



*Charles A. Dice Center for  
Research in Financial Economics*

**Financial Policies and the Financial Crisis:  
How Important Was the Systemic  
Credit Contraction for  
Industrial Corporations?**

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### *Abstract*

Although firm financial policies were affected by a credit contraction during the recent financial crisis, the impact of increased uncertainty and decreased growth opportunities was stronger than that of the credit contraction per se. From the start of the financial crisis (third quarter of 2007) to its peak (first quarter of 2009), both large and investment-grade non-financial firms show no evidence of suffering from an exceptional systemic credit contraction. Instead of decreasing their cash holdings as would be expected with a temporarily impaired credit supply, these firms increase their cash holdings sharply (by 17.8% in the case of investment-grade firms) after the fall of Lehman. Though small and unrated firms have exceptionally low net debt issuance at the peak of the crisis, their net debt issuance in the first year of the crisis is no different from the last year of the credit boom. In contrast, however, the net equity issuance of small and unrated firms is low throughout 2008, whereas an impaired credit supply by itself would have encouraged firms to increase their equity issuance. On average, the cumulative financing impact of the decrease in net equity issuance from the start to the peak of the crisis is approximately twice the cumulative impact of the decrease in net debt issuance. The decrease in net equity issuance and the increase in cash holdings are also economically important for firms with no debt.

After the crash of the dot.coms, the U.S. went through a striking credit boom that was followed by a dramatic financial crisis.<sup>1</sup> The crisis, which is generally considered to have started in August 2007, was unexpected. It became the worst financial crisis since the Great Depression after the surprising events of September 2008, which include the bankruptcy of Lehman and the rescue of AIG, when panic reigned in the markets and there were concerns about whether the financial system would keep functioning.<sup>2</sup> In this paper, we investigate firm-level financial policies during the crisis, taking advantage of the fact that its abrupt start and its unforeseen virulence following Lehman's bankruptcy make it a natural experiment to study the impact of an unexpected systemic crisis.

The conventional view of the crisis is that bank losses from toxic assets led to an abrupt contraction of credit (see Brunnermeier (2009)). These toxic assets were mostly securities backed by subprime and related mortgages, so their loss of value had little to do with the performance of industrial firms, making the credit contraction an exogenous event for these firms. Research in finance, including research on the recent financial crisis, argues that exogenous credit contractions have real effects on firms, in that firms cannot obtain financing as planned and therefore reduce investment.<sup>3</sup> An important issue with this research is that it is difficult to assess whether investment falls because of the credit contraction directly or because firms have fewer attractive investments and thus borrow less. In this paper, we take one step back from directly studying the impact of credit contractions on investment and instead investigate how the financial policies of firms differ during the financial crisis compared to normal times and what those differences tell us about the extent to which industrial firms suffered from an impaired credit supply.

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<sup>1</sup> There is a vast literature on financial crises. Schularick and Taylor (2009) state that "In line with the previous studies we define financial crises as events during which a country's banking sector experiences bank runs, sharp increases in default rates accompanied by large losses of capital that result in public intervention, bankruptcy, or forced merger of financial institutions."

<sup>2</sup> In this paper, we use the bankruptcy of Lehman as a short-hand for the events that took place in the second half of September 2008 and beginning of October 2008 that led to sharp decreases in stock prices and dramatic increases in credit spreads and LIBOR. Among others, these events include the collapse of Washington Mutual, the run on money market funds, the rescue of AIG, and the merger of Merrill Lynch. We are not taking a position in this paper on the issue debated in the literature of whether the changes in credit spreads and LIBOR were caused by the bankruptcy of Lehman or by subsequent events (see Taylor (2009)).

<sup>3</sup> References to this large literature include work focused on the impact of monetary policy (e.g., Gertler and Gilchrist (1994)), Kashyap, Stein, and Wilcox (1993), and Kashyap, Lamont, and Stein (1994)) as well as more recent work focused on specific events associated with changes in the supply of credit (e.g., Sufi (2007), Leary (2009), and Lemmon and Roberts (2010)). Papers on the financial crisis are discussed later in this introduction.

There is much evidence that financial policies depend on both financial market conditions and macroeconomic conditions (see references, for instance, in Baker (2009), Erel, Julio, Kim and Weisbach (2010), and Korajczyk and Levi (2003)). Based on this evidence, we would expect to find that firms exploit advantageous conditions in credit markets and that their leverage increases when such conditions obtain. As the availability of credit becomes restricted, we would expect firms to borrow less. With suddenly less welcoming credit markets, firms should use their cash holdings to finance investment since precautionary holdings of cash, whose importance has been emphasized in the recent literature (see, for instance, Opler, Pinkowitz, Stulz, and Williamson (1999)), exist precisely to mitigate the impact of adverse shocks. Finally, to the extent that a credit contraction is of an unprecedented scale, we would expect the decrease in net debt issuance to also be of an unprecedented scale.

As credit becomes harder to obtain, we would also expect firms to reduce their dividend payouts, to repurchase less stock, and to issue more equity (see Leary (2009) for evidence of the latter). However, at least since Miller (1963), we also know that equity issues are particularly sensitive to the business cycle; equity issues fall during downturns, a phenomenon which is consistent with the view expressed in the literature that information asymmetries become more important as corporate net worth falls (e.g., Bernanke and Gertler (1989)), as growth opportunities disappear (e.g., DeAngelo, DeAngelo, and Stulz (2009)), and as the cost of equity capital increases as investors become more risk-averse. The overall impact of these combined forces on equity issues is ambiguous. If firms issue equity to offset the effects of the credit contraction, we expect equity issuance to increase. Alternatively, if the business cycle effects dominate, we expect equity issuance to fall with the economic downturn. It follows that if the dominant factor in financial policies during the crisis is the exogenous curtailment of credit to industrial firms, additional equity issuance should offset some of the shortfall in firm debt financing. However, if the dominant effects are increased information asymmetries, a disappearance of growth opportunities, and an increase in risk premia, equity issuance should fall.

We investigate firm financial policies using quarterly data, which is the highest frequency corporate data available. Consequently, we must define quarters that correspond to the financial crisis. Early August

seems to be the consensus starting point of the crisis (e.g., Paulson (2010)). In our analysis, we are interested in the financial phase of the crisis, which we define as the period from the start of the third quarter of 2007 through the end of the first quarter of 2009. Though the crisis continues after the first quarter of 2009, financial markets start to stabilize such that at the end of the second quarter of 2009, both the stock market and credit spreads reflect better economic conditions than at the end of the first quarter of 2009. Specifically, the spread of the high yield Merrill Lynch index over intermediate term treasuries reaches its low point for 1983-2009 in the second quarter of 2007, increases to unprecedented levels after the Lehman bankruptcy, and falls back to pre-Lehman bankruptcy levels in the second quarter of 2009. The S&P 500 index reaches its lowest value in March 2009, but it rebounds sharply during the second quarter, so that the end of the first quarter of 2009 is the index's lowest end-of-quarter value during the crisis. For comparison, we consider the credit boom phase to extend from the beginning of 2005 through the second quarter of 2007.

We also investigate firm financial policies using both asset-weighted and equal-weighted results. Firms in the U.S. differ dramatically in size, with a small number of large firms co-existing with a large number of small firms. It is well-known from prior research (e.g., Bernanke (2007)) that the impact of a credit contraction should differ across firms of different sizes, since large firms are more likely to have access to public debt markets, while small firms rely more on bank financing. Equally-weighted averages of financial ratios reflect the characteristics of small firms. Asset-weighted averages of financial ratios represent the ratios for the industrial sector as a whole, or the aggregate of U.S. industrial firms.

When examining the aggregate of U.S. industrial firms, we show that the credit boom is associated with a decrease in cash holdings, a less than one percent change in leverage, an increase in the rate of stock repurchases, and a small increase in dividends to assets. The evidence on stock repurchases is consistent with the aggregate evidence from 1984 to 2009 of Jermann and Quadrini (2009), who find that aggregate payouts to equity are pro-cyclical. Except for the increase in dividends and repurchases, these trends persist after the start of the financial crisis in the third quarter of 2007. To measure the extent of borrowing, we focus on net debt issuance from the cash flow statement. The advantage of this measure is

that there are many different ways for firms to borrow and this measure includes all of them. Consequently, if one type of borrowing is especially restricted – say bank borrowing – it allows for the fact that firms have substitute forms of borrowing – for instance loans from institutional investors. Strikingly, aggregate net debt issuance (obtained from the cash flow statement of firms) in the first twelve months of the crisis is actually higher than during the last twelve months of the credit boom, and net equity issuance (from the same source) is about the same. This evidence is consistent with Chari, Christiano, and Kehoe (2008), who find that aggregate bank credit to firms does not fall in the first year of the crisis. As noted by Ivashina and Scharfstein (2010b), such evidence does not distinguish whether firms are receiving new credits or simply drawing down existing credit lines. However, in either case, firms’ net debt financing is not lower. Confirming the low initial impact of the credit contraction on aggregate data, we find that capital expenditures to total assets are virtually the same in the last twelve months of the boom and the first twelve months of the crisis for our sample of public firms.

