. The standard errors are clustered at both the firm and year level.

The results are reported in Table 5. Columns (1) and (2) only include credit lines in the regression. Column (1) reports the regression using overall accruals quality AQ measure. The coefficient of AQ is significantly negative, meaning that higher accruals quality leads to lower spreads of credit lines. The coefficient of -59.746 suggests that an increase in AQ from the lowest to the highest decile reduces the spread by approximately 60 bps. Column (2) further separates AQ into $InnateAQ$ and $DiscretionaryAQ$. The coefficient of $InnateAQ$ (-101.450) is approximately 3.8 times as large as that of $DiscretionaryAQ$ (-26.582). Transformed into the impact on spreads, an increase in $InnateAQ$ and $DiscretionaryAQ$ from the lowest to the highest decile reduces the spread by 101 and 27 bps, respectively, consistent with Francis et al.'s

(2005) finding that innate accruals quality has a greater influence on costs of debt than does discretionary accruals quality. This result again confirms the argument that different sources of accruals quality have differential impacts on debt contracting. Overall, the results suggest that poor accruals quality increases the spreads of using credit lines. As a result, firms with poorer accruals quality substitute less credit lines for cash holdings due to the higher costs of using credit lines.

In Column (3) both types of credit lines and term loans are included in the regression. I add an indicator variable $CreditLine$ taking the value of one if the loan is a credit line, and 0 if the loan is a term loan, and interact it with $InnateAQ$ and $DiscretionaryAQ$. This design examines whether the effect of accruals quality on costs of credit lines is different from that on term loans. The coefficient of $CreditLine$ is -74.954 and significant, meaning the average spread of credit lines is approximately 75 bps lower than that of term loans. Although the average spread of credit lines is lower, the impact of innate accruals quality on the spread of credit lines is larger than on the spread of term loans, as observed from the coefficient of $CreditLine \times InnateAQ$ (-51.574). This suggests that innate accruals quality plays a more significant role in determining the spreads of credit lines than the spreads of term loans. The coefficient of $CreditLine \times DiscretionaryAQ$ is not significant, suggesting no differential impact of discretionary accruals quality on credit lines and term loans.

CHAPTER 6

ADDITIONAL ANALYSES

In this chapter, I provide additional analyses on the association between accruals quality and the use of credit lines to meet liquidity needs. First, I separate With-CL Sample into More-CL and Less-CL Samples, and examine how accruals quality is associated with the substitution of credit lines for cash holdings between subsamples of No-CL, More-CL and Less-CL Samples. I then do robustness tests as following to provide further supports for Hypotheses H1 and H2: (1) controlling for the factors that are associated with innate accruals quality; (2) controlling for the possible confounding effect of accruals quality on the decision of holding cash; and (3) using continuous accruals quality measures.

6.1 Accruals Quality and the likelihood of Substituting More, Less or No Credit Lines for Cash Holding

We observe in Table 4 that the coefficients of AQ, $InnateAQ$, and $DiscretionaryAQ$ in the regressions using Full Sample are smaller than the corresponding coefficients in the regressions using With-CL Sample. To look into this finding, I isolate firms that do not have credit line and compare them to firms with credit lines. Specifically, I compare the accruals quality of firms with no credit lines to the accruals quality of firms using less credit lines, as well as the accruals quality of firms with no credit lines to the accruals quality of firms using more credit lines. Firms with $CL\ to\ liquidity$ between 0 and 82.2% are considered to use less credit lines in their total liquidity needs, while firms with $CL\ to\ liquidity$ equal to or greater than 82.2% are considered to use more credit lines.[9] If some firms with good accruals quality opt to rely fully on cash holdings, we may observe no or even a negative relationship between accruals quality and the likelihood of using credit lines. I use a multinomial logistic regression in which these two comparisons are made together. Table 6 Columns (1) and (2) are a set of a multinomial logistic regression that tests AQ, and Columns (3) and (4) are a set of a multinomial logistic regression that tests $InnateAQ$ and $DiscretionaryAQ$. In Columns (1) and (3), the dependent variable is an indicator variable of whether firms use no credit lines (coded as 0) or less credit lines (coded as 1); in Columns (2) and (4) the dependent variable is an indicator variable of whether firms use no credit lines (coded as 0) or more credit lines (coded as 1).

Table 6, Column (1) shows that the coefficient of AQ is -0.160. To make the sign negative, there are indeed some firms with better accruals quality choosing not to use any credit lines. However, the coefficient is not statistically significant, suggesting that the likelihood of firms using less credit lines over using no credit lines does not increase when AQ increases. For the comparison of accruals quality between firms with no credit lines and firms with more credit lines in Column (2), the significantly positive coefficient on AQ(0.424) indicates that in order to have a higher probability of obtaining more credit lines in total liquidity needs, firms must have better accruals quality. Similarly, in Column (3) the coefficients on $InnateAQ$ and $DiscretionaryAQ$ in the comparison between firms with no credit lines and firms with less credit lines are not significant, but in Column (4) the coefficients become significant in the

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9 Recall that 82.2% is the median of $CL\ to\ liquidity$ of With-CL Sample, and also the cutoff of $CL\ to\ liquidity$ between More- and Less-CL Samples (See Table 1, Panel B).

comparison between firms with no credit lines and firms with more credit lines. Collectively, accruals quality does not matter when firms choose to either use less credit lines or no credit lines, but does matter if firms want to keep more credit lines in total liquidity needs. This also explains why in Table 4 the association between accruals quality and the use of credit lines become weaker when firms with no credit lines are added into With-CL Sample.

