Cash Holdings and Business Conditions*

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Abstract

We investigate the relation between business conditions and corporate liquidity decisions by US firms. We find strong evidence that financially constrained firms hold more cash during recessions and that business conditions are significant to constrained firms' cash decisions. In contrast, we find weak evidence that financially unconstrained firms adjust cash holdings according to the business cycle. This asymmetric behavior is more pronounced for changes in the short-term interest rate. Moreover, we find that firms increase the level of liquidity during periods of tighter credit conditions. Our findings support both the precautionary motive for holding cash and the pecking order theory.

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1 Introduction

Cash holdings and business conditions have been linked in recent discussions. For example, the *Treasury and Risk Management Magazine* published the following comment in May 2004:

> According to an analysis by Standard & Poor's, the total amount of cash and cash equivalents held by the S&P 500 in 1996 was about $1.2 trillion. By 2002 that figure had risen to $1.5 trillion, an increase of $300 billion. Chris Wolf, head of equities strategy for J.P. Morgan's private banking unit, says he found that 400 of the largest U.S. companies he examined had added some $200 billion to their cash holdings just since the first quarter of 2001. More than half the companies he examined had strengthened their cash holdings over the period.

Is it a coincidence that 2001 is considered to be a year of economic recession? This paper aims to explain how business conditions impact the corporate liquidity decisions. We investigate the role of macroeconomic conditions, as well as firm-specific variables, in determining the level of cash held by firms. Furthermore, we test whether there are differences in cash holdings decisions by financially constrained and unconstrained firms, in particular with respect to the business cycle. We expect that cash accumulation by managers and agency costs are exacerbated during periods of macroeconomic recession and, especially for firms with financial constraints.

There are three important theories that provide an explanation of the level of corporate liquidity. First, there is the trade-off model. According to the trade-off model, firms choose their optimal level of cash by comparing the costs and the benefits of cash holdings. Assuming that managers maximize the shareholders' wealth, they will set the firm's cash holdings in a way that the marginal benefit equals the marginal cost of holding cash. Keynes (1936) identifies the benefits from holding cash as the transaction cost motive and the precautionary motive. The first motive is related to the saving of transaction costs to raise funds and the need of liquidating existing assets to make payments. The second motive suggests that the

firm can use liquidity to finance activities and investments when other financing sources are not available or are extremely costly. The costs of cash holdings are mainly the opportunity cost of the capital invested in liquid assets.

Alternatively, the pecking order theory of Myers and Majluf (1984) says that there is no optimal level of cash, and cash just acts as a buffer between retained earnings and investment needs. In addition, this theory assumes a financing hierarchy followed by firms in order to minimize costs of asymmetric information. In the first instance, firms prefer to finance theirs investments with internal funds, then with debt and finally with equity.

The third theory is the Jensen (1986) free cash flow theory, which suggests that managers prefer to hold cash rather than paying dividends to shareholders because it increases the level of assets they control and their flexibility to pursue their own objectives.

Most studies on the determinants of cash holdings focus on the role of firm-specific variables. Opler, Pinkowitz, Stulz, and Williamson (1999) find that US firms with stronger growth opportunities and riskier cash flows have relatively high ratios of cash to non-cash assets. Firms that have the greatest access to capital markets, such as large firms and those with high credit ratings, tend to have lower ratios of cash to non-cash assets.

Faulkender (2004) provides evidence that small and large firms perceive the costs and benefits of holding cash in a different manner. Moreover, he finds that small firms with high leverage, worse access to trade credit, and with more costs of financial distress also hold more cash. Almeida, Campello, and Weisbach (2004) model the firms' demand for cash in order to test the effects of financial constraints. They find that financially constrained firms save more cash as cash flow increases (higher cash flow sensitivity of cash) than unconstrained firms.

Empirical studies on the determinants of corporate cash holdings support the trade-off theory, suggesting that there is an optimal level of liquidity that maximizes the value for shareholders [e.g., Opler et al. (1999)]. Nevertheless, managers and shareholders do not perceive the costs and benefits of saving cash in the same way. The agency theory can help

to explain why companies do not hold the liquidity level that maximizes the shareholder value. In fact, managers accumulate excess cash in order to reduce the firm's risk and increase their discretion. This leads managers to overweight the precautionary motive to hold cash. However, the US evidence on the relation between cash holdings and agency costs of managerial discretion has not been conclusive. While Opler et al. (1999) show that agency cost proxies do not have a significant impact on cash holdings, Harford, Mansi, and Maxwell (2004) find that firms with weaker shareholder rights (high anti-takeover provisions) actually hold less cash because they dissipate their cash more quickly, primarily on acquisitions.[1]

There are few studies on the impact of macroeconomic conditions on firms' financial decisions. One of the exceptions is Baum, Caglayan, and Ozkan (2003), which consider the impact of macroeconomic volatility on the cross sectional dispersion of corporate cash holdings. They find a negative relation between economic uncertainty and the dispersion of firms' cash-to-assets ratio. This evidence is explained by the ability of the managers to make more accurate cash flow forecasts when the economy is stable and less accurate when it is not. When macroeconomic conditions are volatile, managers will assume a more conservative behavior by increasing the liquidity level of the firm.

Korajczyk and Levy (2003) study the impact of macroeconomic conditions and financial constraints on the capital structure. The main finding is that the target leverage is counter-cyclical for the unconstrained firms sample but pro-cyclical for the constrained sample. They also find that macroeconomic conditions are significant for unconstrained firms' issue choice but less significant for constrained firms. These findings are consistent with the pecking order theory, in particular for the unconstrained group of firms.

We contribute to the literature by studying the role of business conditions as a determinant of corporate cash holdings. In addition, we investigate whether firm-specific and macroeconomic variables have a different role in explaining the cash holding decision by

[1]Cross-country evidence in Dittmar, Mahrt-Smith, and Servaes (2003) and Kalcheva and Lins (2004) shows that higher shareholder rights are associated with lower cash holdings. This suggests that shareholders want managers to distribute cash, presumably to the shareholders.

financially constrained and unconstrained firms. We classify firms as constrained or unconstrained according to several criteria: asset size, growth potential, and a dummy variable based on the investment opportunities as well as agency costs. The sample includes publicly traded US non-financial firms from Compustat over the 1971-2002 period.

The results for firm-specific variables are consistent with the trade-off model, which predicts the firms' cash holdings level by equating the marginal costs and benefits of holding one more dollar of cash. When we split the sample into financially constrained and unconstrained firms, we see some differences across groups. Constrained firms with more cash substitutes, more dividends payments, and more cash flow volatility hold more cash. In contrast, unconstrained firms with less cash substitutes, less dividends payments, and less cash flows volatility hold less cash.

The business conditions are proxied by variables that are well-know to capture business cycle variation. Specifically, we consider the one-year equity market return, the default spread, the three-month treasury bill rate, and the term spread. We find strong evidence that financially constrained firms hold more cash during periods of economic recession. This finding is consistent with the trade-off model and, particularly with the precautionary motive for holding cash. For constrained firms, the costs of being short in cash are extremely high during recessions, due to their great difficulty in accessing capital markets during these periods. Moreover, the costs of liquidating cash substitutes during recessions are much higher. This finding is consistent with the evidence supportive of the precautionary motive for holding cash and of the use of cash reserves in order to reduce the external financing [Mikkelson and Partch (2003)].

These findings on constrained firms are also in line with the predictions of the pecking order model, which says that there is no optimal level of cash, and cash just follows the trends of firm's wealth and investment opportunity set. In fact, constrained firms are more likely to stop investing during recessions because they need to save cash to invest in better projects later. Therefore, constrained firms tend to accumulate more cash during recessions.

Conversely, the results on unconstrained firms do not lead to clear conclusions as we do not find evidence of a consistent behavior of these firms with respect to the business cycle variables. Nevertheless, our findings for unconstrained firms do not contradict the pecking order or the free cash flow theories. We conclude that macroeconomic conditions are more significant for cash holdings decisions of constrained firms than of unconstrained firms. Our findings are in line with Korajczyk and Levy (2003) results of pro-cyclical leverage for constrained firms and counter-cyclical leverage for unconstrained firms. Constrained firms are less levered and hold more cash during recessions for a similar reason, the difficulty of accessing capital markets. In contrast, unconstrained firms are more levered during recessions as they take the opportunity of lower interest rates and as they are less penalized by tight credit conditions.

Our results are also consistent with the work of Faulkender, Goldstein, and Wang (2003). He finds that the marginal value of cash decreases with leverage and firms's accessibility to capital markets. This is in line with our findings that the liquidity level decreases with leverage and that financially constrained firms hold more cash than unconstrained firms. In addition, they find that the marginal value of cash increases in periods of credit crunches what matches our findings of greater cash holdings during periods of high credit spreads, i.e., during recessions.

The remainder of the paper is organized as follows. Section 2 describes the theory and the empirical hypotheses. Section 3 presents the data and methodology. Section 4 presents the empirical results and Section 5 concludes.

2 Theory and Empirical Hypotheses

In this section, we frame the relationship between the firm's level of cash holdings and macroeconomic conditions. The frameworks considered are the trade-off model, the pecking order theory, and the free cash flow theory. For each of these, we take into account the

different levels of financial constraints that firms are subject to.

2.1 Trade-off Model

The trade-off model states that firms set their optimal level of liquidity by equating the cost of saving one more dollar of cash with the cost of being short of one more dollar of cash. According to this model, there are two motives for holding cash, the transaction motive and the precautionary motive. The rationale is that there are alternatives for firms that are short of cash: going to capital markets, liquidating other assets, reducing investment, decreasing dividends, and renegotiating existing financial contracts. Each of these solutions is costly, in which case, firms will use the option of holding cash and liquid assets as a buffer. However, holding liquid assets also has costs, specifically the opportunity cost related to the low return of cash.