Slightly more than one year after the beginning of the crisis, markets were further disrupted by the events of September 2008. In the following, when we discuss financial policies after the bankruptcy of Lehman, we consider financial policies for the last quarter of 2008 and the first quarter of 2009.<sup>4</sup> After the bankruptcy of Lehman, aggregate net debt issues fall, but not to levels that are extreme outliers in the sample – strikingly, neither of the first two quarters after Lehman has aggregate net debt issuance at or below the fifth percentile of the distribution of quarterly aggregate net debt issuance in our sample. In the aggregate, the drop in net debt issuance is more than offset by a reduction in equity repurchases. However, aggregate cash as a percent of assets (the cash ratio) increases by 1.30 percentage points in the two quarters following the bankruptcy of Lehman, a two-quarter increase unmatched since the start of our sample. The fact that in the aggregate firms do not use cash to offset a curtailment in credit availability suggests that concerns about the future brought about by the crisis, which increase the precautionary demand for cash, are more important than the direct impact of the decrease in credit availability.

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<sup>4</sup> One could argue, however, that the financial data for the end of the third quarter of 2008 already partly reflects the impact of the collapse of Lehman. By considering only the two quarters we do, our analysis is conservative and may ignore some of the impact of the collapse of Lehman.

Though it is hard to find traces of an exceptional crisis before the events of September 2008 when investigating aggregate data, the impact of the crisis shows considerable heterogeneity across different firm types when examining equally-weighted data. Yet, net debt issuance in the first twelve months of the crisis is similar to the last twelve months of the boom for all firm types. However, after Lehman's bankruptcy, the extent to which net debt issuance falls is inversely related to firm size. Net debt issuance in the first quarter of 2009 is the worst since the start of our sample in 1983 for unrated and small firms, but not for large and investment-grade firms. All types of firms increase their cash holdings after Lehman's bankruptcy, but before then all but large and investment-grade firms decrease their ratio of cash to assets. The percentage increase in cash holdings after Lehman's bankruptcy is largest for investment-rated firms, for which it is 17.8% on average. We would expect the least debt-dependent firms to be firms with no debt. Strikingly, these firms experience a substantial increase in their cash ratio after Lehman, so the increase in cash holdings cannot be attributed simply to firms drawing down credit lines or to firms concerned about their ability to roll over existing debt.

No type of firm uses increased equity issuance to reduce the impact of a possible curtailment in credit availability. To the contrary, small and unrated firms experience a reduction in their net equity issuance before they experience a reduction in their net debt issuance. Further, from the start to the peak of the crisis, the average cumulative cash flow shortfall from the reduction in net equity issuance is roughly twice the magnitude of the average cumulative cash flow shortfall from the reduction in net debt issuance. In contrast, net equity issuance for large firms is not different during the first twelve months of the crisis compared to the last twelve months of the boom. For these firms, the decrease in net debt issuance between the top of the boom and the peak of the crisis is less than the decrease in net repurchases, so that, on average, the decrease in repurchases makes up for the lost cash from reduced net debt issuance.

After documenting the changes in financial policies during the credit boom and the financial crisis, we use models of cash, net debt issuance, and net equity issuance from the literature before the financial crisis to investigate whether these changes in financial policies remain after controlling for changes in firm fundamentals. Starting with cash, we find that abnormal cash (defined as the actual cash ratio minus

the cash ratio predicted by the regression model) of small firms falls from the end of the credit boom to the quarter before Lehman and then increases again; however, the abnormal cash for these firms at the peak of the crisis is not significantly different from the abnormal cash at the top of the boom. For firms in the top three size quintiles, abnormal cash at the peak of the crisis is sharply higher than at the top of the boom. For instance, abnormal cash increases by 2.83 percentage points during the financial crisis for the largest firms. Similarly, investment-grade firms increase abnormal cash over the crisis in a way that is not explained by fundamentals. In contrast, abnormal cash does not change significantly for speculative grade and unrated firms.

We next turn to net debt issuance. We find that firms have significantly negative net debt issuance in each quarter after Lehman, but not before. When we turn to debt rating subsamples, we show that investment grade firms do not exhibit abnormally low net debt issuance in the quarter after Lehman, while the other rating subsamples do. Further, the largest firms do not experience abnormally low net debt issuance in the quarter after Lehman either, while smaller firms do. All subsamples experience abnormal net debt issuance in the first quarter of 2009. We estimate similar equations for net equity issuance. Unrated firms and the smallest firms have significantly negative abnormal net equity issuance throughout 2008.

Our evidence adds to an increasing literature on the implications of the financial crisis for industrial firms. This literature generally finds that the supply shock to credit associated with the financial crisis has an economically significant impact for some subsets of firms. In particular, using survey data, Campello, Graham, and Harvey (2010) show that firms that were credit constrained in 2008 reduce their spending plans, bypass attractive investment opportunities, and burn more cash. Almeida, Campello, Laranjeira and Weisbenner (2009) show that firms which had a substantial proportion of their long-term debt maturing immediately after the third quarter of 2007 reduce investment substantially in comparison to other firms. Campello, Giambona, Graham, and Harvey (2009) show that credit constrained firms draw down credit lines during the crisis, but also face difficulties in renewing credit lines. They further provide evidence that the terms of credit lines become progressively tighter during the crisis. The importance of credit lines

is also emphasized by Ivashina and Scharfstein (2010a, 2010b), who demonstrate that in the fourth quarter of 2008, new loans to large borrowers fall by 47% from the previous quarter. They provide evidence that firms draw down their credit lines after the Lehman bankruptcy. Strikingly, they show that the drop in lending by banks is highly dependent on the financial conditions of banks in that banks that rely more on deposit financing reduce lending less. Further, Ivashina and Scharfstein (2010b) shows that firms with credit lines hoard the funds drawn in cash. Duchin, Ozbas, and Sensoy (2010) find that firms with greater excess cash holdings at the beginning of the crisis reduce investment less early in the crisis but not later. They interpret their evidence as consistent with the existence of a supply shock to credit that is less costly for firms with excess cash. Iyer, Lopes, Peydró and Schoar (2010) find no credit supply reduction for large firms in Portugal, but find that younger firms with weak bank relationships are affected. Our investigation complements these papers in that we focus on the financial policies of industrial firms, on how they differ from normal times, and on what these differences tell us about the impact of the financial crisis on industrial firms. Our work also contributes to the large literature on financial policies and we note some of the contributions to that literature later.

The paper proceeds as follows. In Section 1, we introduce the dataset we use. In Section 2, we show how cash holdings, debt and equity issuance evolve during the credit boom and the financial crisis. In Section 3, we contrast the evolution of financial policies across different types of firms. In Section 4, we use pre-crisis models of cash holdings, debt issues and equity issues to separate expected and unexpected changes in financial policies and to assess further how financial policies differ during the crisis. We discuss the interpretation of our results and conclude in Section 5.

## **Section 1. The sample**

Most empirical work in corporate finance uses annual data. For our purpose, such data is unsuitable since it would force us to ignore how corporate financial policies differ after Lehman's failure from before; it would make it impossible for us to examine the financial crisis from the top of the credit boom to the peak of the financial crisis which, as already discussed, we define as the first quarter of 2009. We

therefore use quarterly data collected from the CRSP/Compustat Merged (CCM) Fundamentals Quarterly database for 1983-2009.

There are distinct problems with the use of quarterly data. First, many of the Compustat data items are only provided annually, so less data is available on a quarterly basis than on a yearly basis. Second, many industries have seasonal factors. There is little we can do to deal with the lack of data availability, but we can address the seasonality issue. The first approach we use to address the seasonality issue is that we often compare quarters to identical quarters in other years. The second approach is that we estimate models that specifically allow for seasonality.