6.2 Robustness Tests

6.2.1 Accruals Quality and Liquidity Management Controlling for the Factors Used to Estimate Innate Accruals Quality

In this study, the variable of innate accruals quality, $InnateAQ$, is measured as the fitted value of Equation (2) that includes five variables (i.e., size, cash flow volatility, sales volatility, operating cycle, and the incidence of negative earnings) that are considered related to business fundamentals as well as influencing accruals quality. Therefore, $InnateAQ$ is the linear combination of these five factors. One may argue that it is possible that these five variables are also related to the substitution of credit lines for cash holdings, causing a mechanical association between innate accruals quality and the ratio of credit lines to total liquidity needs documented in the previous tests. To resolve this concern, I examine whether $InnateAQ$ remains significant after including these five variables in Equation (4). If $InnateAQ$ remains significant, it suggests that the linear combination of the five factors that constitutes $InnateAQ$ does contain incremental information regarding innate accruals quality that causes variation in $CL\ to\ liquidity$. Since size and cash flow volatility are already included in Equation (4), I add sales volatility, operating cycle and the incidence of negative earnings into the regression in this robustness test.

The results are reported in Table 7. Among the five variables, size and sales volatility are significant in Full Sample in Column (1), and size, sales volatility, and the incidence of negative earnings are significant in With-CL Sample in Column (2). More importantly, $InnateAQ$ remains significantly positive in both samples, suggesting that the positive relationship between $InnateAQ$ and $CL\ to\ liquidity$ is not simply driven by the association between these five factors and $CL\ to\ liquidity$. In addition, the coefficients on $InnateAQ$ in both samples are still statistically greater than the coefficients on $DiscretionaryAQ$, consistent with Hypothesis 2 that the association between accruals quality and liquidity management is more driven by business fundamentals than managerial discretion.

6.2.2 Controlling for the Effect of Accruals Quality on Holding Cash

In my hypotheses, I hold everything else constant and examine whether accruals quality facilitates credit line contracting and therefore is associated with a firm's substitution of credit lines for cash holdings. While poor accruals quality leads to adverse effect on credit line contracting, it also has a negative effect on holding cash. Shareholders can monitor the manager's behavior through accounting information. The agency cost of free cash flows suggests that the manager may hold cash to act in favor of his personal benefits at the expense of shareholders (Jensen, 1986). If accounting quality is high, it can help shareholders evaluate the manager's use of cash holdings. As a result, high accounting quality should mitigate costs of holding cash, and firms with better accounting quality should substitute more cash holdings for credit lines for liquidity needs. Since actual cash holdings are the equilibrium after the firm trades off the effect of accruals quality on holding cash against maintaining credit lines, using actual cash holdings to calculate $CL\ to\ liquidity$ in my previous tests may confound the relationship between liquidity management and accruals quality due to accruals quality facilitating debt contracting.

In this section, I attempt to control for the effect of accruals quality on holding cash by replacing actual cash holdings in $CL\ to\ liquidity$ with expected cash holdings. Therefore, the dependent variable in Equations (3) and (4) becomes the ratio of credit lines to the sum of expected cash holdings and credit lines. I estimate expected cash holdings using Bates et al.'s (2009) model:

$$CashHolding = \theta_0 + \theta_1 Q + \theta_2 Size + \theta_3 CF + \theta_4 NWC + \theta_5 Capx + \theta_6 Lev + \theta_7 R\&D + \theta_8 Dividends + \theta_9 Acquisition + \theta_{10} IndCashRisk + \sum Year + \sum Firm + \tau \quad (6)$$

All variables are in the concurrent year t. Q is the market value of assets to the book value of assets. $Size$ is the log of total assets adjusted by CPI. CF is earnings after interest, dividends, and taxes but before depreciation, deflated by assets. NWC is non-cash net working capital divided by assets. $Capx$ is capital expenditure divided by assets. Lev is long-term debt plus short-term debt divided by assets. $R\&D$ is R&D expenses divided by sales. $Dividends$ is an indicator variable of whether the firm pays out dividends. $Acquisition$ is the acquisition amount divided by assets. $IndCashRisk$ is the cash flow risk at the industry level, calculated as the average of the standard deviations of cash flow of the firms in the same two-digit SIC code in a given year. The standard deviation of firm cash flow is estimated using cash flow divided by assets in the previous ten years. The predicted value from the model is my measure of the expected cash holdings. Since the predicted value can be negative but cash holdings cannot be negative, I set the negative predicted values as 0.[10]

Table 8 reports the results of testing Hypotheses 1 and 2 using expected cash holdings instead of actual cash. The results of all tests still hold. Columns (1) (Full Sample) and (2) (With-CL Sample) show that the coefficients on AQ are significantly positive (0.051 and 0.073, respectively), consistent with Hypothesis 1 that better accruals quality allows firms to substitute more credit lines for cash holdings. Column (3) using Full Sample shows that the coefficients on $InnateAQ$ and $DiscretionaryAQ$ are 0.112 and 0.026, respectively. While two-tailed F test on $InnateAQ = DiscretionaryAQ$ is not significant, one-tailed t test suggests $InnateAQ$ is greater than $DiscretionaryAQ$ at 10% significance level. Column (4) using With-CL Sample shows that the coefficients on $InnateAQ$ (0.186) is significantly greater than $DiscretionaryAQ$ (0.040). Together, the results are consistent with Hypothesis 2 that innate accruals quality has a greater influence on the substitution of credit lines for cash holdings. In all, controlling for the effect of accruals quality on holding cash does not change the conclusion that good accruals quality facilitates credit line contracting and the firm's substitution of credit lines for cash holdings for their liquidity demands.

10 An alternative way to deal with negative predicted values is to delete observations with negative predicted values. The results using this method still hold.