The transaction motive implies that firms have more cash during recessions. When the economy is depressed, the cost of being short of cash is higher, as it is more difficult to convert cash substitutes into liquidity[2]. Although riskless interest rates are lower during economic downturns, accessing capital markets is costly due to high debt agency costs [Bernanke and Gertler (1989)] and high credit spreads [Chen (1991) and Fama (1990)]. Moreover, the opportunity cost of liquidity is lower during economic recessions because the marginal attractiveness of other investments, when compared to cash, is greater when the economy is performing well. When the economic conditions improve, it is not only easier and less costly to liquidate assets or access capital markets, but the opportunity cost of cash is higher as well, i.e., the liquidity premium is higher.

The precautionary motive for holding cash states that firms save cash in order to continue to invest in positive NPV projects in periods when external financing is extremely costly. This is particularly relevant for firms with positive NPV projects, but with great difficulties in accessing the capital markets, especially during periods of tight credit conditions. According

[2]Not just receivables and inventory due to the slowdown of economic activity, but also less liquid assets whose markets are less dynamic during economic downturns.

to this perspective cash holdings mitigate the occurrence of costs of financial distress. It is likely that risk-averse managers become more so when they are less confident about future macroeconomic conditions. Moreover, if the firm faces a decline in cash flows and greater difficulty in accessing capital markets, managers will behave with more caution and save more cash according to the precautionary motive.

Information asymmetry is one of the sources of costs that firms face when trying to raise external funds. Inside and outside investors do not deal with the same level of firm knowledge, leading outsiders to underprice the securities. Then, the cost of external funding increases with the level of information asymmetries.

The agency costs of debt are also a reason for it being so expensive for firms to access external funds. These costs materialize when shareholders' and debtholders' interests are not aligned and can also occur between different categories of debtholders. High agency costs of debt could increase the cost of debt (in terms of the required yield and the collateral). Moreover, shareholders could reject profitable projects if raising additional funds leads to a level of leverage that primarily benefits debtholders - the underinvestment problem [Myers (1977)]. Schnure (1998) shows that firms with rated debt have far lower cash holdings than firms that do not borrow in the public bond market. This suggests that firms which cannot easily access capital markets due to agency problems should have greater cash stocks, in such a way they can continue to invest optimally.

The cost of external funding should be higher during economic slowdowns. Creditors become more demanding, not just in terms of credit spread, but also in terms of collateral, because the agency costs of debt are higher. Agency costs of debt are higher during recessions because it is more likely that shareholders reject positive NPV projects in order to maintain leverage. This happens because the prospects of the firm entering in default and being liquidated are greater during recessions.

In summary, the trade-off model predicts that firms hold more cash during recessions due to the precautionary motive. Furthermore, we expect this relation to be stronger for

financially constrained firms due to greater difficulties in accessing external financing.

2.2 Free Cash Flow Theory and Agency Costs of Managerial Discretion

Jensen (1986) free cash flow theory states that managers can accumulate cash to increase the assets under their control and then pursue their own objectives instead of maximizing shareholders wealth (agency costs of managerial discretion). Managers try to avoid market discipline by hoarding cash because there is less need for external funds to finance projects. The free cash flow theory predicts that cash rich firms that insulate managers from monitoring by external markets generate value-decreasing investment decisions. According to this theory increasing cash by one dollar does not imply that the firm value also increases by one dollar. Evidence in Pinkowiz and Williamson (2002) and Faulkender et al. (2003) give support to this idea that the marginal value of one dollar of cash is not perceived by shareholders as being worth one dollar.

The agency costs are especially important for firms without valuable investment alternatives because, in these cases, the likelihood of shareholders and management's interests being aligned is lower. When there is no alignment of interests, management may pursue an aggressive extraction of private benefits. However, it is not clear that this extraction occurs evenly over time. Managers might choose to reduce present private benefits, when the return from investing resources in the firm increases their future private benefits [Burkart, Gromb, and Panunzi (1997)].

Jensen (1986) also argues that firms with free cash flow that refuse to pay it out to shareholders are likely takeover targets. In fact, once the bidder gains control of the assets, it can use the cash to finance the acquisition [Jarrell and Poulsen (1989)]. Thus, the market for corporate control can well monitor corporate cash holdings by targeting firms with large amounts of cash. However, Harford (1999) and Pinkowitz (2000) dispute this idea. They find that cash rich firms are less likely to be targeted, although it does not seem that having

large amounts of cash helps a firm remain independent once it is targeted. Conversely, cash rich firms are more likely to make acquisitions and these acquisitions are value-destroying as predicted by the free cash flow theory [Harford (1999)].

The predictions of this theory in terms of cash holdings and business conditions are not clear. Based on this theory we expect managers to hold less cash when their interests are aligned with the shareholders'. We argue that managers could sometimes give up current consumption of private benefits (in favor of the firm) in order to increase the potential for future private benefits. This will happen when the firm has good projects to pursue, i.e., more likely during expansions. However, it is also during expansions that managers have more autonomy to pursue their own interests. This happens firstly, because they are subject to less monitoring by shareholders and secondly, because their job market is more dynamic. According to the free cash flow theory, firms could have more cash during recessions because it less likely to be targeted in economic downturns [Jarrell, Brickley, and Netter (1988)].

Financially constrained firms should have lower agency costs of managerial discretion. Constrained firms are typically small firms, whose shareholders are less dispersed and whose managers are closely monitored by debtholders [Jensen and Meckling (1976)]. From this point of view, managers' and shareholders' interests are better aligned in constrained firms and therefore, these firms are expected to have less cash.

2.3 Pecking Order Theory

The pecking order theory of Myers and Majluf (1984) suggests that a financing hierarchy is followed by managers in order to minimize costs of information asymmetry and other financing costs. The first source of funds considered will be retained earnings, then safe debt, then risky debt, and finally equity. This theory also postulates that there is no optimal level of cash, which just works as a buffer between retained earnings and investment needs. If the firm generates enough cash flow it will finance new projects, pay debt and accumulate cash, otherwise it will use the accumulated cash holdings or, when necessary, use debt.

This theory also does not predict a clear relation between cash holdings and business conditions. Firms tend to generate more cash flows during expansions and therefore accumulate more cash. Nevertheless, it is also during expansions that firms invest more, using the cash that has been saved earlier. When we split firms according to their financial constraints these predictions are less ambiguous, in particular for constrained firms. While unconstrained firms could continue to invest during recessions, constrained firms could have to give up investing in positive NPV projects in order to save cash to finance more attractive projects in expansions. During expansions, constrained firms will certainly spend a large part of their liquidity to invest in those projects, consequently retaining less cash.

Overall, while we can not easily predict how financially unconstrained firms will behave with respect to cash holdings across the business cycles, the same is not true for financially constrained firms. Constrained firms are expected to hold more cash during recessions.

3 Data and Methodology

We test our empirical hypotheses using a sample of US non-financial firms drawn from Compustat over the 1971-2002 period. Firms are classified into industries using two-digit Standard Industrial Classification (SIC) codes. Similarly to Opler et al. (1999), our sample does not include financial firms (SIC code 6) and utilities (SIC code 49). Financial firms are excluded because their reasons to hold cash could be related to capital requirements. Utilities are excluded because their cash holdings are regulated in several states. We also exclude firm-years with non-positive sales. Finally, we exclude ADRs and firms designated as pre-FASB. Our sample has a total of 110,789 firm-years observations.

3.1 Firm-specific Variables

We use data items cash and marketable securities (data #1) and assets (data #6) to compute the ratio of cash to non-cash assets (net assets). Our approach is similar to Opler et al.

(1999), with the view that a firm's ability to generate future profits is a function of its assets in place.

The market-to-book ratio is used as a measure of growth options, i.e., the likelihood of a firm having positive NPV projects in the future. Firms with market values greater than their book values are expected to have profitable investment opportunities [Smith and Watts (1992) and Gaver and Gaver (1993)]. The ratio is computed as market value of assets, divided by the book value of assets. The market value of assets is determined by the book value of assets, less the book value of equity, plus the market value of equity. We use the market value of equity at the end of each calendar year.

The firm size is calculated as the natural logarithm of the book value of assets deflated into 2002 dollars using the Consumer Price Index (CPI).

We measure cash flow as earnings after interest, dividends and taxes but before depreciation, divided by net assets.

Net working capital is used as a proxy for the availability of cash substitutes since the firms may use other liquid assets as well as credit lines as alternatives for cash holdings. In fact, factoring and securitization are usual for companies that need to liquidate receivables. Moreover, in periods of financial distress, firms usually sell non-core assets as a way of increasing liquidity [Lang, Poulsen, and Stulz (1995)]. We use net working capital less cash and equivalents over net assets to define the net working capital-to-assets ratio.

Capital expenditures are measured using the ratio of capital expenditures over net assets. This variable measures whether firms hold cash in order to face the needs of funds during periods of investment.

The cash flow riskiness is determined by the standard deviation of industry cash flow calculated using the approach suggested by Opler et al. (1999). First, for each firm-year, we compute the cash flow standard deviation for the previous 20 years, if available, using data since 1950. Then, we compute the mean of the ratio of cash flow-to-assets standard deviation across industries (industry sigma).

We use the research and development (R&D) expenses-to-sales ratio as a proxy for both growth opportunities and potential costs of financial distress. Firms that do not report R&D expenses are considered to have a zero R&D investment.

Leverage is computed as long term debt over the book value of assets. Leverage is a measure for both financial risk and costs of financial distress.[3]

To capture the effects of dividend payments we define a dummy variable that is set to one if the firms pay dividends in a given year and zero otherwise.

We use a dummy variable for industries that have been subject to entry and price regulation during a given period. This variable is similar to that employed by Barclay and Smith (1995) and Opler et al. (1999). Regulated industries include railroads (SIC code 4011) during 1980, trucking (SIC codes 4210, 4213) during 1980, airlines (SIC code 4512) during 1978 and telecommunications (SIC codes 4812, 4813) during 1982.

3.2 Macroeconomic Variables

We use four different variables to proxy for macroeconomic conditions. These variables are well-know to be related to the business conditions, specifically: the one-year equity market index return, the relative Treasury bills rate of return (RTB), the term spread, and the default spread.