In our investigation, we use issuance data from the cash flow statement. This is not the data typically used in the literature that focuses on security issuance to better understand firms' capital structure decisions. That literature typically considers changes in debt or equity above a threshold (see, for instance, Leary and Roberts (2005)) or considers only public issues (e.g., DeAngelo, DeAngelo, and Stulz (2010)). In this paper, we are focused on the funding obtained by corporations from all sources, not just banks or public markets, since substitution across funding sources could help firms offset the impact of a bank credit contraction, for instance (for evidence of such substitution see, for instance, Iyer, Lopes, Peydró and Schoar (2010)). We are also focused on understanding whether financing flows are unusual, so that a net debt issuance close to zero for a class of firms is of interest to us since it could be abnormally low.

The quarterly issuance data we need in our investigation is only available beginning in the third quarter of 1983. Consequently, our sample effectively starts from that quarter and ends with the first quarter of 2009. We delete observations with negative total assets (*atq*), negative sales (*saleq*), negative cash and marketable securities (*cheq*), cash and marketable securities greater than total assets, and firms not incorporated in the U.S. If a firm changes its fiscal-year end, and thus a given data quarter is reported twice in Compustat (for both the old fiscal quarter and the new fiscal quarter) we retain the observation for the new fiscal quarter only. Finally, we eliminate all financial firms, which we define as firms with

SIC codes between 6000 and 6999; we also eliminate utilities, which we define as firms with SIC codes between 4900 and 4949.

## **Section 2. The aggregate evidence**

At the start of the crisis, our sample includes 3,198 firms. When we divide firms listed on the NYSE into quintiles based on total assets and assign non-NYSE firms to these quintiles, we find that 2,021 of the 3,198 firms are smaller than the largest firm in the bottom quintile of NYSE firms. Consequently, at the beginning of the crisis, two-thirds of our firms are small firms with assets less than \$715.7 million. The average and median assets for these firms are \$196.6 million and \$127.6 million, respectively. In contrast, the mean and median of assets are \$31.9 billion and \$16.1 billion, respectively, for the firms in the top quintile. We therefore examine the financial policies of firms in two different ways. First, we weight each firm by its assets. Second, we weight each firm equally. As we will see, results using the asset-weighted approach are strikingly different from the equally-weighted approach. Such differences occur when the experience of large firms differs from the experience of small firms, as equally-weighted results are dominated by small firms while asset-weighted results are dominated by large firms. At the end of the section, we examine the role of credit lines for a random sample.

### **Section 2.1. Asset-weighted results**

Panel A of Table 1 shows the asset-weighted results. We start with the asset-weighted ratio of cash to assets, where cash is cash and marketable securities (*cheq*). We show the values of this ratio from the first quarter of 2005 to the first quarter of 2009. The cash ratio shows a u-shape during this period. It starts in 2005 with a value of 10.42%, falls to 9.49% at the top of the credit boom, and ends the period at 10.18%. Consequently, at the peak of the financial crisis, firms hold more of their assets in the form of cash than at the start of the crisis. After the top of the credit boom, the ratio keeps falling and reaches its lowest point (8.89%) at the end of the third quarter of 2008. In the last two quarters alone, the cash ratio increases by 1.30 percentage points, representing an increase in cash holdings of 9.5%. There is no other two-quarter

period in our sample where the cash ratio increases by more.<sup>5</sup> We assess the significance of these changes using two different approaches. The first approach (seasonality-adjusted p-values) is extremely conservative in that we compare the change of interest to changes over identical quarterly calendar periods to account for seasonality. For example, to investigate the statistical significance of the increase in cash holdings of 1.30 percentage points after Lehman, we use the distribution of two-quarter turn-of-the-year changes in cash holdings. This approach has low power since it uses only 26 two-quarter changes, but it fully adjusts for seasonality. The second approach (Newey-West p-values) uses all two-quarter changes but relies on Newey-West t-statistics to account for overlap. The 1.30 percentage point change over the last two quarters is significant irrespective of the approach we use. In contrast, the increase in cash holdings from the top of the boom to the peak of the crisis is only significant with the Newey-West t-statistic.

In the first year of the crisis, the cash ratio falls by 0.58 percentage points. One is tempted to conclude that firms react to the crisis by consuming cash and that this is evidence of a supply shock to credit. However, such a conclusion does not withstand more careful study. To see why, note that from the fourth quarter of 2005 to the fourth quarter of 2006, a period of abundant credit, the cash ratio falls by much more, namely by 0.90 percentage points. A falling cash ratio is therefore not necessarily indicative of a recession or of a credit contraction. As discussed in Bates, Kahle, and Stulz (2009), we understand only partly why the cash holdings of industrial firms more than doubled since the early 1980s. That trend stops during the credit boom and cash holdings fall, but not drastically. The aggregate cash ratio peaks at 10.77% at the end of 2004; it then falls to 9.49% at the start of the crisis and bottoms out at 8.89% in the third quarter of 2008.

The next two columns examine net debt issuance. We use two measures to examine net debt issuance. For either measure, there is no difference between net debt issuance in the last twelve months of the credit

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<sup>5</sup> The next highest increase is 1.22 percentage points from Q3 1999 to Q1 2000. There was much concern about potential software problems at the turn of the century and this concern most likely explains this hoarding. Because cash holdings were lower at that time, the percentage change in cash is higher at the turn of the century (18.8%) than from 2008Q3 to 2009Q1 (14.6%).

boom and the first twelve months of the crisis. The first measure is obtained from the statement of cash flows and is calculated as long-term debt issuance (*dltisy*) minus long-term debt retirement (*dltry*) divided by lagged assets.<sup>6</sup> Strikingly, the highest net long-term debt issue ratio does not occur during the credit boom period, but in the last quarter of 2007. Though this ratio dips in the quarter after Lehman, it is always positive. In contrast, it has a negative value in the second quarter of 2005 – as well as in twelve other quarters before 2005. The second (and broader) measure of debt issuance, which we refer to as net total debt issuance and which includes short-term debt, is examined next. This measure is calculated from the balance sheet data and includes changes in both long-term debt (*dlttq*) and debt in current liabilities (*dlcq*) during the quarter. With this measure, we again see that the highest ratio is in the last quarter of 2007. The ratio falls steadily after the last quarter of 2007 and turns negative in the first quarter of 2009. Strikingly, however, there are six quarters since 1983 where this ratio has a lower value than in the first quarter of 2009. Consequently, when looking at the asset-weighted data, none of the quarters from the start of the crisis to its peak show evidence of this crisis leading to debt issuance ratios that are the lowest in our sample period, or even in the bottom 5% of the distribution.

We turn next to the aggregate ratio of net equity issuance to lagged assets, where aggregate net equity issuance is defined as aggregate equity issuance (*sstky*) minus aggregate equity repurchase (*prstkcy*). Equity issuance falls during the crisis. However, more strikingly, equity repurchases (not reported in table) decrease sharply. Because of these offsetting effects, net equity issuance is similar in the last twelve months of the boom and the first twelve months of the crisis. Equity repurchases reach a peak of 1.51% of assets in the third quarter of 2007 and fall to 0.31% of assets in the first quarter of 2009. The repurchase peak and trough coincide with the highs and lows of the stock market. The decrease in repurchases more than finances the increase in cash holdings – or the decrease in net debt issuance using the net total debt issuance measure. Though we do not show dividends in the table, dividends to assets do not decrease at all during the crisis.

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<sup>6</sup> Many of the quarterly Compustat variables, including *dltis* and *dltry*, are reported on a year-to-date basis. For these variables, in the second, third, and fourth quarter of each fiscal year, the quarterly value is calculated by subtracting the lagged value from the current value.

Since firms are both repurchasing equity on net and issuing debt on net during the crisis, it is not surprising that leverage increases during the crisis. Here, leverage is defined as the sum of long-term debt ( $dlttq$ ) plus debt in current liabilities ( $dlcq$ ), divided by assets ( $atq$ ). Perhaps more surprising is the fact that leverage hardly moves during the credit boom. In the first quarter of 2005, the aggregate leverage ratio is 26.16%. Although not shown in the table, one year earlier, leverage is 27.17%. At the top of the credit boom, that ratio is 26.94%. Given the low credit spreads and the general availability of credit, such an outcome is surprising. From the top of the boom to the peak of the crisis, leverage increases sharply. It increases almost 3 percentage points before the Lehman bankruptcy. After the Lehman bankruptcy, it increases by roughly 1.5 percentage points, with most of the increase taking place in the last quarter of 2008 (though partly because of a decrease in the book value of assets, as we will discuss later). We also consider (but do not report) results for the net leverage ratio, defined as the sum of long-term debt ( $dlttq$ ) plus debt in current liabilities ( $dlcq$ ) minus cash ( $cheq$ ), divided by assets ( $atq$ ). This ratio increases through most of the boom and most of the crisis, but it falls in the first quarter of 2009. The reason the ratio increases throughout the boom is not because firms have more debt, but because they have less cash. The net leverage ratio hardly changes after Lehman, but leverage increases (though the increase is only marginally significant using the seasonality adjusted p-value). This evidence confirms that at the aggregate level firms increase debt and hoard much of the proceeds.