6.2.3 Using Continuous Values of Accruals Quality Measures

In this section, I run regressions (3) and (4) using continuous value of accruals quality instead of ranked ones. The results are reported in Table 9. For the test of Hypothesis 1, In Full Sample (With-CL Sample) in Column (1) (Column (2)), a positive coefficient 0.317 (0.423) on AQ supports Hypothesis 1 that firms with better accruals quality substitute more credit lines for cash holdings. The coefficients also suggest that an improvement in AQ by two standard deviations increases the portion of total liquidity needs provided by credit lines by 2.9% (3.9%). For the test of Hypothesis 2, In Full Sample in Column (3), the coefficients on $InnateAQ$ and $DiscretionaryAQ$ are 0.682 and 0.215, respectively. While two-tailed F test does not suggest the two coefficients are statistically different from each other, one-tailed t test suggests $InnateAQ$ is greater than $DiscretionaryAQ$ at 10% significance level. In With-CL Sample in Column (4), the coefficient on $InnateAQ$ (1.776) is statistically larger than the coefficient on $DiscretionaryAQ$ (0.259). Together, the results are consistent with Hypothesis 2 that innate accruals quality has a greater impact on liquidity management than discretionary accruals quality. The result also suggests that a two-standard-deviation increase in $InnateAQ$ increases the use of credit lines in total liquidity needs by 12.4%. However, a two-standard-deviation increase in $DiscretionaryAQ$ only has a 2.1% increase in $CL\ to\ liquidity$. Overall, the results of testing Hypotheses 1 and 2 hold when the continuous variables of accruals quality are used.

CHAPTER 7

CONCLUDING REMARKS AND FUTURE RESEARCH

7.1 Conclusions

In this study, I examine the implications of accruals quality for a firm's liquidity choices between holding cash and using obtaining credit lines. Although the theory suggests that firms should rely fully on credit lines since holding cash incurs certain costs, firms still maintain a high level of cash on hand. The prior studies have documented that firms rely more on credit lines and less on cash holdings when they have higher cash flows, better cash flow hedging, and lower aggregate risk. I argue and document that good accruals quality facilitates debt contracting and allows firms to substitute more credit lines for cash holdings. On the other hand, firms with bad accruals quality must rely more on cash holdings for their liquidity needs. I also find that the innate part of accruals quality causes a larger impact on this substitution than does the discretionary part of accruals quality since it is more difficult for firms to alter the business fundamentals. Overall, the paper shows that the substation of credit lines for cash holding depends on the firm's accruals quality. These findings confirm the importance of the role of accounting in debt contracting, and suggest that the economic consequence of poor accounting is that firms deviate from a better liquidity management policy.

7.2 Future research extension

One interesting puzzle from section 5.2 is that we observe that the average spread of credit lines is approximately 75 bps lower than that of term loans. If credit lines allow firms to use funds with more flexibility and enjoy lower spreads, why do some firms have term loans? Does accounting quality play a role in the bank's decision on what firms are granted credit lines or term loans? Or do credit line contracts have more stringent debt terms than term loan contracts to complement lower spreads?

Another extension is the implications of firms that are able to reserve liquidity. Having enough liquidity reserves enables firms to overcome future uncertainty, and should therefore lower the risks of business failure and bankruptcy. Would such clients lower an auditor's inherent audit risk? In addition, since firms that obtain credit lines are screened by banks, who possess public and private information about clients, do auditors treat firms having credit lines as a signal of lower audit risk? Do auditors charge different audit fees on clients who possess different ability to reserve liquidity, especially credit lines? Research that extends such implications to the third partis should be interesting.

APPENDIX A

VARIABLE DEFINITIONS

Variables	Definitions
AQ	AQ is the standard deviation of residuals from Equation (1) from year t-4 to t and then multiplied by -1. A larger AQ means better accruals quality. In Table 1, 2 and 9, AQ is the original continuous value. In Tables 4 through 8, AQ is ranked into deciles and standardized to be between (0,1).
Age	Years since the first year that the firm is included in Compustat.
$CFOVol$	The standard deviation of CFO over the past 10 years, in which at least 5 years of CFO data are required.
$CL\ to\ liquidity$	The ratio of credit lines to total liquidity needs, measured as sum of cash and credit lines.
$CreditLine$	An indicator variable taking the value of one is the loan is a credit line, 0 if the loan is a term loan.
$DiscretionaryAQ$	$DiscretionaryAQ$ is the residual of Equation (2) and then multiplied by -1. A larger $DiscretionaryAQ$ means better discretionary accruals quality. In Table 1, 2 and 9, $DiscretionaryAQ$ is the original continuous value. In Tables 4 through 8, $DiscretionaryAQ$ is ranked into deciles and standardized to be between (0,1).
$FinCovenant$	Number of financial covenants in a loan.
$IndSalesVol$	First calculate within-year standard deviation of quarterly changes sales for each firm deflated by average assets over the year, then take the median value across all firms in the same 3-digit SIC code in a given year.
$InnateAQ$	$InnateAQ$ is the predicted value of Equation (2). Larger $InnateAQ$ means better innate accruals quality. In Table 1, 2 and 9, $InnateAQ$ is the original continuous value. In Tables 4 through 8, $InnateAQ$ is ranked into deciles and standardized to be between (0,1).
Lev	Long-term debt to total assets.
$LoanSize$	Log of the loan amount.
$Maturity$	Maturity of the loan in terms of months.
$NegEarn$	The proportion of reporting negative annual earnings before extraordinary items over the past 10 years.
$NetWorth$	Non-cash total assets less total liabilities, dividend by non-cash assets.
$NubLender$	Number of lenders in the loan.