The one-year equity market return is calculated from the CRSP value-weighted index of stocks traded on NYSE, AMEX and Nasdaq. This variable is used in Korajczyk and Levy (2003) as a proxy for macroeconomic conditions.

We use the relative Treasury bills rate of return (RTB) as a measure for the level of short-term interest rates. As the short-term interest rate itself may be nonstationary over the sample period it needs to be stochastically detrended. RTB is determined by the difference between the current one-month Treasury bills rate and its mean over the previous 12 months,

[3]We use long term debt over the book value of assets to define leverage. Although the results are not reported, we also considered total leverage (long term debt plus short term debt). The main results are not affected.

obtained from Ibbotson Associates. Fama and Schwert (1977) notice that the level of short-term interest rate is related to business conditions.

Term spread is the difference between the long-term yield on government bonds and the Treasury bill rate, also obtained from Ibbotson Associates. Fama and French (1989) confirm that the term spread has a business cycle pattern, being low around business peaks and high around depressions. Estrella and Hardouvelis (1991) find that a positive slope of the yield curve is associated with a future increase in real economic activity.

Default spread is determined by the difference between the average yield on Moody's corporate bond ratings AAA and BAA, obtained from the FRED database. Fama (1990) states that variables like default spread are measures of business conditions, as the spreads are likely to be high when conditions are poor and low when they are strong. Chen (1991) confirms that the default spread is negatively correlated with past and future output growth.

3.3 Financially Constrained and Unconstrained Firms

We split our sample into financially constrained and unconstrained firms using three alternative criteria.

Criterion #1: we rank firms according to their book value of total assets, for each year, over the 1971-2002 period. Firms below the 25^{th} percentile are allocated to the financially constrained group, while the firms above the 75^{th} percentile are allocated to the unconstrained group. This approach is similar to the size criteria used by Almeida et al. (2004) and it is supported by the argument that small firms are typically younger, less known and therefore more vulnerable to the imperfections of capital markets.

Criterion #2: we use the firm's Tobin's Q, defined as the sum of the market value of equity and the book value of debt, divided by the book value of assets, to define if a firm is financially constrained, based on its growth opportunities. A firm is set to be financially constrained (unconstrained) if its Tobin's Q is greater (lower) than one. This is one of the conditions used by Korajczyk and Levy (2003) to define financially constrained firms. The

reason for using this criterion is based on the fact that companies with more investment opportunities are usually younger and riskier, which leads to a greater exposure to market conditions.

Criterion #3: we split the sample using a dummy variable which is set to one (zero) if, for each year, the firm is financially constrained (unconstrained). This variable is constructed to distinguish between financially constrained and unconstrained firms following Korajczyk and Levy (2003). A firm is financially constrained when: 1) the firm does not have a net repurchase of debt or equity and does not pay dividends within the year; and 2) the firm's Tobin's Q is greater than one.

3.4 Descriptive Statistics and Variation Across Business Cycles

Table 1 describes the variables used in our study for the full sample of firms. Cash holdings are, on average, approximately 18% of non-cash assets, but there is a large variation across the sample. Among the macroeconomic variables the equity market return is, as expected, the variable with the larger difference between percentiles.

Table 2 presents the correlation matrix among exogenous variables. Both firm-specific and macroeconomic variables show low correlations. The higher correlation coefficient is between the default spread and the term spread, but still below 70%.

Table 3 shows the descriptive statistics of cash holdings for all, financially constrained, and financially unconstrained firms. According to the three criteria considered, financially constrained firms hold more cash than unconstrained firms.

Figure 1 presents the median cash-to-assets ratio over the 1951-2002 period for small and large firms. The firms are sorted according to their total assets (adjusted for inflation using the CPI). Recessions, as defined by the NBER, are identified by shaded bars.

For small firms we can identify peaks of the cash-to-assets ratio during recessions, which is not so clear for large firms. During the 1950s and 1960s there is a strong decline of cash holdings for both small and large firms. This may be related to firms having a surplus of

cash during WWII and technologic evolution on liquidity management. For small firms we find evidence of a steady increase of cash holdings in the 1990s. This can be explained by the fact that small firms, on average, have become more intellectual-property intensive and have fewer valuable assets on the balance sheet causing the cash-to-assets ratio to look larger. For large firms we do not find evidence of significant changes in cash holdings level after the 1960s.

4 Empirical Results

In order to study the determinants of corporate cash holdings, we estimate panel regressions of cash holdings on macroeconomic variables as well as firm-specific variables. The dependent variable is the natural logarithm of cash to non-cash assets ratio. The firm specific variables are observed in the same fiscal year of the dependent variable. The macroeconomic variables are observed with a lag of three quarters, following the procedure of Korajczyk and Levy (2003). Firms may enter and leave the panel during the sample period 1971-2002.

4.1 All Firms Regressions

Table 4 presents regression estimates on the full sample of firms using OLS (common regression), industry fixed-effects regression, and fixed-effects regression. We run the industry fixed-effects regression using a dummy variable for each industry (defined by 2-digit SIC codes) in order to control for industry effects.

The results on firm-specific variables are in line with the results in Opler et al. (1999). The main difference is the coefficient on working capital. According to the trade-off model, we expect a negative relation between net working capital and cash because the net working capital acts as a cash substitute. However, according to the financial hierarchy model there is no clear prediction for this relation because the role of the net working capital as cash substitute is not defined. The industry sigma is the only variable with inconsistent sign across

regression models. The positive and significant coefficient on the industry sigma obtained in the common regression is consistent with the trade-off model. The negative significant coefficient on the industry sigma obtained in the fixed-effects regression is consistent with Opler et al. (1999). The dividend dummy coefficient is positive and statistically significant across all regression models, which is not consistent with either the trade-off theory and the pecking order theory. Nevertheless, this result is the same as found in Opler et al. (1999) using a regression model with fixed-effects.

The results on macroeconomic variables are consistent with the trade-off model and we conclude that, in general, firms hold more cash during periods of economic recession. The macroeconomic variables are both statistically and economically significant, with the exceptions of the relative Treasury bill rate (RTB) in the common regression and of the term spread in the fixed-effects regression. The default spread is positive and significant, which is consistent with the results in Faulkender et al. (2003) that during a "credit crunch" cash becomes more valuable from the perspective of shareholders and subsequently, there is an incentive to hold more cash.

4.2 Financially Constrained and Unconstrained Firms Regressions

Table 5 reports the results of regressions of liquidity levels for the two groups of firms defined by the firm asset's size criteria (see Section 3.3). Panel A reports results for large firms (unconstrained firms) and Panel B for small firms (constrained firms).

With respect to the firm-specific variables, we see some differences between small and large firms for the net working capital, industry sigma, and dividend dummy coefficients. The net working capital coefficient is positive for small firms and negative for large firms. This can be explained by the fact that small firms can find more difficulties to convert cash substitutes (net working capital) into cash than large firms. The negative coefficient on the industry sigma for large firms and positive for small firms is possibly due to the fact that small firms are more sensitive to the effects of cash flow volatility. These differences between

groups are consistent with the financial hierarchy model, which does not predict a sign for neither industry sigma nor net working capital. Regarding the trade-off model, one would expect these variables (net working capital and industry sigma) to have a negative sign which it is the case only for the sample of large firms.

The results on the dividend dummy predict that small firms with more cash holdings pay more dividends, contrary to large firms that pay less dividends. Considering that dividends and stock market return present the same sign for large firms, these findings are consistent with the idea that dividend payouts are merely driven by macroeconomic changes [Dittmar and Dittmar (2002)].

Table 5 provides evidence that small firms hold more cash during recessions, which is consistent with both the trade-off model and the pecking order theory. For small firms, there is evidence of an increase in cash holdings when the default spread increases, and the RTB and the term spread decrease, i.e., during recessions. The one-year market return variable presents a positive sign for small firms, although the coefficient is not statistically significant at the 5% level.

In contrast with small firms, there is weak evidence that cash holdings increase during recessions for large firms. The one-year market return and default spread have signs consistent with an increase in cash holdings during recessions. However, the RTB is positive and significant which is consistent with a decrease in cash holdings during recessions. Furthermore, the term spread is not statistically significant for large firms, contrary to small firms. Thus, we can not predict if large firms hold more cash during recessions or expansions. These results are consistent with the pecking order model and the free cash flow theory, as these theories do not predict a clear relation between cash holdings and business conditions for large firms.

The cash determinants are generally the same as those for the leverage, but having an opposite effect [Opler et al. (1999)]. For small firms, our results are consistent with this view. Korajczyk and Levy (2003) find the target leverage for constrained firms is pro-

cyclical. Conversely, we find that cash holdings are counter-cyclical. Our findings are also consistent with the Almeida et al. (2004) result that constrained and unconstrained firms act differently across the business cycles by saving more cash out of the cash flow in recessions.

Table 6 reports the results of the regressions for cash holdings for groups of firms based on their growth potential measured by the Tobin's Q. Firms with Tobin's Q greater (lower) than one are classified as high (low) Tobin's Q. The main difference between the two groups, in terms of firm-specific variables, is the sign of the industry sigma coefficient. Similarly to the small and large firm groups, we find that firms with high growth potential (financially constrained) are more sensitive to cash flow volatility. Surprisingly, the coefficients of cash substitutes and dividends have the same positive sign in both sub-samples, i.e., not only for high Tobin's Q firms but also for low Tobin's Q firms, cash holdings are expected to increase with the level of cash substitutes and with dividend payment.

The results on macroeconomic variables are similar to the ones using the size criterion to define financially constrained and unconstrained firms. The RTB is negative and significant and the default spread is positive and significant for the high Tobin's Q firms. This is consistent with the hypothesis that financially constrained firms have more cash during recessions. The one-year market return and the term spread are not statistically significant. For the low Tobin's' Q firms (financially unconstrained), we find similar results to the ones for large firms but with higher t-statistics in absolute value. The one-year market return and the term spread are negative and significant; the default spread and the RTB are positive and, in general, statistically significant. While the equity market return, the default spread and the term spread coefficients are consistent with financially unconstrained firms having more cash during recessions, on the other hand the positive RTB coefficient is consistent with having less cash during recessions. Therefore, we cannot predict how financially unconstrained firms behave, in terms of liquidity management, across the business cycle.