One could be concerned that the cash hoarding simply reflects firms saving cash by reducing capital expenditures in anticipation of a deep recession. The evidence is not consistent with this hypothesis for the quarter immediately after Lehman; in that quarter there is no evidence that capital expenditures or R&D decrease (R&D not reported in table). Capital expenditures as a percent of assets do not decrease in 2008 and are higher than in 2005. Though capital expenditures fall in the first quarter of 2009, so does operating cash flow. Operating cash flow has a pronounced seasonal component, so that it is generally much lower in the first quarter, but the fall in operating cash flow is significant when we use the seasonality adjusted p-value. Operating cash flow in the quarter after Lehman is hardly distinguishable from before Lehman. To obtain quarterly operating cash flow, we use the approach of Minton and

Schrand (1999). Operating cash flow is computed as sales (*saleq*) less cost of goods sold (*cogsq*) less selling, general and administrative expenses (*xsgaq*) less the change in working capital for the period, divided by total assets (*atq*). Working capital is current assets other than cash and short-term investments less current liabilities and is calculated as the sum of the non-missing amounts for accounts receivable (*rectq*), inventory (*invtq*), and other current assets (*acoq*) less the sum of the non-missing amounts for accounts payable (*apq*), income taxes payable (*txpq*), and other current liabilities (*lcoq*). If all components of working capital are missing in either the current quarter or the previous quarter, working capital and operating cash flow are both set equal to missing. Quarterly selling, general and administrative expenses exclude one-quarter of annual research and development costs (*xrd*) and advertising expenses (*xad*) when those data items are available. Thus, operating cash flow represents the cash flow available for discretionary investment.

## **Section 2.2. Equally-weighted results**

We now turn to the equally-weighted results provided in Panel B of Table 1. While in the aggregate results we require firms to have data for all variables so that the denominator of the ratios is the same, for the equally-weighted results we construct averages for each variable separately and only require data for that variable. The number of observations reported is the number of firms for which we have cash and assets data. We winsorize the equally-weighted results at the 1% and 99% levels, however, to mitigate the influence of outliers. Firms decrease their cash holdings by 1.1 percentage points from the first quarter of 2005 to the top of the boom. The magnitude is similar to the 1.3 percentage point drop for the asset-weighted results. However, instead of a u-shape pattern of cash holdings, cash holdings fall from the top of the boom to the peak of the crisis by 1.78 percentage points. When examining the asset-weighted results, we noted that the cash ratio falls more during 2006 than it does in the first year of the crisis. This is clearly not the case for the equally-weighted ratio. In 2006, the equally-weighted cash ratio falls by 0.8 percentage points. From the top of the boom to one year later, the cash ratio falls by 2.01 percentage points. This ratio increases by 0.58 percentage points after Lehman's bankruptcy. In evaluating

significance, we report p-values for paired t-tests using a sample of firms that are in existence before Lehman's bankruptcy and at the peak of the crisis. For these firms, cash holdings increase by 0.70 percentage points, which is statistically significant at the 1% level. The evidence is consistent with the view that small firms use their precautionary cash holdings to cope with adverse shocks. This behavior does not show up in aggregate data because, while there are many small firms, their weight in the asset-weighted average is small.

The story of net debt issuance is substantially different after the Lehman bankruptcy when we examine the equally-weighted average instead of the asset-weighted average, but not in the first twelve months of the crisis. During the first twelve months of the crisis, net debt issuance is the same as during the last twelve months of the credit boom, irrespective of the measure of net debt issuance used. However, net debt issuance collapses after the failure of Lehman. For both measures of net debt issuance, we find that net debt issuance is negative in the two quarters after the failure of Lehman, i.e. firms are repaying debt. Further, the net total debt issuance measure (that includes short-term debt) has its lowest value in the sample in the first quarter of 2009, and the net long-term debt issuance measure has its second worst value in that quarter.

In contrast to net debt issuance, net equity issuance falls sharply in the first year of the crisis. In the last twelve months of the boom, net equity issuance is roughly 1% per quarter; it drops to 0.5% in the first twelve months of the crisis. Strikingly, it turns negative in the quarter following the failure of Lehman, albeit by a small amount – this is the only quarter in our sample where equally-weighted net equity issuance is negative. In contrast, asset-weighted net equity issuance is typically negative because large firms repurchase more equity than they issue. There is no evidence that firms faced an exogenous curtailment of credit that led them to use equity issuance as a substitute for debt issuance.

The cumulative shortfall in financing cash flow from the decrease in net equity issuance for the equally-weighted results is on average more than double the cumulative shortfall from the reduction in net debt issuance. To see this, suppose that from the start of the crisis to its peak, firms continued issuing equity at the same rate as in the last quarter of the credit boom. Over these seven quarters, firms would

have issued equity corresponding to approximately 9.94% of assets.<sup>7</sup> Instead, they issue equity corresponding to 2.50% of assets, for a shortfall of 7.44% of assets. In contrast, had firms kept issuing debt as they did in the last quarter of the credit boom, they would have issued debt equal to approximately 7.35% of assets. Instead, they issue debt equal to 3.79% of assets, for a shortfall of 3.56% of asset.

Both net debt issuance and net equity issuance affect a firm's leverage. Leverage increases by 1.2 percentage points from the start of 2005 to the top of the credit boom. It then increases by 3.0 percentage points to the bottom of the financial crisis. However, leverage actually falls in the first quarter of 2009. Though average net leverage (not reported) is negative during the credit boom, it increases from 2005 onward – i.e., becomes less negative – and turns positive in the first quarter of 2008.

In sum, there are striking differences between the asset-weighted and equally-weighted averages. In the aggregate, net debt issuance is not affected by the crisis in the first twelve months and does not have extreme values in the two quarters after Lehman. However, with equally-weighted averages, debt issuance collapses after Lehman. Yet, strikingly, while equally-weighted debt issuance is unaffected in the first twelve months of the crisis, equally-weighted equity issuance falls in half during this period; in contrast, it stays unchanged for the asset-weighted average. This evidence suggests that financial policies evolved in sharply different ways for large and small firms during the financial crisis and that the financial crisis affected large and small firms in a markedly different way, a finding that is reminiscent of the conclusion of Bernanke (1983) that small firms bore the brunt of the Great Depression. Our results are also consistent with some of the evidence on investment for this crisis (e.g., Campello, Graham, and Harvey (2010) and Duchin, Ozbas, and Sensoy (2010)) and with Iyer, Lopes, Peydró and Schoar (2010), who show that large Portuguese firms were not affected by the credit supply shock.

The patterns observed after Lehman cannot be observed in the other recession in our sample associated with a credit crunch, namely the recession of 1990-1991. With that recession, there are only trivial changes in the asset-weighted and equally-weighted averages of the cash ratio. More specifically,

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<sup>7</sup> Note that, for simplicity, we use actual assets in these computations rather than what the assets would have been had equity issuance or debt issuance been different.

the aggregate cash ratio falls by 0.06 percentage points from the third quarter of 1990 to the first quarter of 1991 and the equally-weighted average increases by 0.03 percentage points. Nothing like the post-Lehman increase in cash holdings takes place in that recession. Such an increase does occur in the recession in our sample period not associated with a credit crunch, namely the 2001 recession. In that recession, the aggregate cash ratio increases by 0.62 percentage points and the equal-weighted cash ratio increase by 1.58 percentage points. However, just about all of the increase in the cash ratio takes place after September 11. The only other dramatic two-quarter increase in cash is from the third quarter of 1999 to the first quarter of 2000, when there was much concern about the impact of passing the millennium mark on the functioning of computers.