Variables	Definitions
OTC	An indicator variable taking the value of 1 if the firm is traded over the counter, and 0 otherwise.
$OperCycle$	Log of operating cycle, calculated as 360/(sales/average accounts receivable)+360/(cost of goods sold/average inventory).
PP	An indicator variable taking the value of one if at least one performance pricing provision exists in the loan.
$ProfitVol$	Firm-level standard deviation of annual changes in operating income before depreciation over a lagged four-year period, deflated by average non-cash assets in the lagged period.
$Profitability$	Operating income before depreciation deflated by non-cash total assets.
$Rating$	The rating of senior debts from S&P, Moddy's, Fitch or DPR. It is coded from 1 through 24, with 1 being the highest rating and 24 being the lowest rating. Firms without ratings are coded as 25.
$Relation$	An indicator value taking the value of one if at least one of the loan's lead arrangers had been the lead arranger of the loans that the borrower had over the five years preceding the issuance date of the loan, and zero otherwise.
$S\&P$	An indicator variable taking the value of 1 if the firm is included in S&P 500, S&P Midcap 400 or S&P Smallcap 600, and 0 otherwise.
$SalesVol$	The standard deviation of sales over the past 10 years.
$Size$	Log of non-cash total assets.
$Size2$	The square of $Size$.
$Spread$	All-In-Drawn-Spread reported in DealScan, which is the amount the borrower pays in basis points over LIBOR for each dollar drawn down. Therefore, All-In-Drawn-Spread represents the sum of the spread of the loan and annual fee paid to the bank.
$Tangibility$	Net PPE deflated by non-cash assets.
$Tbobin'sQ$	Non-cash assets less the book value of equity plus the market value of equity, divided by non-cash assets.

APPENDIX B

TABLES

Table 1. Descriptive Statistics

Panel A. Full Sample and With-CL Sample

	Full Sample (N=24,398)					With-CL Sample (N=13,322)				
Variables	Mean	Standard deviation	Median	25%	75%	Mean	Standard deviation	Median	25%	75%
<u>Liquidity management</u>										
CL to liquidity	0.395	0.411	0.250	0.000	0.853	0.724	0.267	0.822	0.554	0.948
<u>Accruals quality</u>										
AQ	-0.060	0.046	-0.044	-0.027	-0.076	-0.050	0.040	-0.038	-0.024	-0.062
InnateAQ	-0.063	0.035	-0.053	-0.037	-0.077	-0.052	0.026	-0.046	-0.034	-0.064
DiscretionaryAQ	-0.000	0.040	0.007	0.022	-0.012	0.001	0.035	0.006	0.020	-0.010
<u>Other firm characteristics</u>										
Profitability	0.129	0.143	0.142	0.080	0.207	0.149	0.098	0.147	0.100	0.199
CFOVol	0.074	0.050	0.059	0.037	0.096	0.062	0.042	0.050	0.033	0.077
Non-cash total assets ($M)	2452	10649	247	54	1161	3753	13104	669	188	2433
Tangibility	0.322	0.211	0.276	0.154	0.449	0.334	0.212	0.287	0.166	0.466
NetWoth	0.434	0.232	0.446	0.291	0.609	0.395	0.200	0.399	0.273	0.532
Tobin'sQ	2.216	1.696	1.593	1.167	2.500	1.868	1.194	1.496	1.161	2.112
IndSalesVol	0.041	0.025	0.034	0.023	0.047	0.043	0.027	0.035	0.024	0.051
ProfitVol	0.058	0.053	0.039	0.020	0.076	0.046	0.044	0.031	0.017	0.057
Age (year)	20.807	12.128	17	11	28	23.192	13.403	20	12	33
OTC	0.046	0.209	0	0	0	0.023	0.151	0	0	0
S&P	0.452	0.498	0	0	1	0.594	0.491	1	0	1

Table 1 continued

Panel B No-CL Sample, Less-CL Sample, More-CL Sample and Difference between Groups

	No-CL Sample (N=11,076)			Less-CL Sample (N=6,661)			More-CL Sample (N=6,661)		
Variables	Mean	Standard deviation	Median	Mean	Standard deviation	Median	Mean	Standard deviation	Median
Liquidity management									
CL to liquidity	0	0	0	0.512	0.224	0.554	0.936	0.049	0.948
Accruals quality									
AQ	-0.071	0.051	-0.054	-0.055	0.043	-0.041	-0.046	0.035	-0.035
InnateAQ	-0.075	0.040	-0.066	-0.055	0.029	-0.048	-0.049	0.023	-0.044
DiscretionaryAQ	0.000	0.045	0.008	-0.001	0.037	0.005	0.003	0.032	0.007
Other firm characteristics									
Profitability	0.106	0.180	0.133	0.155	0.114	0.155	0.143	0.078	0.140
CFOVol	0.091	0.057	0.076	0.067	0.045	0.053	0.057	0.038	0.046
Non-cash assets ($M)	505	1563	71	2420	3660	646	1981	2948	690
Tangibility	0.308	0.209	0.262	0.315	0.201	0.268	0.353	0.221	0.306
Networth	0.480	0.257	0.526	0.411	0.218	0.423	0.379	0.179	0.381
Tobin'sQ	2.635	2.073	1.801	2.160	1.461	1.671	1.576	0.740	1.377
IndSalesVol	0.038	0.023	0.032	0.042	0.026	0.035	0.044	0.028	0.037
ProfitVol	0.073	0.060	0.053	0.051	0.048	0.033	0.041	0.038	0.029
Age (year)	17.94	9.64	15	23.43	13.78	20	22.95	13.01	21
OTC	0.072	0.259	0	0.020	0.140	0	0.027	0.161	0
S&P	0.281	0.449	0	0.608	0.488	1	0.581	0.493	1

Table 1 Panel B continued

Panel B No-CL Sample, Less-CL Sample, More-CL Sample and Difference between Groups