Similarly to the results using the size criterion, the stronger evidence of a distinct behavior between the two groups of firms is provided by the short-term interest rate. In fact, this

variable supports that financially constrained (unconstrained) firms hold more (less) cash during recessions. Thus, the changes in the short-term interest rate seem to be of crucial importance for decisions about the level of cash holdings. The strongest evidence of a similar behavior between the two groups of firms is provided by the default spread variable. This is consistent with the finding in Faulkender et al. (2003) that the market value of cash increases during credit crunches.

Regressions in Table 7 predict the liquidity levels for constrained and unconstrained firms using the dummy variable criterion (one if financially constrained and zero if unconstrained). A firm is financially constrained if: 1) the firm does not have a net repurchase of debt or equity and does not pay dividends within the year; and 2) the firm's Tobin's Q is greater than one.

We see some differences between constrained and unconstrained firms in terms of firm-specific variables, but similar to the ones found using the other criteria. Cash flow is positive for unconstrained firms and negative for constrained firms. This result supports that financially constrained firms with higher cash flows, in general, do not use those cash flows to increase liquidity. In contrast, financially unconstrained firms save cash out of cash flow, increasing liquidity when their cash flow increases.

Net working capital is positive for constrained firms, which is consistent with the previous results on small firms and high Tobin's Q firms. This is also consistent with the view that the role of net working capital as a liquidity substitute is weak for firms that face financial constraints. With respect to unconstrained firms, the relation between cash holdings and net working capital is not consistent across regression models. Industry sigma is positive (negative) for financially constrained (unconstrained) firms, which is consistent with the findings in the size and in the Tobin's Q criteria. Constrained firms in industries with more volatile cash flows hold more cash in order to prevent against the greater cash flow uncertainty. Unconstrained firms, with easier access to capital markets, are not so exposed to cash flow volatility.

The results for both constrained and unconstrained firms in terms of macroeconomic variables are consistent with the ones obtained under the size and Tobin's Q criteria. The hypothesis that financially constrained firms hold more cash in recessions is supported by the increase in cash holdings when the RTB and the term spread decrease and when the default spread increases. For financially unconstrained firms, we find that cash holdings increase when the equity market return and the term spread decrease and when the default spread increases. However, RTB is insignificant for unconstrained firms.

Overall, we find strong evidence that financially constrained firms increase the level of cash during recessions, which is consistent with the trade-off model, particularly with the precautionary motive for holding cash, and the pecking order theory. Unconstrained firms present mixed results with respect to the macroeconomic variables. Moreover, the distinct behavior between the two groups of firms is more pronounced in terms of the short-term interest rate, which supports the idea that cash holdings are cyclical for unconstrained firms and countercyclical for constrained firms. This result is consistent with the findings that leverage is cyclical for constrained firms and countercyclical for unconstrained firms [Korajczyk and Levy (2003)].

4.3 Robustness

We estimate additional regression models in order to check the robustness of our findings. Table 8 presents reduced-form regressions on the full sample of firms in which we exclude some exogenous variables (Panel A) and include a measure for the change in cash holdings (Panel B).

The trade-off model suggests that cash holdings, target leverage, and investment policy are chosen together, and therefore the previous estimates could be inconsistent. Thus, we exclude the dividend dummy, capital expenditures, and leverage as explanatory variables. The results do not contradict our previous findings, as the coefficients do not present significant changes. In general, firms are expected to have more cash in recessions as the equity

market return, RTB and the term spread are negative and the default spread is positive.

The measure for differences in cash holdings is added in order to determine whether there are transitory cash holdings or not. Firms may increase cash holdings because they do not hold the optimal level of liquidity, or just because they have just raised funds and are waiting to spend them. This variable should capture the effects of this transitory liquidity. The main results are in line with our previous findings that, in general firms hold more cash during economic recessions, and the negative coefficient on the changes in cash is similar to the one found in Opler et al. (1999).

Table 9 presents regression estimates for financially constrained and unconstrained firms using the size (Panel A), Tobin's Q (Panel B), and dummy variable (Panel C) criteria . In contrast to the previous section, we estimate the models by pooling constrained and unconstrained firms and controlling for differences between groups in terms of business conditions using an interaction variable as explanatory variable. Specifically, we interact each macroeconomic variable with a dummy variable, which is equal to one for large firms (Panel A), low Tobin's Q firms (Panel B), and financially unconstrained firms (Panel C). Only the estimates on macroeconomic and interaction coefficients are shown, although the regressions also include firm-specific controls. The interaction coefficients explicitly test whether unconstrained and constrained firms react differently to macroeconomic conditions when making decisions about cash levels.

The results in Table 9 confirm our previous finding that constrained firms react to a decrease in short-term interest rates (RTB) with an increase in cash holdings, while unconstrained firms decrease cash holdings. This finding is supported by the negative and significant coefficient on the RTB and positive and significant coefficient on the RTB interacted with a dummy variable for unrestricted firms. Furthermore, the results confirm that firms increase cash levels when the equity market return and the term spread decrease and when the default spread increases, i.e. during recessions. The results are robust across the three criteria used to defined constrained and unconstrained firms.

Table 10 reports results using alternative proxies for the macroeconomic conditions. We considered the same macroeconomic variables used by Korajczyk and Levy (2003): two-year equity market return, the two-year aggregate domestic non-financial corporate profit growth, and the commercial paper spread.

The two-year equity market return is computed from the CRSP value-weighted index of stocks traded on NYSE, AMEX and Nasdaq. The two-year aggregate domestic non-financial corporate profit growth is computed using the annual data from the Flow of Funds. The commercial paper spread is calculated as the difference between the three-month commercial paper rate and the three-month Treasury bill. The commercial paper spread is frequently used as a forward-looking measure to corporate profits. Friedman and Kuttner (1992) provide some argument supporting that commercial paper spread has a good performance in predicting economic activity. Bernanke and Blinder (1992) find that the ratio of commercial paper over Treasury bills tends to increase sharply during credit crunches.

Likewise, we estimate the models pooling constrained and unconstrained firms, and controlling for differences between groups interacting each of the macroeconomic variables with a dummy variable, which is equal to one for large firms (Panel A), low Tobin's Q firms (Panel B), and financially unconstrained firms (Panel C). Only the results on macroeconomic and interaction coefficient estimates are shown, although the regressions also include firm-specific controls.

The results in Table 10 confirm our finding of an asymmetric behavior of financially constrained and unconstrained firms cash holding decisions with respect to macroeconomic conditions. The results on the two-year corporate profit growth and commercial paper spread support our previous finding. The two-year corporate profit growth is negative and significant for constrained firms (the only exception is for small firms). The commercial paper spread is negative and significant for constrained firms. Moreover, the interaction of the corporate profit growth and commercial paper spread with the dummy variable for unconstrained firms is significantly positive and significantly negative, respectively. Thus,

the results for the corporate profit growth and commercial paper spread support the view that liquidity is counter-cyclical for constrained firms and cyclical for unconstrained firms.

5 Conclusion

We investigate the role of business conditions as a determinant of firms' cash holdings using a panel of publicly traded non-financial US firms over the 1971-2002 period. We test whether business conditions have different implications for cash holding decisions of financially constrained and unconstrained firms.

There is evidence that cash levels increase during recessions, especially for financially constrained firms. This is consistent with the predictions of both the trade-off theory, namely by the precautionary motive for holding cash, and the pecking order model. We find weaker evidence that financially unconstrained firms decide to increase cash holdings during recessions.

The results are supportive of the idea that constrained firms increase cash holdings when the short-term riskless interest rate decreases. In contrast, unconstrained firms do not react by adjusting their level of cash in result of a decrease in interest rates. Moreover, we find evidence of an increase of the level of liquidity during periods of high default spreads and commercial paper spreads (credit crunches), which gives support to the view that cash is more valuable during periods of tighter credit conditions.

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Table 1: **Descriptive Statistics of Firm-specific and Macroeconomic Variables**

Descriptive statistics are shown for our sample of US non-financial publicly traded firms between 1971 and 2002. Assets in the denominator, except for the leverage ratio, are calculated as total assets less cash and marketable securities. The market-to-book ratio is measured as the book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Real size is defined as the natural logarithm of total assets deflated using the CPI into 2002 dollars. Cash flow is defined as earnings before interest and taxes, but before depreciation and amortization, less interest, taxes and common dividends. Net working capital is calculated as net current assets minus cash. Industry sigma is the mean of standard deviations of cash flow over assets over the previous 20 years for firms in the same industry, as defined by 2-digit SIC code. Leverage is long term debt over total assets. Other firm variables displayed include measures of research and development (R&D) spending and capital expenditures. The one-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. Default spread is the difference between an average yield on BAA and AAA Moody's rated bonds. RTB is the relative Treasury-bill rate of return. Term spread is the difference between the long term yield on government bonds and the Treasury-bill rate. N is the number of observations in the sample for each variable.