One concern is that our results could be influenced by the changing composition of the sample as firms cease to exist. Consequently, in untabulated results, we construct a sample of firms that exist continuously from the end of the first quarter of 2007 to the end of the first quarter of 2009. There are 2,547 firms that satisfy this requirement. The change in the aggregate cash ratio after Lehman's failure for these firms is 1.47 percentage points as compared to 1.30 percentage points for the whole sample of firms. All the other patterns we discuss exist for these firms. We also verify that the dollar amount of cash holdings increases as well and find that, over the crisis, the aggregate dollar amount of cash held by firms that are continuously in existence increases by roughly \$100 billion from the top of the boom to the peak of the crisis. For the whole sample, cash holdings increase by \$89 billion in the two quarters after Lehman. We also investigate the medians for the sample used for the equally-weighted average. We find an increase in the median cash ratio after Lehman of 0.91 percentage points, compared to the mean change of 0.58 percentage points.

### **Section 2.3. Lines of Credit**

As discussed in our review of the literature, much attention has been paid to the role of credit lines and credit line drawdowns during the financial crisis. Using the approach of Sufi (2009), we construct a random sample of 300 firms as of the second quarter of 2007 to examine the economic importance of

credit line drawdowns for firms meeting our sampling criteria. We then obtain data on line of credits available and drawdowns from 10-Qs and 10-Ks. Table 2 shows data for the asset-weighted sample and the equally-weighted sample. Not surprisingly given the existing literature, many firms have access to credit lines. Out of our 300 firms, 248 or 82.7% have credit lines at the start of the crisis. In our equally-weighted sample, credit lines represent 18.0% of assets in the sample formation quarter, which is not very different from the 16.5% in the Sufi (2009) sample. The percentage of firms with credit lines having new drawdowns is typically less than 10% per quarter except in two quarters, the fourth quarter of 2007 when it is 34.4%, and the fourth quarter of 2008 when it is 30.6%. The next column shows the percentage of new drawdowns as a percentage of the total line of credit. We then estimate the importance of credit lines and credit lines drawdowns using asset-weighted averages and equally-weighted averages. Looking first at the asset-weighted sample, we find that the ratio of total lines of credit to total assets is 9.79% at the start of the crisis, which implies that credit lines are proportionately larger for smaller firms. The aggregate amount drawn down per quarter divided by total assets is less than 1% of assets in all quarters except one, the fourth quarter of 2007, when it is 1.46%. Yet, during that quarter, the ratio of cash holdings to total assets for our random sample falls. New drawdowns in the first quarter of 2009 are trivial. We turn next to the equally-weighted results. The equally-weighted average of the new drawdowns in the fourth quarter of 2008 is 1.44%. For comparison, the equally-weighted average cash ratio for our random sample increases by 0.30 percentage points during this quarter, from 18.6 to 18.9%.

### **Section 3. Evidence for size, ratings, financially constrained and zero debt subsamples**

The contrast between the equally-weighted results and the asset-weighted results shows that financial policies of small and large firms evolve very differently during the financial crisis. To investigate this heterogeneity further, we turn to several subsamples. First, we consider firms of different sizes. Second, we examine financial policies of firms that differ in credit ratings – either the level or the existence of one. Third, we report results for firms that are financially constrained versus unconstrained immediately

before the crisis, according to a modified version of the definition of Korajczyk and Levi (2003). Finally, we discuss results for a sample of firms with no debt.

### **Section 3.1. Size groups**

We first examine the financial policies of firms by size. Size quintiles are formed quarterly. We divide the NYSE firms into five quintiles based on assets at the beginning of the quarter. We then assign the non-NYSE firms to these quintiles. Panel A of Table 3 provides data for the smallest and largest size quintiles, detailing changes in financial policies and the significance of these changes from pre- to post-crisis and pre- to post-Lehman. Figure 1 shows the evolution of the equally-weighted average cash ratio for size quintiles in our sample. In the figure, we normalize the ratio to 1 at the start of 2005 for all size quintiles. It is immediately apparent that the experience of firms is quite different depending on their size. Firms in the three top quintiles decrease cash throughout the boom period and continue to do so until at least the first quarter of 2008. However, the cash ratio increases after the failure of Lehman; the increase is especially sharp for the third and fifth quintile. In contrast, the two quintiles of the smallest firms have a substantially different experience. The decrease in cash for these firms during the boom period is minimal. However, they decrease their holdings sharply during the first year of the financial crisis, and increase their cash less during the two quarters following September 2008.

We turn to net debt issuance next. Figure 2 shows the evolution of the broad measure of net total debt issuance for the five size quintiles. It is apparent for all size quintiles that there is no clear change from before the peak of the credit boom to the first year of the financial crisis. However, net debt issuance falls dramatically after Lehman and turns negative for all size groups except the largest firms, whose net debt issuance is essentially zero in the last quarter of the sample. For the four smallest size quintiles, the low net debt issuance after Lehman is lower than the lowest net debt issuance experienced during the boom. In contrast, for the largest firms, the net debt issuance for the first quarter of 2009 is actually higher than the net debt issuance in the first quarter of the boom period. Over our whole sample period, the four smallest size quintiles never experience a net debt issuance rate lower than the one they experience in the first

quarter of 2009. Since small firms rely much more on bank loans than large firms, our evidence is consistent with the evidence in Becker and Ivashina (2010) of a serious supply shock to bank debt in 2009. However, the situation of the largest firms is different as they experience lower net debt issuance for 18 quarters during the sample period.

Figure 3 shows net equity issuance for the size quintiles. Equity issues are important for small firms. They have positive net equity issuance while the other size groups have negative net issuance – i.e., they buy back more equity more than they issue. In fact, in the four quarters before the start of the crisis, Panel A of Table 3 shows that small firms raise an average of 1.90% net equity a quarter and 0.83% net debt a quarter. In the first four quarters of the crisis, net equity issuance falls to 1.12% while net debt issuance remains unchanged at 0.83%. For the other size groups, net equity issuance increases in 2008, but that is because repurchases fall. It is only in the last two quarters of the sample that the other size groups experience net equity issuance ratios that are higher than the highest experienced during the credit boom. In contrast, net equity issuance by small firms plunges in early 2008. For three quarters in 2008 and the first quarter in 2009, small firms have the lowest net equity issuance of any quarter in our sample. In 2008, only the second quarter has net equity issuance higher – but only slightly so – than the lowest net equity issuance of our sample before the crisis – and that quarter is the fourth quarter of 1990.

As shown in Panel A of Table 3, book leverage increases sharply during the crisis for small firms. At the start of the crisis, their leverage is 15.9%; at the bottom, it is 18.3%. Small firms during that time have negative net leverage – i.e., they have more cash than debt. However, net leverage increases more than leverage because firms reduce their cash holdings. Leverage increases even more for the largest firms. For these firms, it is 26.5% at the top of the boom and increases to 30.7% at the bottom of the crisis, an increase of 4.2 percentage points. Net leverage is positive for large firms. It increases slightly less than leverage, from 17.4% to 21.1%, an increase of 3.7 percentage points. Perhaps not surprising at this point, the leverage of large firms increases by 2.2 percentage points in the quarter following Lehman's failure and the associated increase in net leverage is 1.6 percentage points. In contrast, the increase in leverage of small firms is only 0.5 percentage points and net leverage falls by 0.1 percentage points. Note that if firms

hoard the cash proceeds from new debt, net leverage falls - assets (the denominator) increase due to the increase in cash while net debt (the numerator) is unchanged. Thus the net leverage decrease of small firms is more consistent with full hoarding of new debt than the net leverage increase of large firms.

### **Section 3.2. Credit rating groups**

We next turn to subsets of our sample based on credit ratings in Table 3, Panel B. We divide firms quarterly into firms with an investment grade rating, a speculative rating, and no rating using the S&P long-term rating (*spltrm*) available on Compustat. The results are striking. Investment grade firms, as shown in Figure 4, have a higher cash ratio at the peak of the crisis than at the beginning of the crisis. Their cash ratio increases by 1.43 percentage points, from 8.04% to 9.47%. Another way to put this is that, measured as a fraction of assets, their cash at the peak of the crisis is 17.79% higher than at the beginning of the crisis. Almost all of the increase in cash takes place in the last two quarters – cash as a percent of assets increases by 1.19 percentage points in the last two quarters. Investment grade firms raise funds through debt each quarter, though in the last quarter the net debt issuance is a trivial 0.01%. They also are net repurchasers of equity throughout the crisis. Not surprisingly, their leverage increases throughout the crisis. From the end of Q3 2008 to the end of Q1 2009, leverage increases by 1.08 percentage points, but net leverage increases by only 0.02 percentage points. Consequently, investment grade firms increase debt but hoard much of the proceeds.