	Less-CL minus No-CL		More-CL minus No-CL		More-CL minus Less-CL	
Variables	Mean	Median	Mean	Median	Mean	Median
<u>Liquidity management</u>						
CL to liquidity	0.512 ***	0.554 ***	0.936 ***	0.948 ***	0.424 ***	0.394 ***
<u>Accruals quality</u>						
AQ	0.016 ***	0.013 ***	0.025 ***	0.020 ***	0.010 ***	0.006 ***
InnateAQ	0.020 ***	0.017 ***	0.026 ***	0.022 ***	0.006 ***	0.005 ***
DiscretionaryAQ	-0.002 **	-0.003 ***	0.003 ***	0.000	0.005 ***	0.003 ***
<u>Other firm characteristics</u>						
Profitability	0.050 ***	0.022 ***	0.037 ***	0.007 ***	-0.013 ***	-0.015 ***
CFOVol	-0.024 ***	-0.022 ***	-0.034 ***	-0.030 ***	-0.010 ***	-0.008 ***
Non-cash assets ($M)	1915 ***	574 ***	1476 ***	619 ***	-439 ***	44
Tangibility	0.007 **	0.006 ***	0.044 ***	0.044 ***	0.038 ***	0.038 ***
Networth	-0.069 ***	-0.104 ***	-0.101 ***	-0.146 ***	-0.032 ***	-0.042 ***
Tobin'sQ	-0.474 ***	-0.129 ***	-1.058 ***	-0.424 ***	-0.584 ***	-0.295 ***
IndSalesVol	0.004 ***	0.003 ***	0.006 ***	0.005 ***	0.002 ***	0.002 ***
ProfitVol	-0.022 ***	-0.020 ***	-0.032 ***	-0.024 ***	-0.009 ***	-0.004 ***
Age (year)	5.494 ***	5.000 ***	5.014 ***	6.000 ***	-0.480	1.000
OTC	-0.053 ***	0.000 ***	-0.046 ***	0.000 ***	0.007 **	0.000 **
S&P	0.327 ***	1.000 ***	0.300 ***	1.000 ***	-0.027 ***	0.000 ***

Table 1 summarizes the descriptive statistics for variables used in Regressions (3) and (4). Panel A reports the statistics of Full Sample (N=24,398) and With-CL Sample (N=13,322). In Panel B, With-CL Sample is further separated into Less-CL Sample (N=6,661) and More-CL Sample (N=6,661), and the statistics of these two subgroups are reported together with No-CL Sample (N=11,076). The mean difference is based on t-test and the median difference is based on Wilcoxon Rank-Sum test. See Appendix A for variable definitions.

Table 2. Pearson Correlation Matrix

	CL to liquidity	AQ	Innate AQ	Discretionary AQ	Profitability	CFOVol	Size	Tangibility	NetWoth	Tobin's Q	IndSalesVol	ProfitVol	Age	OTC
AQ	0.250***													
InnateAQ	0.338***	0.662***												
DiscretionaryAQ	0.035***	0.733***	0.020***											
Profitability	0.116***	0.341***	0.468***	0.061***										
CFOVol	-0.304***	-0.594***	-0.870***	-0.038***	-0.314***									
Size	0.461***	0.408***	0.600***	0.006	0.279***	-0.508***								
Tangibility	0.083***	0.239***	0.257***	0.082***	0.132***	-0.255***	0.173***							
NetWoth	-0.187***	0.114***	0.070***	0.105***	0.212***	-0.004	-0.218***	-0.048***						
Tobin's Q	-0.286***	-0.275***	-0.338***	-0.086***	0.009	0.336***	-0.169***	-0.089***	-0.012*					
IndSalesVol	0.119***	0.116***	0.112***	0.063***	0.115***	-0.053***	0.043***	-0.124***	0.030***	-0.158***				
ProfitVol	-0.273***	-0.533***	-0.574***	-0.204***	-0.361***	0.512***	-0.468***	-0.102***	-0.046***	0.231***	-0.112***			
Age	0.183***	0.292***	0.359***	0.066***	0.144***	-0.332***	0.425***	0.057***	-0.088***	-0.163***	0.010	-0.271***		
OTC	-0.098***	-0.159***	-0.202***	-0.039***	-0.164***	0.157***	-0.234***	-0.033***	-0.035***	-0.014**	0.004	0.198***	-0.108***	
S&P	0.270***	0.298***	0.434***	0.009***	0.288***	-0.324***	0.674***	0.099***	-0.023***	0.047***	0.014**	-0.297***	0.324***	-0.166***

This table reports the correlation matrix using Full-Sample (N=24,398). See Appendix A for variable definitions. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively.

Table 3. Replication of Sufi (2009)

	Dependent variable: CL to liquidity																	
	(1) Full Sample			(2) With-CL Sample			(3) Full Sample			(4) With-CL Sample			(5) Full Sample			(6) With-CL Sample		
	Coeff.	t stat		Coeff.	t stat		Coeff.	t stat		Coeff.	t stat		Coeff.	t stat		Coeff.	t stat	
Profitability	0.055	2.06	**	0.079	1.77	*	0.055	1.55		0.079	1.46		0.018	0.53		0.029	0.58	
CFOVol													-0.308	-2.18	**	-0.571	-3.84	***
Size	0.072	17.37	***	-0.005	-1.11		0.072	13.40	***	-0.005	-0.93		0.140	9.46	***	0.070	4.17	***
Size2													-0.006	-4.48	***	-0.006	-4.48	***
Tangibility	-0.036	-1.27		0.051	2.15	**	-0.036	-1.07		0.051	2.12	**	-0.048	-1.54		0.032	1.40	
NetWoth	-0.210	-9.80	***	-0.093	-3.95	***	-0.210	-6.88	***	-0.093	-3.34	***	-0.214	-7.07	***	-0.089	-3.25	***
Tobin'sQ	-0.053	-22.56	***	-0.077	-21.57	***	-0.053	-17.83	***	-0.077	-18.84	***	-0.049	-16.11	***	-0.070	-18.27	***
IndSalesVol	0.879	3.50	***	0.408	2.21	**	0.879	3.56	***	0.408	1.95	*	0.825	3.36	***	0.411	1.98	**
ProfitVol	-0.435	-4.80	***	-0.841	-7.47	***	-0.435	-3.21	***	-0.841	-7.69	***	-0.283	-2.26	**	-0.629	-5.66	***
Age	-0.034	-3.17	***	0.001	0.07		-0.034	-2.57	***	0.001	0.07		-0.025	-1.95	*	0.005	0.50	
OTC	-0.007	-0.36		0.014	0.68		-0.007	-0.34		0.014	0.69		0.015	0.72		0.036	1.77	*
S&P	0.019	1.25		0.003	0.29		0.019	1.26		0.003	0.29		0.015	1.01		-0.004	-0.30	
Intercept	-0.017	-0.18		0.888	23.46	***	-0.017	-0.90		0.888	18.45	***	-0.244	-2.33	**	0.715	11.01	***
Year dummy	Yes			Yes			Yes			Yes			Yes			Yes		
Industry dummy	Yes			Yes			Yes			Yes			Yes			Yes		
Firm cluster	Yes			Yes			Yes			Yes			Yes			Yes		
Year cluster	No			No			Yes			Yes			Yes			Yes		
Observations	24398			13322			24398			13322			24398			13322		
Adj R^2	0.292			0.189			0.292			0.189			0.296			0.200		