	Mean	25^{th} Percentile	Median	75^{th} Percentile	N
Cash/assets	0.1826	0.0231	0.0635	0.1810	110,789
Market-to-book ratio	1.9428	1.0067	1.3367	2.0911	110,789
Real size	4.7703	3.3785	4.6688	6.0426	110,789
Cash flow/assets	0.0240	0.0192	0.0700	0.1151	110,789
Net working capital/assets	0.1328	-0.0196	0.1354	0.3026	110,789
Capital expenditures/assets	0.0904	0.0318	0.0612	0.1117	110,789
Industry sigma	0.1941	0.0567	0.1023	0.2261	110,789
R&D/sales	0.0360	0.0000	0.0000	0.0202	110,789
Leverage	0.2126	0.0390	0.1711	0.3119	110,789
1-year equity market return	0.1385	0.0245	0.1476	0.2563	110,789
Default spread	0.0109	0.0070	0.0094	0.0131	110,789
RTB	0.0000	-0.0006	-0.0001	0.0006	110,789
Term spread	0.0784	0.0640	0.0744	0.0857	110,789

Table 2: **Correlation Matrix of Firm-specific and Macroeconomic Variables**

Correlations between exogenous variables are shown for our sample of US non-financial publicly traded firms between 1971 and 2002. Assets in the denominator, except for the leverage ratio, are calculated as total assets less cash and marketable securities. The market-to-book ratio is measured as the book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Real size is defined as the natural logarithm of total assets deflated using the CPI into 2002 dollars. Cash flow is defined as earnings before interest and taxes, but before depreciation and amortization, less interest, taxes and common dividends. Net working capital is calculated as net current assets minus cash. Industry sigma is the mean of standard deviations of cash flow over assets over the previous 20 years for firms in the same industry, as defined by 2-digit SIC code. Leverage is long term debt over total assets. Other firm variables displayed include measures of research and development (R&D) spending and capital expenditures. The one-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. Default spread is the difference between an average yield on BAA and AAA Moody's rated bonds. RTB is the relative Treasury-bill rate of return. Term spread is the difference between the long term yield on government bonds and the Treasury-bill rate.

	MB	Real size	Cash flow /assets	NWC	Capex /assets	Industry sigma	R&D /sales	Leverage	R_m	Default spread	RTB	Term spread
Market-to-book (MB)	1.0000	-0.1952	-0.1801	-0.1291	0.1622	0.1775	0.3057	-0.0874	0.0660	-0.0598	-0.0365	-0.0349
Real size		1.0000	0.2748	-0.0073	-0.0286	-0.1374	-0.1329	0.1628	-0.0445	-0.0402	0.0034	-0.0918
Cash flow/assets			1.0000	0.2197	-0.0182	-0.0949	-0.4237	-0.0668	-0.0141	0.0201	0.0107	0.0141
Net work.cap./assets (NWC)				1.0000	-0.2575	-0.1481	-0.0811	-0.1630	-0.0239	0.0867	0.0205	0.0792
Capex/assets					1.0000	0.0770	0.0420	0.0539	0.0361	0.0623	0.0423	0.1048
Industry sigma						1.0000	0.1657	-0.0432	0.0153	-0.2346	-0.0286	-0.2043
R&D/sales							1.0000	-0.0359	0.0116	-0.0527	-0.0116	-0.0427
Leverage								1.0000	-0.0027	-0.0034	0.0008	-0.0157
1-year market return (R_m)									1.0000	0.0157	0.0630	-0.0031
Default spread										1.0000	-0.2310	0.6891
RTB											1.0000	0.0604
Term spread												1.0000

Table 3: **Descriptive Statistics of Cash Holdings for Financially Constrained and Unconstrained Firms**

Cash-to-assets ratio mean, median, and 25^{th} and 75^{th} percentiles are shown for all firms and financially constrained and financially unconstrained firms for our sample of US non-financial publicly traded firms between 1971 and 2002. Small firms have, for each year, total assets below the 25^{th} size percentile. Large firms have, for each year, total assets above the 75^{th} size percentile. Low (high) growth potential firms have, for each year, a Tobin's Q ratio lower (greater) than one. Tobin's Q ratio is defined as the sum of the market value of equity and the book value of debt, divided by the book value of assets. Financially constrained firms do not have a net repurchase of debt or equity and do not pay dividends within the year; and the Tobin's Q is greater than one. All other firms are unconstrained.

	Mean	25^{th} Percentile	Median	75^{th} Percentile	N
All firms	0.1826	0.0231	0.0635	0.1810	110,789
Small firms	0.2553	0.0289	0.0899	0.2733	27,700
Large firms	0.0993	0.0188	0.0470	0.1116	27,700
High Tobin's Q firms	0.2632	0.0306	0.1036	0.3006	46,532
Low Tobin's Q firms	0.1242	0.0199	0.0489	0.1210	64,257
Constrained dummy firms	0.2388	0.0223	0.0696	0.2375	26,848
Unconstrained dummy firms	0.1646	0.0233	0.0618	0.1682	83,941

Table 4: **Regressions Predicting Liquidity Levels for All Firms**

The dependent variable in all regressions is the logarithm of cash/assets, which is calculated as cash divided by assets less cash holdings. The sample is US non-financial publicly traded firms between 1971 and 2002. Assets in the denominator, except for the leverage ratio, are calculated as total assets less cash and marketable securities. The market-to-book ratio is measured as the book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Real size is defined as the natural logarithm of total assets deflated using the CPI into 2002 dollars. Cash flow is defined as earnings before interest and taxes, but before depreciation and amortization, less interest, taxes and common dividends. Net working capital is calculated as net current assets minus cash. Industry sigma is the mean of standard deviations of cash flow over assets over the previous 20 years for firms in the same industry, as defined by 2-digit SIC code. Leverage is long term debt over total assets. Dividend dummy is a variable set to one if the firm paid a dividend in the year and set to zero if it did not. Regulation dummy is a variable set to one if the firm is in a regulated industry for the year, and set to zero if it is not. Other firm variables displayed include measures of research and development (R&D) spending and capital expenditures. The one-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. Default spread is the difference between an average yield on BAA and AAA Moody's rated bonds. RTB is the relative Treasury-bill rate of return. Term spread is the difference between the long term yield on government bonds and the Treasury-bill rate. The industry effects regression is estimated with dummy variables for each industry defined by 2-digit SIC code. White heteroskedasticity robust t-statistics are in parentheses.

	Common regression	Industry effects regression	Fixed-effects regression
Constant	-3.1488	N.A.	N.A.
	(-123.97)	N.A.	N.A.
Market-to-book ratio	0.3192	0.3057	0.2341
	(101.19)	(95.99)	(27.43)
Real size	-0.0655	-0.0568	-0.1358
	(-24.46)	(-20.80)	(-2.62)
Cash flow/assets	0.2053	0.1507	0.1247
	(7.94)	(6.09)	(2.97)
Net working capital/assets	-0.0112	0.1700	0.2698
	(-0.50)	(6.54)	(4.96)
Capital expenditures/assets	0.8365	0.8526	0.6978
	(16.50)	(15.93)	(9.53)
Industry sigma	0.0773	-0.0228	-0.1450
	(3.45)	(-0.84)	(-2.12)
R&D/sales	1.0548	0.9846	0.3737
	(22.11)	(20.84)	(4.66)
Leverage	-0.8538	-0.8434	-0.3177
	(-27.85)	(-27.02)	(-8.45)
Dividend dummy	0.1127	0.1397	0.1424
	(10.96)	(13.43)	(6.68)
Regulation dummy	0.0616	-0.0048	-0.0676
	(0.48)	(-0.04)	(-0.78)
1-year equity market return	-0.1668	-0.1705	-0.0637
	(-6.72)	(-6.96)	(-2.61)
Default spread	24.2909	24.4814	18.6332
	(17.57)	(17.83)	(15.64)
RTB	-5.8191	-7.2752	-15.2406
	(-1.57)	(-1.98)	(-4.81)
Term spread	-2.3314	-2.4920	-1.1833
	(-7.68)	(-8.27)	(-1.02)
N	110,789	110,789	110,789
$\overline{R}^2$	0.198	0.217	0.615

Table 5: **Regressions Predicting Liquidity Levels for Small and Large Firms**

The dependent variable in all regressions is the logarithm of cash/assets, which is calculated as cash divided by assets less cash holdings. The sample is US non-financial publicly traded firms between 1971 and 2002. Small firms have, for each year, total assets below the 25^{th} size percentile. Large firms have, for each year, total assets above the 75^{th} size percentile. Assets in the denominator, except for the leverage ratio, are calculated as total assets less cash and marketable securities. The market-to-book ratio is measured as the book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Real size is defined as the natural logarithm of total assets deflated using the CPI into 2002 dollars. Cash flow is defined as earnings before interest and taxes, but before depreciation and amortization, less interest, taxes and common dividends. Net working capital is calculated as net current assets minus cash. Industry sigma is the mean of standard deviations of cash flow over assets over the previous 20 years for firms in the same industry, as defined by 2-digit SIC code. Leverage is long term debt over total assets. Dividend dummy is a variable set to one if the firm paid a dividend in the year and set to zero if it did not. Regulation dummy is a variable set to one if the firm is in a regulated industry for the year, and set to zero if it is not. Other firm variables displayed include measures of research and development (R&D) spending and capital expenditures. The one-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. Default spread is the difference between an average yield on BAA and AAA Moody's rated bonds. RTB is the relative Treasury-bill rate of return. Term spread is the difference between the long term yield on government bonds and the Treasury-bill rate. The industry effects regression is estimated with dummy variables for each industry defined by 2-digit SIC code. White heteroskedasticity robust t-statistics are in parentheses.