When we examine speculative grade firms, the increase in cash throughout the crisis is small as it is only 0.27 percentage points. However, the increase from the end of Q3 2008 to the end of Q1 2009 is 0.83 percentage points. Debt issuance is negative for these firms in the last two quarters of the sample. Speculative-grade firms raise equity on net each quarter, but the amount is very small after Lehman. Leverage increases by 2.95 percentage points after Lehman even though net debt issuance is negative.

Finally, non-rated firms have a dramatically different experience from the firms with a rating and hence with access to public markets, which supports further the conclusion of Faulkender and Petersen

(2006) that access to public debt markets has an important impact on firm financial policies. The cash ratio of these firms is 26.77% at the start of the crisis. That ratio is almost the same as the one they have at the beginning of 2005 when it is 27.67%. At the bottom of the crisis, these firms have a cash ratio of 24.14%, so their cash ratio falls by 2.63 percentage points. These firms increase their cash holdings after Lehman's failure as well. The unrated firms issue debt on net in every quarter except for the last two. The net debt issuance of these firms is actually larger in the first year of the crisis than in the last year of the boom – an average of 0.69% per quarter in the last year of the boom versus 0.83% in the first year of the crisis. In contrast, net equity issuance falls from an average of 1.52% to 0.80% from the last four quarters of the boom to the first four quarters of the crisis. Leverage increases for these firms during the crisis as well, but the increase in leverage after September 2008 is only 0.57 percentage points. The increase in net leverage over that period is 0.14 percentage points. Unrated firms have negative net leverage. From the start of the crisis to its peak, the net leverage of unrated firms increases from -11.10% to -5.75%.

### **Section 3.3. Financially constrained firms**

It is not uncommon in the literature to define financially constrained firms to be small firms or firms without a rating.<sup>8</sup> Table 3 shows that these firms decrease their cash holdings during the financial crisis, but nevertheless experience an increase in cash holdings after Lehman. We also compare cash holdings between a sample of firms that are financially constrained and firms that are not constrained at the top of the credit boom, using a modified version of the definition of Korajczyk and Levi (2003). We define a firm to be financially constrained if it (1) does not pay dividends, (2) does not have net equity repurchases, (3) does not have a credit rating, and (4) has a Tobin's q greater than one (defined as the market value of the assets divided by the book value, where market value of assets is book value minus book equity plus market value of equity). With our definition of financial constraint, we attempt to isolate firms that have growth opportunities that outpace their internally generated cash and that have not had access to public debt markets. We find that constrained firms have an average cash ratio of 35.77%

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<sup>8</sup> See, for instance, Almeida, Campello and Weisbach (2004).

at the end of the credit boom. The cash ratio of these firms falls sharply during the crisis, to 31.09% at the peak of the crisis. Yet, the cash ratio of these firms increases after Lehman by 0.36 percentage points on average. Before the crisis, these firms are large issuers of equity and their average net equity issuance dwarfs their average net debt issuance. In the second quarter of 2007, their equity sales amount to 3.13% of assets. Equity sales are sharply lower in 2008 and early 2009. In the quarter after Lehman, they amount to 0.55%. Since the capital expenditures of these firms stay unchanged in the first year of the crisis, they must be using their cash holdings to offset the decrease in equity sales. Unconstrained firms experience a decrease in the cash ratio during the crisis as well, but they have a much larger increase in their cash ratio after Lehman, since their cash ratio increases from 24.51% to 25.86%, or by 1.35 percentage points.

### **Section 3.4. Zero debt groups**

To understand the role of debt better in the evolution of firm financial policies during the crisis, we construct two samples of firms that have no debt, which we define as firms with zero leverage. We do not tabulate the results. The first sample is composed of firms that have zero leverage at the start of a quarter. These firms could borrow during that quarter and end the quarter with debt. We would expect the financial policies of such firms to be the least affected by changes in the credit markets among the subsamples we have considered. These firms have an extremely high cash ratio of 41.95% at the end of the credit boom. The cash ratio of these firms falls to 38.32% at the end of the third quarter of 2008. However, these firms hoard cash after Lehman as their cash ratio increases to 40.27%, an increase of 1.96 percentage points, which is the largest percentage point increase among the subsamples we have considered. This increase, representing an increase in cash holdings of 10.70%, is statistically significant. Further, these firms experience a dramatic decrease in net equity issuance. Strikingly, net equity issuance for these firms as a percentage of assets is 2.05% in the last quarter of the credit boom. Yet, it is negative for each quarter in 2008. Net equity issuance for firms with no debt is negative in one quarter prior to 2008, the third quarter of 2002. There are no consecutive quarters with negative net equity issuance for such firms before 2008. The second sample is a sample of firms that have no debt at the end of the

quarter. Obviously, this creates a bias in the results. However, the point of this sample is to consider firms that do not increase their cash because of debt issuance. Because these firms have no debt at the end of the quarter, they typically have negative net debt issuance during the quarter. These firms experience an increase in the cash ratio after Lehman's failure of 1.19 percentage points. This increase is statistically significant as well and represents an increase in cash holdings of 15.38%. It follows that the increase in cash holdings is not tied to credit line drawdowns. These firms also experience a dramatic drop in net equity issuance.

### Section 3.5. Sources of changes in the cash to assets ratio

To better understand why the cash ratio changes, we decompose the change in the cash ratio using a first-order approximation as follows:

$$\frac{C(t)}{A(t)} - \frac{C(t-1)}{A(t-1)} = \frac{C(t) - C(t-1)}{A(t-1)} - \frac{A(t) - A(t-1)}{A(t-1)} * \frac{C(t-1)}{A(t-1)} + \textit{approximation error}$$

where C(t) is cash at date t and A(t) corresponds to assets at date t. This decomposition shows that the cash ratio can increase even though cash holdings fall if assets fall sufficiently. We compute the ratios  $[C(t)-C(t-1)]/A(t-1)$  and  $[A(t)-A(t-1)]/A(t-1)$  for all our subsamples. Strikingly, changes in cash are negative for the equally-weighted ratio but not for the asset-weighted ratio in the quarter after Lehman's failure. However, for the equally-weighted ratio, the asset growth ratio is also negative, so that the value of assets falls. It turns out that the negative change in cash is driven by the smallest firms and the unrated firms. For all the other groups, the change in cash is positive. The drop in assets after Lehman's failure is striking. For the equally-weighted average, assets decrease by 5.44% in the last quarter of 2008. We examine the decreases in assets for that quarter across firms and find that a major source of decreases in assets are write-downs of goodwill. In 2008, firms adopt FASB 157 which requires them to use an exit value for estimates of fair value. We would expect that such estimates would have fallen substantially in the last quarter of 2008 as the stock market fell dramatically. In an examination of goodwill impairments for the last quarter of 2008, not only is the average impairment large (10.07% of assets for the firms that

report such impairments) but the number of firms that report impairments is unusually large (from 2005Q1 to 2007Q2, the highest number of firms reporting impairments in a quarter is 165, but that number is 666 in Q4 of 2008).

#### **Section 4. Predicted versus unpredicted changes in financial policies**

So far, we have shown that the first year of the financial crisis is not associated with lower net debt issuance by firms, but is associated with lower net new equity issuance by smaller and unrated firms. Cash holdings fall for smaller firms and firms with a non-investment grade rating or no rating. After the collapse of Lehman, however, firms hoard cash, but much more so for larger firms and investment grade firms, and net debt issuance becomes exceptionally low at the peak of the crisis for all but large and investment grade firms. In this section, we investigate whether these changes can be explained by the evolution of firm characteristics using models from the recent literature. Our approach is to use these models to predict financial policies and to evaluate whether departures from these predicted values during the crisis, the abnormal values for these financial policies, are significant. None of these models were developed using quarterly data because quarterly data is not typically used in corporate finance research. Consequently, when we find that changes in a financial policy cannot be explained by fundamentals, it could be because the models we use are poorly specified when using quarterly data. However, we do find that our estimates of these models are consistent with estimates using yearly data. We also estimate the models using lagged values for firm characteristics, and the results we find are supportive of the results we report.