This table reports the replication of Sufi (2009). The full sample, which includes firm-year observations that have credit lines and do not have credit lines, is used in columns (1), (3) and (5). In columns (2), (4) and (6) the sample is restricted to firm-year observations that have credit lines. Column (1) and (2) strictly follow Sufi's model. In Column (3) and (4) I include year cluster in estimating standard errors in addition to firm cluster in Sufi (2009). In Column (5) and (6) I add CFOVol and Size2 into the regression. See Appendix A for variable definitions. ***, **, * denote significance at the 1, 5, and 10 percent (two-tailed) test levels, respectively.

Table 4. Accruals Quality and the Substitution Credit Lines for Cash Holdings

	Dependent variable: CL to liquidity											
	(1) Full Sample			(2) With-CL Sample			(3) Full Sample			(4) With-CL Sample		
	Coeff.	t stat		Coeff.	t stat		Coeff.	t stat		Coeff.	t stat	
AQ(Ranked)	0.049	2.14	**	0.069	4.99	***						
InnateAQ(Ranked)							0.128	2.34	**	0.182	6.59	***
DiscretionaryAQ (Ranked)							0.021	1.55		0.034	2.96	***
Profitability	0.013	0.40		0.018	0.36		-0.005	-0.15		-0.009	-0.18	
CFOVol	-0.215	-1.62		-0.424	-2.95	***	0.107	0.74		0.113	0.71	
Size	0.141	9.44	***	0.070	4.25	***	0.139	9.14	***	0.066	3.99	***
Size2	-0.006	-4.51	***	-0.006	-4.67	***	-0.006	-4.45	***	-0.006	-4.75	***
Tangibility	-0.058	-1.99	**	0.019	0.82		-0.070	-2.51	**	0.002	0.09	
Networth	-0.220	-7.54	***	-0.099	-3.66	***	-0.228	-8.34	***	-0.116	-4.37	***
Tobin'sQ	-0.048	-15.98	***	-0.068	-18.24	***	-0.049	-16.56	***	-0.069	-18.57	***
IndSalesVol	0.804	3.28	***	0.386	1.88	*	0.778	3.23	***	0.347	1.76	*
ProfitVol	-0.222	-1.93	*	-0.537	-4.73	***	-0.198	-1.75	*	-0.480	-4.18	***
Age	-0.027	-2.13	**	0.003	0.34		-0.029	-2.41	**	0.003	0.34	
OTC	0.016	0.78		0.036	1.78	*	0.017	0.84		0.033	1.70	
S&P	0.014	0.89		-0.006	-0.52		0.009	0.53		-0.013	-1.11	
Constant	-0.218	-2.18	**	0.752	11.57	***	-0.169	-1.76	*	0.807	12.73	***
Year dummy	Yes			Yes			Yes			Yes		
Industry dummy	Yes			Yes			Yes			Yes		
Test of equality of InnateAQ and DiscretionaryAQ							F stat=4.24** t stat=2.06**			F stat=26.87*** t stat=5.18***		
Observations	24398			13322			24398			13322		
Adj R^2	0.297			0.204			0.299			0.211		

This table reports the results of Equations (3) and (4). The full sample, which includes firm-year observations that have credit lines and do not have credit lines, is used in columns (1) and (3). In columns (2) and (4) the sample is restricted to firm-year observations that have credit lines. See Appendix A for variable definitions. Standard errors are clustered at both the firm and year levels. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively. All significance tests are two-tailed tests, except for one-tailed t test on coefficient of InnateAQ > coefficient of DiscretionaryAQ.

Table 5. Accruals Quality and the Cost of Debt

	Dependent variable: Spread								
	(1)			(2)			(3)		
	Only credit line sample			Only credit line sample			Credit line and term loan sample		
	Coeff.	t stat		Coeff.	t stat		Coeff.	t stat	
AQ(Ranked)	-59.746	-13.47	***						
InnateAQ(Ranked)				-101.450	-16.45	***	-57.074	-3.38	***
DiscretionaryAQ(Ranked)				-26.582	-6.45	***	-37.111	-3.19	***
CreditLine×InnateAQ(Ranked)							-51.574	-2.91	***
CreditLine×DiscretionaryAQ(Ranked)							9.836	0.83	
CreditLine							-74.954	-6.11	***
Size	-5.606	-2.85	***	-2.050	-1.07		-1.346	-0.58	
Profitability	-242.555	-10.97	***	-213.402	-10.10	***	-219.382	-10.60	***
Lev	127.357	8.39	***	128.877	8.89	***	131.072	9.16	***
Rating	1.316	3.41	***	1.105	3.08	***	1.216	2.91	***
Relation	-6.332	-2.71	***	-6.641	-2.98	***	-10.453	-4.13	***
FinCovenant	10.824	5.05	***	9.991	4.66	***	10.519	4.07	***
LoanSize	-24.443	-16.23	***	-23.140	-15.38	***	-19.702	-10.34	***
Maturity	0.214	2.52	**	0.210	2.60	***	0.249	3.21	***
NumLender	0.630	2.84	***	0.565	2.45	**	0.315	1.18	
PP	-23.962	-9.41	***	-22.140	-8.91	***	-31.652	-7.20	***
Constant	208.841	10.13	***	156.269	8.29	***	196.422	8.77	***
Year dummy	Yes			Yes			Yes		
Observations	7638			7638			9772		
Adj R^2	0.533			0.552			0.535		

This table reports the results of Equation (5). The regression of column (1) and (2) use only credit lines, and column (3) uses credit lines and term loans. Standard errors are clustered at both the firm and year levels. See Appendix A for variable definitions. ***, **, * denote significance at the 1, 5, and 10 percent (two-tailed) test levels, respectively.