	Common regression	Industry effects regression	Fixed-effects regression
Panel A: Large firms			
Constant	-2.6470	N.A.	N.A.
	(-35.20)	N.A.	N.A.
Market-to-book ratio	0.3667	0.3718	0.2137
	(32.65)	(34.28)	(5.46)
Real size	-0.1228	-0.1176	-0.3572
	(-16.96)	(-15.85)	(-1.33)
Cash flow/assets	-0.3603	-0.3357	1.0419
	(-2.45)	(-2.26)	(4.71)
Net working capital/assets	-0.7783	-0.8760	-0.7935
	(-14.50)	(-14.32)	(-2.50)
Capital expenditures/assets	0.3737	0.3063	-0.0483
	(2.66)	(1.97)	(-0.14)
Industry sigma	-0.5232	-1.0521	-0.5224
	(-11.11)	(-20.22)	(-3.32)
R&D/sales	3.6918	2.7829	0.4068
	(7.84)	(6.67)	(0.58)
Leverage	-1.0189	-0.8627	-0.2054
	(-18.08)	(-15.04)	(-1.41)
Dividend dummy	-0.2151	-0.1812	-0.0081
	(-10.53)	(-8.67)	(-0.18)
Regulation dummy	-0.1005	-0.2025	-0.1720
	(-0.45)	(-1.03)	(-1.24)
1-year equity market return	-0.4365	-0.4178	-0.2554
	(-10.12)	(-9.85)	(-5.62)
Default spread	42.2125	38.3093	28.2862
	(17.95)	(16.59)	(14.55)
RTB	21.4591	17.8148	6.1377
	(3.48)	(2.94)	(0.81)
Term spread	-0.7402	-1.4728	-2.9406
	(-1.39)	(-2.82)	(-1.02)
N	27,700	27,700	27,700
$\overline{R}^2$	0.178	0.215	0.627

Table 5: continued

	Common regression	Industry effects regression	Fixed-effects regression
Panel B: Small firms			
Constant	-3.1424	N.A.	N.A.
	(-48.63)	N.A.	N.A.
Market-to-book ratio	0.2304	0.2243	0.2002
	(48.13)	(46.25)	(17.87)
Real size	-0.0190	-0.0029	0.0509
	(-1.54)	(-0.23)	(0.43)
Cash flow/assets	-0.1443	-0.1841	-0.1506
	(-5.28)	(-6.71)	(-2.40)
Net working capital/assets	0.6127	0.9195	0.7925
	(16.29)	(21.59)	(10.43)
Capital expenditures/assets	1.5362	1.4071	1.0754
	(18.64)	(16.57)	(8.51)
Industry sigma	0.2066	0.2828	0.0135
	(4.61)	(5.15)	(0.04)
R&D/sales	0.4425	0.4537	0.2796
	(7.52)	(7.66)	(2.75)
Leverage	-0.7346	-0.7083	-0.3126
	(-15.14)	(-14.77)	(-4.42)
Dividend dummy	0.4614	0.4380	0.1675
	(18.00)	(17.04)	(3.19)
Regulation dummy	0.5132	0.2699	0.0116
	(1.02)	(0.55)	(0.04)
1 year equity market return	0.0806	0.0768	0.1049
	(1.47)	(1.42)	(0.94)
Default spread	4.0288	5.7430	12.3927
	(1.29)	(1.84)	(4.01)
RTB	-27.1869	-26.5814	-6.2246
	(-3.18)	(-3.14)	(-0.74)
Term spread	-2.1501	-1.6790	-0.0501
	(-3.00)	(-2.34)	(-0.01)
N	27,700	27,700	27,700
$\overline{R}^2$	0.159	0.180	0.643

Table 6: **Regressions Predicting Liquidity Levels for Firms with High and Low Tobin's Q**

The dependent variable in all regressions is the logarithm of cash/assets, which is calculated as cash divided by assets less cash holdings. The sample is US non-financial publicly traded firms between 1971 and 2002. Low (high) growth potential firms have, for each year, a Tobin's Q ratio lower (greater) than one. Tobin's Q ratio is defined as the sum of the market value of equity and the book value of debt, divided by the book value of assets. Assets in the denominator, except for the leverage ratio, are calculated as total assets less cash and marketable securities. The market-to-book ratio is measured as the book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Real size is defined as the natural logarithm of total assets deflated using the CPI into 2002 dollars. Cash flow is defined as earnings before interest and taxes, but before depreciation and amortization, less interest, taxes and common dividends. Net working capital is calculated as net current assets minus cash. Industry sigma is the mean of standard deviations of cash flow over assets over the previous 20 years for firms in the same industry, as defined by 2-digit SIC code. Leverage is long term debt over total assets. Dividend dummy is a variable set to one if the firm paid a dividend in the year and set to zero if it did not. Regulation dummy is a variable set to one if the firm is in a regulated industry for the year, and set to zero if it is not. Other firm variables displayed include measures of research and development (R&D) spending and capital expenditures. The one-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. Default spread is the difference between an average yield on BAA and AAA Moody's rated bonds. RTB is the relative Treasury-bill rate of return. Term spread is the difference between the long term yield on government bonds and the Treasury-bill rate. The industry effects regression is estimated with dummy variables for each industry defined by 2-digit SIC code. White heteroskedasticity robust t-statistics are in parentheses.

	Common regression	Industry effects regression	Fixed-effects regression
Panel A: Low Tobin's Q firms			
Constant	-4.1366	N.A.	N.A.
	(-91.48)	N.A.	N.A.
Market-to-book ratio	1.4473	1.4661	1.1912
	(43.27)	(42.24)	(13.74)
Real size	-0.0814	-0.0748	-0.1632
	(-24.78)	(-21.86)	(-1.78)
Cash flow/assets	0.1806	0.1155	0.3774
	(3.89)	(2.57)	(4.70)
Net working capital/assets	0.2631	0.6602	0.6379
	(8.50)	(18.04)	(6.27)
Capital expenditures/assets	1.3843	0.9588	0.4420
	(17.96)	(12.22)	(4.37)
Industry sigma	-0.1412	-0.3001	-0.4054
	(-4.48)	(-8.02)	(-4.24)
R&D/sales	1.5237	1.5817	1.0177
	(10.77)	(10.86)	(3.91)
Leverage	-1.0723	-1.1885	-0.4558
	(-30.99)	(-33.44)	(-6.72)
Dividend dummy	0.1589	0.1616	0.1132
	(12.82)	(12.90)	(4.47)
Regulation dummy	0.0953	0.0081	-0.1094
	(0.72)	(0.06)	(-1.27)
1-year equity market return	-0.4593	-0.4508	-0.2864
	(-14.87)	(-14.78)	(-11.56)
Default spread	35.3904	34.1291	22.5755
	(21.38)	(20.82)	(16.21)
RTB	20.8323	20.1808	4.4868
	(4.67)	(4.56)	(1.25)
Term spread	-5.5379	-5.7000	-3.8375
	(-14.93)	(-15.56)	(-3.09)
N	64,257	64,257	64,257
$\overline{R}^2$	0.177	0.200	0.640

Table 6: continued

	Common regression	Industry effects regression	Fixed-effects regression
Panel B: High Tobin's Q firms			
Constant	-3.4006	N.A.	N.A.
	(-81.07)	N.A.	N.A.
Market-to-book ratio	0.3104	0.2963	0.2074
	(81.69)	(77.68)	(17.07)
Real size	-0.0461	-0.0349	-0.0538
	(-10.98)	(-8.30)	(-0.71)
Cash flow/assets	0.3130	0.2632	0.0850
	(10.45)	(9.14)	(1.68)
Net working capital/assets	0.1600	0.2238	0.2655
	(4.57)	(5.63)	(2.80)
Capital expenditures/assets	0.5832	0.8666	0.6265
	(8.62)	(12.02)	(5.51)
Industry sigma	0.1404	0.1044	-0.0898
	(4.47)	(2.68)	(-0.79)
R&D/sales	0.9519	0.8375	0.2977
	(19.84)	(17.61)	(3.51)
Leverage	-0.6630	-0.6267	-0.2332
	(-16.97)	(-16.23)	(-4.12)
Dividend dummy	0.0232	0.0749	0.1379
	(1.37)	(4.36)	(2.81)
Regulation dummy	0.1856	0.0405	0.6531
	(0.52)	(0.11)	(2.55)
1-year equity market return	0.0049	0.0083	0.0691
	(0.12)	(0.21)	(1.22)
Default spread	17.1502	17.9526	18.1999
	(7.32)	(7.70)	(7.76)
RTB	-23.7767	-23.9897	-23.1183
	(-3.73)	(-3.80)	(-4.04)
Term spread	0.0287	-0.2553	0.9343
	(0.06)	(-0.52)	(0.40)
N	46,532	46,532	46,532
$\overline{R}^2$	0.237	0.259	0.688

Table 7: **Regressions Predicting Liquidity Levels for Financially Unconstrained and Constrained Firms**

The dependent variable in all regressions is the logarithm of cash/assets, which is calculated as cash divided by assets less cash holdings. The sample is US non-financial publicly traded firms between 1971 and 2002. Financially constrained firms do not have a net repurchase of debt or equity and do not pay dividends within the year; and the Tobin's Q is greater than one. All other firms are unconstrained. Assets in the denominator, except for the leverage ratio, are calculated as total assets less cash and marketable securities. The market-to-book ratio is measured as the book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Real size is defined as the natural logarithm of total assets deflated using the CPI into 2002 dollars. Cash flow is defined as earnings before interest and taxes, but before depreciation and amortization, less interest, taxes and common dividends. Net working capital is calculated as net current assets minus cash. Industry sigma is the mean of standard deviations of cash flow over assets over the previous 20 years for firms in the same industry, as defined by 2-digit SIC code. Leverage is long term debt over total assets. Dividend dummy is a variable set to one if the firm paid a dividend in the year and set to zero if it did not. Regulation dummy is a variable set to one if the firm is in a regulated industry for the year, and set to zero if it is not. Other firm variables displayed include measures of research and development (R&D) spending and capital expenditures. The one-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. Default spread is the difference between an average yield on BAA and AAA Moody's rated bonds. RTB is the relative Treasury-bill rate of return. Term spread is the difference between the long term yield on government bonds and the Treasury-bill rate. The industry effects regression is estimated with dummy variables for each industry defined by 2-digit SIC code. White heteroskedasticity robust t-statistics are in parentheses.