##### **Section 4.1. Predicted and unpredicted cash holdings.**

We start by investigating abnormal cash. Our model for expected cash is the model used in Bates, Kahle, and Stulz (2009), but we estimate this model using quarterly data. This model allows for a transaction demand for cash as well as a precautionary demand for cash. The dependent variable is the cash ratio, and the following explanatory variables are used: the standard deviation of cash flows at the

industry level (using the two-digit SIC level), the market-to-book ratio, the log of firm size, the ratio of cash flow to assets, the ratio of net working capital to assets, capital expenditures to assets, leverage, R&D to assets, a dummy variable for missing data on R&D, dividends to assets, acquisitions to assets, net equity issuance to assets, and net debt issuance to assets.<sup>9</sup> Because we use quarterly data, we add to the model indicator variables for the second, third, and fourth quarters to accommodate seasonal effects.

We estimate the model from the first quarter of 1995 through the first quarter of 2009. We also estimate the model over our whole sample period and our inferences are similar. Given that the cash ratio increases over time, we prefer to use a shorter sample period that reflects better cash holding patterns over the credit boom and the financial crisis. However, it turns out that whether we start the sample in 1983 or in 1998 makes no substantive difference for our conclusions. We estimate the model for all firms and then separately for the five size quintiles and for the three ratings groups. We use indicator variables for each quarter starting in the first quarter of 2005 to capture average abnormal cash (i.e., the cash ratio minus the predicted cash ratio). Since we know that cash holdings increase dramatically over time and that only part of the increase is explained by the firm characteristics typically used in models explaining cash holdings (see Bates, Kahle, and Stulz (2009)), we expect average abnormal cash to be positive, at least early in the credit boom period. Our interest is in how abnormal cash changes rather than in the level of these abnormal cash holdings.

Table 4, Panel A, reports the estimated regressions. Regression (1) shows estimates of the model for the whole sample of industrial firms. The independent variables take values that are consistent with estimates for the aggregate sample in Bates, Kahle, and Stulz (2009). The seasonal indicator variables are significant for the fourth quarter for the investment grade and unrated firms. We see that the abnormal cash ratio is roughly constant and significantly positive during the credit boom period. It falls in half in the first three quarters of 2008 and then increases sharply from 1.54% to 4.60% from the Lehman bankruptcy to the peak of the crisis. Consequently, the increase in the cash ratio after the Lehman

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<sup>9</sup> Not all firms report R&D on a quarterly basis. When a firm does not report R&D quarterly, we use the annual R&D, divided by four, as an estimate of R&D in each quarter of that year. Results are similar if we set R&D as missing for these firms.

bankruptcy is even larger after accounting for changes in fundamentals. Abnormal cash is significantly higher at the peak of the financial crisis than at the top of the credit boom.

The next two regressions in Table 4, Panel A, report results for the smallest and largest size quintiles. We also examine but do not report estimates for the other size quintiles. Almost all coefficients on the independent variables are significant and consistent in sign across size quintiles except for the coefficients of operating cash flow to assets and size. The indicator variable for the fourth quarter is positive and significant, except for the middle and largest quintiles. There are sharp differences in the evolution of abnormal cash across firm sizes. Abnormal cash at the top of the credit boom is not significantly different from abnormal cash at the peak of the financial crisis for the two smallest size quintiles, but this result is due to the increase in the cash ratio after September 2008. More specifically, abnormal cash drops in the first year of the crisis for the two quintiles of smallest firms. For the top three size quintiles, abnormal cash increases significantly over the crisis. More specifically, abnormal cash increases by 2.83 percentage points during the crisis for the largest firms. After Lehman's failure, abnormal cash increases significantly for all but the two smallest size quintiles, but the increase in abnormal cash takes place almost exclusively in the first quarter of 2009. At the end of that quarter, firms in the three top quintiles of firm size have extremely large abnormal cash.

Regressions (4) to (6) show the results for the three ratings groups. For investment grade firms, abnormal cash falls during the credit boom and keeps falling until the end of 2007. After that, abnormal cash increases. Not surprisingly, abnormal cash for investment grade firms is significantly higher at the peak of the crisis compared to the top of the boom and compared to the third quarter of 2008. Abnormal cash increases by 6.56 percentage points over the crisis, but most of this increase occurs in the last quarter of the sample period. The increase in abnormal cash is much smaller for firms with a speculative rating. For these firms, abnormal cash becomes significantly negative during the crisis and is positive at the peak of the crisis, so that it increases by 2.27 percentage points after Lehman, but the latter increase is not statistically significant ( $p$ -value = 0.11). Finally, firms without a rating have positive abnormal cash throughout the credit boom and the financial crisis, but their abnormal cash has a u-shape during the

crisis. The abnormal cash of these firms is similar at the end of the credit boom and at the peak of the financial crisis. However, their abnormal cash more than doubles after September 2008.

It follows from Table 4, Panel A, that abnormal cash for large and investment grade firms increases even more following Lehman than the cash ratio itself. Such a result implies that fundamentals typically used in cash holding regressions cannot explain the change in cash holdings in these firms after the failure of Lehman. However, changes in fundamentals seem to explain changes in cash holdings for the smaller firms. In the literature, small firms and firms without ratings are often viewed as firms that are financially constrained. These firms actually do not experience an increase in abnormal cash over the crisis, but they do not experience a significant decline either. The reason that constrained firms do not experience a decline in abnormal cash is due to the increase in the cash ratio following Lehman. Though we do not report the results in the table, we also estimate a regression that allows abnormal cash to evolve differently for constrained and unconstrained firms, where the definition of constrained firms is the modified Levi-Korajczyk (2003) definition of financially constrained firms discussed earlier. For unconstrained firms, abnormal cash increases from 1.71% at the top of the credit boom to 4.00% at the peak of the crisis, but before increasing after Lehman, abnormal cash falls to 0.59% in the second quarter of 2008. The abnormal cash of constrained firms exceeds the abnormal cash of unconstrained firms by 5.46% at the top of the credit boom and this excess falls to 4.02% at the peak of the crisis. This result is consistent with the evidence in Duchin, Ozbas, and Sensoy (2010) that constrained firms used their abnormal cash holdings early in the crisis. However, the abnormal cash of constrained firms increases by 3.07 percentage points after Lehman's failure, showing that consumption of abnormal cash stops in September 2008.

Though the model we estimate for cash makes the cash ratio of a firm depend on the uncertainty of its environment, the uncertainty measure we use may not be sufficiently forward looking and the absence of a forward-looking measure of uncertainty may explain why fundamentals do not seem to capture the increase in the cash ratio after Lehman's failure. To explore this possibility, we estimate cash regressions (but do not reproduce them in a table) where we add the VIX at the beginning of the quarter and the

change in the VIX during the quarter as forward-looking measures of economic uncertainty. The VIX is often used as a measure of risk-aversion and is sometimes viewed as an investor fear gauge (see Durand, Lim, and Zumwalt (2007)). The addition of the VIX variables does not change our conclusions. Surprisingly, the VIX variables are not even significant when added to a regression for the whole sample.

#### **Section 4.2. Predicted and unpredicted debt and equity issuance.**

To estimate abnormal debt and equity issuance, we follow Fama and French (2008). We estimate their models from 1995 to 2009. However, they estimate their models using annual data, and some of the data they use is not available with quarterly data. Consequently, we modify some variable definitions to account for the quarterly data limitations and add other variables. Our corresponding independent variables include the percentage change in assets from the previous quarter, operating cash flow to assets, dividends to assets, a dummy variable equal to one if the firms pays dividends, lagged leverage, an indicator variable equal to one if book equity is negative, the lagged market capitalization, the market-to-book ratio (computed as book assets minus book equity plus market equity divided by assets), lagged cash over assets, lagged debt in current liabilities over assets, R&D over assets, and capital expenditures over assets. However, we lag the independent variables by one additional quarter to avoid having a mechanical relation between our independent variables and net issuance. Finally, as with the cash regressions, we allow for seasonality. The high yield credit spread is 2.65% at the peak of the credit boom and 10.63% at the end of Q1 2009. At the end of 2008, the high yield credit spread is at 13.04%. We would expect that such a dramatic increase in credit spreads would have an adverse impact on the demand for debt. To assess the role of the increase in credit spreads on debt and equity issuance, we also estimate our regressions with the intermediate term treasury rate and the credit spread of high yield debt over the intermediate term treasury rate. We only report the results without the credit spreads in the table, but also discuss untabulated results that include the credit spreads.