Table 6. Accruals Quality and the Likelihood of Substituting More, Less or No Credit Lines for Cash Holdings

	Multinomial logit model						Multinomial logit model			
	(1)			(2)			(3)		(4)	
	Less-CL			More-CL			Less-CL		More-CL	
	Coeff.	z-stat		Coeff.	z-stat		Coeff.	z-stat	Coeff.	z-stat
AQ(Ranked)	-0.160	-1.35		0.424	3.16	***				
InnateAQ(Ranked)							-0.025	-0.12	1.154	4.81***
DiscretionaryAQ (Ranked)							-0.089	-0.92	0.280	2.46**
Profitability	1.645	6.09	***	1.963	5.87	***	1.624	5.96***	1.720	5.22***
CFOVol	0.390	0.44		-0.784	-0.73		0.582	0.53	2.570	1.93*
Size	0.649	5.86	***	1.279	9.21	***	0.649	5.86***	1.255	9.05***
Size2	-0.007	-0.69		-0.062	-5.27	***	-0.007	-0.72	-0.062	-5.29***
Tangibility	-0.739	-3.73	***	-0.566	-2.55	**	-0.765	-3.78***	-0.669	-2.97***
NetWoth	-0.915	-5.71	***	-1.788	-9.57	***	-0.923	-5.75***	-1.913	-10.09***
Tobin'sQ	-0.177	-7.46	***	-0.690	-16.65	***	-0.176	-7.42***	-0.693	-16.74***
IndSalesVol	4.953	3.15	***	3.416	1.79	*	4.938	3.13***	3.221	1.69*
ProfitVol	1.640	2.29	**	-0.985	-1.13		1.688	2.35**	-0.581	-0.67
Age	-0.122	-1.68	*	-0.305	-3.67	***	-0.126	-1.75*	-0.318	-3.80***
OTC	-0.028	-0.16		0.093	0.51		-0.025	-0.14	0.090	0.50
S&P	0.059	0.61		0.143	1.35		0.057	0.58	0.106	0.99
Year dummy	Yes			Yes			Yes		Yes	
Industry dummy	Yes			Yes			Yes		Yes	
Observations	24398						24398			
Pseudo R^2	0.200						0.201			

This table reports the results of the multinomial logistic regressions using Equations (3) and (4) that test the likelihood of whether firms use credit line or not. In Column (1) and (3) the dependent variable, Less-CL, equals 1 if firms use less credit lines (0< $CL\ to\ liquidity$ <82.2%), and 0 if firms use no credit line. In Column (2) and (4) the dependent variable, More-CL, equals 1 if firms use more credit lines ($CL\ to\ liquidity$>=82.2%), and 0 if firms use no credit line. Standard errors are clustered at both the firm level. See Appendix A for variable definitions. ***, **, * denote significance at the 1, 5, and 10 percent (two-tailed) test levels, respectively.

Table 7. Accruals Quality and Liquidity Management Controlling for the Factors Used to Estimate Innate Accruals Quality

	Dependent variable: CL to liquidity					
	(1) Full Sample			(2) With-CL Sample		
	Coeff.	t stat		Coeff.	t stat	
InnateAQ(Ranked)	0.139	2.16	**	0.135	3.15	***
DiscretionaryAQ(Ranked)	0.021	1.58		0.035	3.05	***
Profitability	-0.035	-0.96		-0.049	-0.89	
CFOVol	0.022	0.14		-0.118	-0.62	
Size	0.140	8.99	***	0.064	3.85	***
Size2	-0.006	-4.32	***	-0.006	-4.56	***
SaleVol	0.110	2.61	***	0.094	2.44	**
OperCycle	-0.014	-1.17		-0.009	-0.80	
NegEarn	-0.010	-0.29		-0.075	-1.89	*
Tangibility	-0.079	-2.54	**	0.009	0.35	
NetWorth	-0.218	-8.13	***	-0.113	-4.31	***
Tobin'sQ	-0.047	-15.60	***	-0.066	-16.55	***
IndSalesVol	0.696	2.89	***	0.286	1.48	
ProfitVol	-0.216	-1.89	*	-0.493	-4.29	***
Age	-0.030	-2.46	**	0.003	0.29	
OTC	0.018	0.89		0.035	1.81	*
S&P	0.008	0.49		-0.015	-1.27	
Constant	-0.100	-0.91		0.838	9.49	***
Year dummy	Yes			Yes		
Industry dummy	Yes			Yes		
Tests of equality of InnateAQ	F stat=3.81*			F stat=5.68**		
and DiscretionaryAQ	t stat=1.95**			t stat=2.38***		
Observations	24398			13322		
Adj R^2	0.300			0.215		

This table reports the results of Equation (4) with additional controls for the factors that determine innate accruals quality in Equation (2). The full sample, which includes firm-year observations that have credit lines and do not have credit lines, is used in columns (1). In columns (2) the sample is restricted to firm-year observations that have credit lines. Standard errors are clustered at both the firm and year levels. See Appendix A for variable definitions. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively. All significance tests are two-tailed tests, except for one-tailed t test on coefficient of InnateAQ > coefficient of DiscretionaryAQ.