	Common regression	Industry effects regression	Fixed-effects regression
Panel A: Unconstrained firms			
Constant	-3.0237	N.A.	N.A.
	(-104.11)	N.A.	N.A.
Market-to-book ratio	0.3258	0.3138	0.2469
	(79.25)	(75.67)	(21.62)
Real size	-0.0761	-0.0648	-0.1668
	(-29.15)	(-23.79)	(-2.36)
Cash flow/assets	0.3774	0.3116	0.3075
	(10.13)	(8.71)	(5.52)
Net working capital/assets	-0.0994	0.0638	0.1290
	(-3.80)	(2.09)	(1.74)
Capital expenditures/assets	0.6974	0.7202	0.5814
	(10.23)	(9.92)	(5.68)
Industry sigma	-0.0504	-0.1876	-0.2190
	(-1.94)	(-6.05)	(-3.17)
R&D/sales	1.2960	1.1980	0.6239
	(17.46)	(16.60)	(4.55)
Leverage	-0.9687	-0.9591	-0.3286
	(-22.31)	(-21.66)	(-6.27)
Dividend dummy	N.A.	N.A.	N.A.
	N.A.	N.A.	N.A.
Regulation dummy	-0.0115	-0.0329	-0.0680
	(-0.08)	(-0.24)	(-0.73)
1-year equity market return	-0.2348	-0.2354	-0.1073
	(-8.56)	(-8.68)	(-4.33)
Default spread	27.3557	27.0099	20.8993
	(18.12)	(18.03)	(16.04)
RTB	2.6663	0.8703	-9.4211
	(0.66)	(0.22)	(-2.83)
Term spread	-1.9776	-2.2388	-1.4129
	(-5.93)	(-6.76)	(-1.17)
N	83,941	83,941	83,941
$\overline{R}^2$	0.190	0.208	0.628

Table 7: continued

	Common regression	Industry effects regression	Fixed-effects regression
Panel B: Constrained firms			
Constant	-3.5391	N.A.	N.A.
	(-63.40)	N.A.	N.A.
Market-to-book ratio	0.3107	0.2952	0.2223
	(61.81)	(58.18)	(15.28)
Real size	0.0068	0.0111	-0.0620
	(1.11)	(1.78)	(-0.71)
Cash flow/assets	-0.0743	-0.1059	-0.0698
	(-2.30)	(-3.37)	(-1.00)
Net working capital/assets	0.2127	0.4467	0.6355
	(4.94)	(9.15)	(6.34)
Capital expenditures/assets	1.1534	1.1275	0.8722
	(15.09)	(14.12)	(7.10)
Industry sigma	0.2906	0.2500	-0.0528
	(6.78)	(4.50)	(-0.20)
R&D/sales	0.8136	0.7408	0.2141
	(13.75)	(12.32)	(1.71)
Leverage	-0.7378	-0.7263	-0.2594
	(-17.20)	(-16.77)	(-3.81)
Dividend dummy	N.A.	N.A.	N.A.
	N.A.	N.A.	N.A.
Regulation dummy	0.4448	0.1890	0.1135
	(1.77)	(0.69)	(0.46)
1-year equity market return	0.0347	0.0309	0.1056
	(0.62)	(0.56)	(1.08)
Default spread	14.4501	15.8482	13.0940
	(4.42)	(4.86)	(3.66)
RTB	-32.9611	-34.6310	-24.1901
	(-3.65)	(-3.87)	(-2.75)
Term spread	-2.2095	-2.0447	-0.0701
	(-3.13)	(-2.91)	(-0.02)
N	26,848	26,848	26,848
$\overline{R}^2$	0.226	0.252	0.722

Table 8: **Modified Regressions Predicting Liquidity Levels for All Firms**

The dependent variable in all regressions is the logarithm of cash/assets, which is calculated as cash divided by assets less cash holdings. The sample is US non-financial publicly traded firms between 1971 and 2002. Panel A shows reduced form regressions that exclude capital expenditures, leverage and dividends as independent variables. Panel B shows regressions that include the change in cash holdings as control. Assets in the denominator, except for the leverage ratio, are calculated as total assets less cash and marketable securities. The market-to-book ratio is measured as the book value of assets, less the book value of equity, plus the market value of equity, divided by assets. Real size is defined as the natural logarithm of total assets deflated using the CPI into 2002 dollars. Cash flow is defined as earnings before interest and taxes, but before depreciation and amortization, less interest, taxes and common dividends. Net working capital is calculated as net current assets minus cash. Industry sigma is the mean of standard deviations of cash flow over assets over the previous 20 years for firms in the same industry, as defined by 2-digit SIC code. Leverage is long term debt over total assets. Dividend dummy is a variable set to one if the firm paid a dividend in the year and set to zero if it did not. Regulation dummy is a variable set to one if the firm is in a regulated industry for the year, and set to zero if it is not. Other firm variables displayed include measures of research and development (R&D) spending and capital expenditures. The one-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. Default spread is the difference between an average yield on BAA and AAA Moody's rated bonds. RTB is the relative Treasury-bill rate of return. Term spread is the difference between the long term yield on government bonds and the Treasury-bill rate. The industry effects regression is estimated with dummy variables for each industry defined by 2-digit SIC code. White heteroskedasticity robust t-statistics are in parentheses.

	Common regression	Industry effects regression	Fixed-effects regression
Panel A: Reduced form regressions			
Constant	-3.2970	N.A.	N.A.
	(-132.81)	N.A.	N.A.
Market-to-book ratio	0.3341	0.3208	0.2419
	(108.64)	(103.68)	(27.77)
Real size	-0.0692	-0.0567	-0.1347
	(-29.45)	(-23.27)	(-2.58)
Cash flow/assets	0.3059	0.2440	0.1559
	(10.76)	(9.04)	(3.63)
Net working capital/assets	0.0583	0.2374	0.2836
	(2.77)	(9.20)	(5.23)
Industry sigma	0.0956	-0.0780	-0.1889
	(4.25)	(-2.85)	(-2.76)
R&D/sales	1.1038	1.0286	0.3988
	(22.87)	(21.68)	(5.01)
Regulation dummy	0.0289	0.0130	-0.0570
	(0.23)	(0.11)	(-0.67)
1-year equity market return	-0.1724	-0.1762	-0.0566
	(-6.86)	(-7.09)	(-2.30)
Default spread	25.7259	25.2939	18.6705
	(18.46)	(18.26)	(15.60)
RTB	-0.3391	-2.3733	-11.4000
	(-0.09)	(-0.64)	(-3.62)
Term spread	-1.7583	-2.0123	-0.7389
	(-5.76)	(-6.63)	(-0.64)
N	110,789	110,789	110,789
$\overline{R}^2$	0.180	0.199	0.613

Table 8: continued

	Common regression	Industry effects regression	Fixed-effects regression
Panel B: Regressions adding changes in cash holdings			
Constant	-2.9420	N.A.	N.A.
	(-108.63)	N.A.	N.A.
Market-to-book ratio	0.2904	0.2798	0.1827
	(78.54)	(75.13)	(17.71)
Real size	-0.0849	-0.0769	-0.1814
	(-29.94)	(-26.41)	(-2.94)
Cash flow/assets	0.4986	0.4297	0.3953
	(14.09)	(12.43)	(7.61)
Net working capital/assets	-0.2584	-0.0587	0.1483
	(-10.57)	(-2.06)	(2.02)
Capital expenditures/assets	0.3842	0.3373	0.2025
	(6.93)	(5.78)	(2.43)
Industry sigma	0.0123	-0.1383	-0.1749
	(0.48)	(-4.49)	(-2.44)
R&D/sales	1.2743	1.1904	0.3978
	(18.60)	(17.50)	(3.27)
Leverage	-0.9599	-0.9595	-0.3900
	(-30.22)	(-29.59)	(-8.91)
Dividend dummy	0.1259	0.1490	0.1354
	(11.66)	(13.66)	(6.02)
Regulation dummy	0.0741	0.0025	-0.0187
	(0.60)	(0.02)	(-0.23)
Change in cash	-1.2764	-1.2869	-1.3963
	(-37.61)	(-38.19)	(-40.08)
1-year equity market return	-0.2194	-0.2197	-0.0924
	(-8.27)	(-8.35)	(-3.67)
Default spread	26.2342	24.9934	17.5080
	(17.94)	(17.14)	(13.79)
RTB	-4.6446	-6.3072	-16.4488
	(-1.20)	(-1.65)	(-5.05)
Term spread	-2.1015	-2.2707	-1.0040
	(-6.49)	(-7.07)	(-0.86)
N	90,283	90,283	90,283
$\overline{R}^2$	0.229	0.248	0.651

Table 9: **Regressions Predicting Liquidity Levels with Interaction between Business Conditions and Financial Constrainst**

The dependent variable in all regressions is the logarithm of cash/assets, which is calculated as cash divided by assets less cash holdings. The sample is US non-financial publicly traded firms between 1971 and 2002. Large firms have, for each year, total assets above the 75^{th} size percentile. Low (high) growth potential firms have, for each year, a Tobin's Q ratio lower (greater) than one. Tobin's Q ratio is defined as the sum of the market value of equity and the book value of debt, divided by the book value of assets. Financially constrained firms do not have a net repurchase of debt or equity and do not pay dividends within the year; and the Tobin's Q is greater than one. All other firms are unconstrained. The one-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. Default spread is the difference between an average yield on BAA and AAA Moody's rated bonds. RTB is the relative Treasury-bill rate of return. Term spread is the difference between the long term yield on government bonds and the Treasury-bill rate. The industry effects regression is estimated with dummy variables for each industry defined by 2-digit SIC code. Firm-specific variables are also included as controls. White heteroskedasticity robust t-statistics are in parentheses.