Table 8. Accruals Quality and the Substitution of Credit Lines for Cash Holdings Controlling for the Effect of Accruals Quality on Holding Cash

	Dependent variable: Credit lines/(Expected cash + credit lines)											
	(1) Full Sample			(2) With-CL Sample			(3) Full Sample			(4) With-CL Sample		
	Coeff.	t stat		Coeff.	t stat		Coeff.	t stat		Coeff.	t stat	
AQ(Ranked)	0.051	2.46	**	0.073	5.22	***						
InnateAQ(Ranked)							0.112	1.98	**	0.186	6.17	***
DiscretionaryAQ (Ranked)							0.026	2.00	**	0.040	3.07	***
Profitability	0.055	1.33		0.138	2.21	**	0.039	0.98		0.106	1.73	*
CFOVol	-0.274	-1.84	*	-0.506	-3.33	***	-0.007	-0.05		0.051	0.33	
Size	0.145	8.69	***	0.070	4.23	***	0.142	8.49	***	0.065	3.96	***
Size2	-0.007	-4.63	***	-0.006	-4.57	***	-0.007	-4.56	***	-0.006	-4.66	***
Tangibility	-0.076	-2.46	**	0.006	0.21		-0.085	-2.91	***	-0.011	-0.42	
NetWoth	-0.273	-8.75	***	-0.209	-9.17	***	-0.280	-9.68	***	-0.226	-9.95	***
Tobin'sQ	-0.051	-15.44	***	-0.069	-15.96	***	-0.052	-15.74	***	-0.070	-16.29	***
IndSalesVol	0.996	3.88	***	0.567	2.63	***	0.974	3.84	***	0.531	2.53	**
ProfitVol	-0.238	-2.07	**	-0.530	-4.62	***	-0.215	-1.87	*	-0.467	-4.01	***
Age	-0.033	-2.29	**	-0.003	-0.28		-0.035	-2.50	**	-0.003	-0.29	
OTC	0.029	1.41		0.039	1.88	*	0.030	1.45		0.036	1.78	*
S&P	0.018	1.16		0.003	0.25		0.014	0.84		-0.004	-0.33	
Constant	-0.230	-2.62	***	0.648	10.65	***	-0.187	-2.34	**	0.713	11.58	***
Year dummy	Yes			Yes			Yes			Yes		
Industry dummy	Yes			Yes			Yes			Yes		
Tests of equality of InnateAQ and DiscretionaryAQ							F stat=2.37 t stat=1.54*			F stat=22.22*** t stat=4.71***		
Observations	20759			11775			20759			11775		
Adj R^2	0.315			0.222			0.316			0.230		

This table reports the results of Equations (3) and (4) using expected cash holdings to calculate *CL to liquidity*. That is, the dependent variable equals Credit lines/(Expected cash + credit lines). Expected cash holdings is estimated from Equation (6). The full sample, which includes firm-year observations that have credit lines and do not have credit lines, is used in columns (1) and (3). In columns (2) and (4) the sample is restricted to firm-year observations that have credit lines. Standard errors are clustered at both the firm and year levels. See Appendix A for variable definitions. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively. All significance tests are two-tailed tests, except for one-tailed t test on coefficient of InnateAQ > coefficient of DiscretionaryAQ.

Table 9. Accruals Quality Using Continuous Values and the Substitution of Credit Lines for Cash Holdings

	Dependent variable: CL to liquidity											
	(1) Full Sample			(2) With-CL Sample			(3) Full Sample			(4) With-CL Sample		
	Coeff.	t stat		Coeff.	t stat		Coeff.	t stat		Coeff.	t stat	
AQ(Ranked)	0.317	2.62	***	0.423	3.90	***						
InnateAQ(Ranked)							0.682	1.89	*	1.776	4.59	***
DiscretionaryAQ (Ranked)							0.215	2.19	**	0.259	2.57	***
Profitability	0.009	0.29		0.013	0.25		-0.008	-0.26		-0.038	-0.75	
CFOVol	-0.212	-1.51		-0.445	-3.01	***	-0.023	-0.15		0.130	0.74	
Size	0.141	9.51	***	0.069	4.11	***	0.138	9.18	***	0.058	3.39	***
Size2	-0.006	-4.52	***	-0.006	-4.50	***	-0.006	-4.41	***	-0.005	-4.09	***
Tangibility	-0.056	-1.86	*	0.023	1.00		-0.058	-1.91	*	0.014	0.60	
NetWorth	-0.220	-7.30	***	-0.098	-3.59	***	-0.223	-7.66	***	-0.112	-4.36	***
Tobin'sQ	-0.048	-16.06	***	-0.068	-17.84	***	-0.047	-15.25	***	-0.066	-17.15	***
IndSalesVol	0.793	3.23	***	0.378	1.84	*	0.776	3.18	***	0.338	1.67	*
ProfitVol	-0.217	-1.83	*	-0.547	-4.75	***	-0.221	-1.85	*	-0.511	-4.40	***
Age	-0.027	-2.07	**	0.003	0.35		-0.027	-2.13	**	0.004	0.39	
OTC	0.016	0.79		0.037	1.83	*	0.017	0.81		0.039	1.89	*
S&P	0.014	0.91		-0.006	-0.46		0.012	0.79		-0.010	-0.85	
Constant	-0.227	-2.21	**	0.743	11.48	***	-0.209	-2.02	**	0.832	12.38	***
Year dummy	Yes			Yes			Yes			Yes		
Industry dummy	Yes			Yes			Yes			Yes		
Tests of equality of InnateAQ and DiscretionaryAQ							F stat=1.65 t stat=1.28*			F stat=14.52*** t stat=3.81***		
Observations	24398			13322			24398			13322		
Adj R^2	0.297			0.203			0.297			0.207		

This table reports the results of Equations (3) and (4). The full sample, which includes firm-year observations that have credit lines and do not have credit lines, is used in columns (1) and (3). In columns (2) and (4) the sample is restricted to firm-year observations that have credit lines. Standard errors are clustered at both the firm and year levels. See Appendix A for variable definitions. ***, **, * denote significance at the 1, 5, and 10 percent levels, respectively. All significance tests are two-tailed tests, except for one-tailed t test on coefficient of InnateAQ > coefficient of DiscretionaryAQ.

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