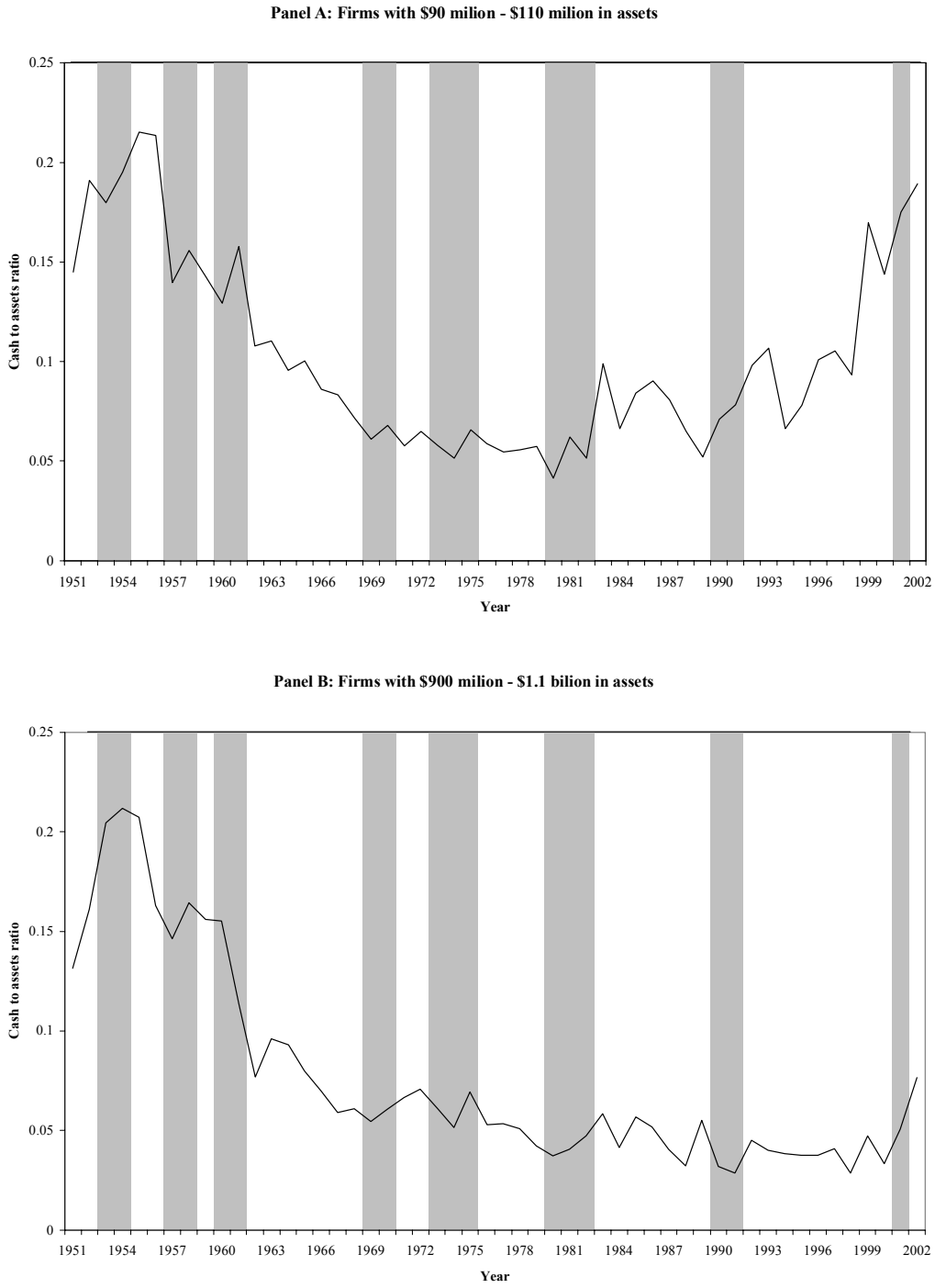
	Common regression	Industry effects regression	Fixed-efects regression
Panel A: Small and large firms			
1-year equity market return	-0.0052	-0.0084	0.0688
	(-0.10)	(-0.16)	(0.73)
Default spread	10.5437	10.3603	13.0053
	(3.38)	(3.33)	(4.16)
RTB	-15.2442	-18.7722	-3.0542
	(-1.77)	(-2.19)	(-0.36)
Term spread	-1.9992	-2.1647	-1.2124
	(-3.17)	(-3.44)	(-0.32)
1-year equity market return × Large dummy	-0.3847	-0.3716	-0.2845
	(-5.51)	(-5.37)	(-2.98)
Default spread × Large dummy	26.6715	25.5595	12.6957
	(6.86)	(6.63)	(3.19)
RTB × Large dummy	21.0745	22.8217	-1.3908
	(1.99)	(2.18)	(-0.14)
Term spread × Large dummy	-2.0459	-1.8727	-0.6623
	(-3.00)	(-2.74)	(-0.21)
N	55,400	55,400	55,400
$\overline{R}^2$	0.173	0.192	0.641
Panel B: High and low Tobin's Q firms			
1-year equity market return	-0.0644	-0.0683	0.0172
	(-1.59)	(-1.71)	(0.47)
Default spread	18.5963	18.0575	16.3169
	(7.99)	(7.82)	(7.60)
RTB	-21.7611	-23.7988	-24.0911
	(-3.41)	(-3.77)	(-4.46)
Term spread	-2.4369	-2.7239	-1.0968
	(-5.92)	(-6.69)	(-1.02)
1-year equity market return × Low Q dummy	-0.1557	-0.1497	-0.1344
	(-3.07)	(-2.99)	(-3.37)
Default spread × Low Q dummy	8.3227	9.1213	3.9330
	(2.93)	(3.24)	(1.54)
RTB × Low Q dummy	22.5831	22.4254	14.4513
	(2.91)	(2.91)	(2.22)
Term spread × Low Q dummy	0.3719	0.6029	-0.1432
	(0.87)	(1.42)	(-0.34)
N	110,789	110,789	110,789
$\overline{R}^2$	0.199	0.218	0.615
Panel C: Constrained and unconstrained firms			
1-year equity market return	0.0222	0.0066	0.0362
	(0.40)	(0.12)	(0.76)
Default spread	13.5544	14.5873	10.7724
	(4.19)	(4.55)	(3.60)
RTB	-31.5339	-32.8102	-29.6643
	(-3.49)	(-3.67)	(-3.73)
Term spread	-2.5551	-3.0955	-1.2709
	(-4.88)	(-5.96)	(-1.02)
1-year equity market return × Unconstrained dummy	-0.2552	-0.2464	-0.1308
	(-4.18)	(-4.09)	(-2.66)
Default spread × Unconstrained dummy	14.0442	13.0691	9.6606
	(3.98)	(3.73)	(3.05)
RTB × Unconstrained dummy	33.8405	34.3274	19.0420
	(3.44)	(3.53)	(2.25)
Term spread × Unconstrained dummy	0.4009	0.6434	0.2130
	(0.78)	(1.26)	(0.46)
N	110,789	110,789	110,789
$\overline{R}^2$	0.199	0.216	0.615

Table 10: **Regressions Predicting Liquidity Levels with Interaction between Alternative Business Conditions Variables and Financial Constrainst**

The dependent variable in all regressions is the logarithm of cash/assets, which is calculated as cash divided by assets less cash holdings. The sample is US non-financial publicly traded firms between 1971 and 2002. Large firms have, for each year, total assets above the 75^{th} size percentile. Low (high) growth potential firms have, for each year, a Tobin's Q ratio lower (greater) than one. Tobin's Q ratio is defined as the sum of the market value of equity and the book value of debt, divided by the book value of assets. Financially constrained firms do not have a net repurchase of debt or equity and do not pay dividends within the year; and the Tobin's Q is greater than one. All other firms are unconstrained. The two-year equity market return is the return on CRSP value weighted index of stocks traded on NYSE, AMEX, and Nasdaq. The two-year aggregate domestic non-financial corporate profit growth is computed using the annual data from the Flow of Funds. The commercial paper spread is the difference between the three-month commercial paper rate and the three-month Treasury bill. The industry effects regression is estimated with dummy variables for each industry defined by 2-digit SIC code. Firm-specific variables are also included as controls. White heteroskedasticity robust t-statistics are in parentheses.

	Common regression	Industry effects regression	Fixed efects regression
Panel A: Small and large firms			
2-year equity market return	-0.0947	-0.1104	-0.0180
	(-2.38)	(-2.79)	(-0.24)
2-year corporate profit growth	0.0323	-0.0201	-0.1596
	(0.52)	(-0.32)	(-1.93)
Commercial paper spread	0.0416	0.0526	0.0126
	(2.90)	(3.69)	(0.42)
2-year equity market return × Large dummy	-0.2987	-0.2809	-0.2487
	(-6.16)	(-5.83)	(-2.91)
2-year corporate profit growth × Large dummy	0.0103	0.0397	0.1112
	(0.14)	(0.53)	(1.29)
Commercial paper spread × Large dummy	-0.0722	-0.0740	0.0065
	(-4.06)	(-4.17)	(0.23)
N	54,404	54,404	54,404
$\overline{R}^2$	0.171	0.191	0.642
Panel B: High and low Tobin's Q firms			
2-year equity market return	-0.2240	-0.2540	-0.1354
	(-8.19)	(-9.40)	(-5.59)
2-year corporate profit growth	-0.1854	-0.2275	-0.2232
	(-4.11)	(-5.09)	(-4.42)
Commercial paper spread	0.0746	0.0953	0.0503
	(5.91)	(7.61)	(3.09)
2-year equity market return × Low Q dummy	-0.0107	0.0230	-0.0341
	(-0.34)	(0.75)	(-1.10)
2-year corporate profit growth × Low Q dummy	0.2480	0.2619	0.1189
	(4.68)	(4.98)	(2.67)
Commercial paper spread × Low Q dummy	-0.1001	-0.1176	-0.0384
	(-7.48)	(-8.83)	(-3.24)
N	108,800	108,800	108,800
$\overline{R}^2$	0.197	0.217	0.617
Panel C: Constrained and unconstrained firms			
2-year equity market return	-0.2253	-0.2473	-0.1684
	(-6.71)	(-7.45)	(-4.83)
2-year corporate profit growth	-0.2835	-0.3419	-0.2919
	(-4.66)	(-5.68)	(-4.69)
Commercial paper spread	0.0893	0.0988	0.0768
	(5.81)	(6.47)	(4.00)
2-year equity market return × Unconstrained dummy	-0.0317	-0.0194	0.0096
	(-0.91)	(-0.56)	(0.31)
2-year corporate profit growth × Unconstrained dummy	0.3522	0.3878	0.1927
	(5.39)	(5.99)	(3.43)
Commercial paper spread × Unconstrained dummy	-0.1103	-0.1122	-0.0671
	(-6.92)	(-7.09)	(-4.63)
N	108,800	108,800	108,800
$\overline{R}^2$	0.197	0.216	0.616

Figure 1: **Median Cash-to-assets ratio 1951-2002**



Median of cash-to-assets ratio of US non-financial publicly traded firms between 1951 and 2002 with real assets in the $90 to $110 range (Panel A) and in the $900 million to $1.1 billion range (Panel B), adjusted into 2002 dollars using the CPI. The ratio is computed as cash and marketable securities over assets less cash and marketable securities.