As for cash holdings, we start with the regressions for the whole sample. Though we estimate the regressions for both definitions of debt issuance, we focus on the broadest definition and do not report in

Panel B of Table 4 the estimates for the narrower definition. Regression (1) is estimated using all industrial firms. The estimates of the coefficients on firm characteristics are generally unsurprising. The quarterly indicator variables are mostly insignificant. The unpredicted part of net debt issuance is negative and significant in the two quarters after Lehman, but at no other time during the financial crisis. The results are similar for the narrower definition of net long-term issuance debt. When we turn to size and investment rating groups, we find that in the last quarter of 2008, investment grade firms and large firms do not have abnormal net debt issuance. However, in the first quarter of 2009, all subsamples have significant negative abnormal net debt issuance. When we take into account credit spreads, firms have positive abnormal net debt issuance in the last quarter of 2008 (not reported).

Panel C of Table 4 shows regressions estimating net equity issuance. The independent variables are the same as the ones used in the net debt issuance model. The first regression provides estimates for the whole sample. Estimates of abnormal net equity issuance are significantly negative early in 2008, but not after Lehman. When we turn to subsamples, we find that the negative abnormal equity issuance is concentrated among small firms and unrated firms. These firms have significantly negative abnormal equity issuance throughout 2008. There is no evidence, therefore, that these firms somehow use equity to make up for abnormal net debt issuance brought about by a curtailment in the supply of debt – these firms issue abnormally low amounts of equity before they issue abnormally low amounts of debt, and when they issue abnormally low amounts of debt they do not issue more equity.

## **Section 5. Conclusion.**

We examine financial policies of firms throughout the credit boom and from the start of the financial crisis to its peak to understand what these policies tell us about the impact of the financial crisis and about the consequences of an exogenous supply shock to credit resulting from an unexpected financial crisis. Our findings raise important questions about the gravity of such a supply shock. First, there is no evidence of a systemic supply shock before the fall of Lehman. More specifically, industrial firms do not show any evidence of a decrease in net debt issuance before the fall of Lehman. Second, in the first year

of the crisis, small and unrated firms do decrease their cash holdings. However, they do not borrow less but instead raise less equity financing. It is striking that the drop in equity financing for small and unrated firms precedes the drop in debt financing. Third, debt financing drops sharply after Lehman for all types of firms. Yet, the drop for large firms does not lead them to experience a level of debt financing that is exceptionally low even at the peak of the financial crisis. In contrast, the level of net debt financing for small and unrated firms is exceptionally low in the first quarter of 2009. Fourth, large firms more than make up the decrease in debt financing through a reduction in share repurchases. As a result, they are able to raise their cash holdings sharply after Lehman, an increase that we would not expect to see if these firms had been starved for cash because of the inability to borrow, but that is consistent with an increase in the demand for precautionary cash holdings because of exceptionally uncertain times – including uncertainty about the future availability of credit. Fifth, from the start of the crisis to its peak, the cumulative loss of financing resulting from the decrease in equity financing for small and unrated firms is more than twice the cumulative loss of financing resulting from the decrease in debt financing for these firms. Sixth, all firm types increased their cash to asset ratio after Lehman – even firms that made no use of debt.

The hoarding of cash following the events of the third quarter of 2008 and the economically large changes in net equity issuance suggest that the reaction of firms to the financial crisis is more complicated than the narrative of the economy being adversely affected as a result of firms being unable to invest because they were unable to borrow. At the very least, fear and increased uncertainty played at least as much of a role in financing policies as direct borrowing constraints. Further, it is hard to make sense of the decrease in equity issuance without taking into account that firms faced a higher cost of equity capital and/or poorer investment opportunities well before they started raising substantially less cash through debt. Future research should investigate why equity financing flows are so important during the crisis. Another fruitful topic for future research is whether our aggregate results obscure problems in the allocation of credit across firms.

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## **Table 1: Financial Policies Statistics During the Credit Boom and the Financial Crisis**

### **Panel A: Financial Policies Using Asset-weighted Averages**

This table examines the time series of firm financial policy variables, on an asset-weighted basis, from the first quarter of 2005 to the first quarter of 2009. We begin with quarterly data collected from the CRSP/Compustat Merged (CCM) Fundamentals Quarterly database for 1980-2009. We delete observations with negative total assets (ATQ), negative sales (SALEQ), negative cash and marketable securities (CHQ), cash and marketable securities greater than total assets, and firms not incorporated in the U.S. We also eliminate all financial firms, which we define as firms with SIC codes between 6000 and 6999 and utilities, which we define as firms with SIC codes between 4900 and 4949. LT stands for long-term debt. Other variable definitions are provided in the Appendix.

Quarter	N	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
2005Q1	3444	0.1042	0.0011	0.0013	-0.0039	0.2616	0.0106	0.0225
2005Q2	3413	0.1019	-0.0015	0.0002	-0.0056	0.2603	0.0126	0.0377
2005Q3	3381	0.1018	0.0026	0.0036	-0.0057	0.2571	0.0129	0.0316
2005Q4	3317	0.1053	0.0043	0.0061	-0.0072	0.2548	0.0146	0.0682
2006Q1	3347	0.0971	0.0073	0.0090	-0.0062	0.2620	0.0128	0.0345
2006Q2	3325	0.0963	0.0047	0.0079	-0.0102	0.2628	0.0141	0.0415
2006Q3	3318	0.0955	0.0058	0.0067	-0.0095	0.2644	0.0141	0.0503
2006Q4	3225	0.0964	0.0015	0.0067	-0.0058	0.2622	0.0159	0.0499
2007Q1	3240	0.0956	0.0068	0.0071	-0.0074	0.2659	0.0133	0.0356
2007Q2	3198	0.0949	0.0077	0.0087	-0.0110	0.2694	0.0143	0.0458
2007Q3	3179	0.0962	0.0064	0.0097	-0.0117	0.2732	0.0142	0.0447
2007Q4	3122	0.0955	0.0080	0.0098	-0.0091	0.2741	0.0158	0.0469
2008Q1	3167	0.0890	0.0061	0.0097	-0.0088	0.2860	0.0136	0.0362
2008Q2	3101	0.0890	0.0071	0.0067	-0.0059	0.2862	0.0146	0.0442
2008Q3	3078	0.0889	0.0061	0.0043	-0.0065	0.2922	0.0155	0.0442
2008Q4	3000	0.0981	0.0035	0.0009	-0.0028	0.3058	0.0156	0.0484
2009Q1	2971	0.1018	0.0077	-0.0019	-0.0019	0.3072	0.0111	0.0236
<b>Avg 1983-2004</b>		0.0675	0.0036	0.0065	-0.0009	0.2922	0.0183	0.0451
<b>Avg 1990-2004</b>		0.0666	0.0036	0.0056	-0.0008	0.3024	0.0171	0.0454
Min		0.0486	-0.0057	-0.0164	-0.0076	0.2201	0.0097	0.0204
Max		0.1077	0.0144	0.0460	0.0061	0.3278	0.0295	0.0608
Std. Dev.		0.0149	0.0034	0.0077	0.0021	0.0259	0.0040	0.0076
<b>Post crisis vs pre crisis</b>								
Avg (2007Q3-2008Q2)		0.0924	0.0069	0.0090	-0.0089	0.2799	0.0146	0.0430
Avg (2006Q3-2007Q2)		0.0956	0.0055	0.0073	-0.0084	0.2655	0.0144	0.0454
Difference		-0.0032	0.0014	0.0017	-0.0005	0.0144	0.0002	-0.0024
seasonality adjusted p-values		0.6484	0.5044	0.7192	0.8116	0.2413	0.9365	0.6943
<b>Post vs pre Lehman</b>								
2009Q1		0.1018	0.0077	-0.0019	-0.0019	0.3072	0.0111	0.0236
2008Q3		0.0889	0.0061	0.0043	-0.0065	0.2922	0.0155	0.0442
2007Q2		0.0949	0.0077	0.0087	-0.0110	0.2694	0.0143	0.0458
Difference (2009Q1 - 2008Q3)		0.0130	0.0016	-0.0062	0.0046	0.0150	-0.0044	-0.0206
Newey West test p-values		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Seasonality adjusted p-values		0.0433	0.7082	0.2423	0.0758	0.1118	0.0842	0.0274
Difference (2009Q1 - 2007Q2)		0.0070	0.0000	-0.0106	0.0091	0.0378	-0.0032	-0.0222
Newey West test p-values		0.0000	0.6400	0.0000	0.0000	0.0000	0.0000	0.0000
Seasonality adjusted p-values		0.4982	0.9995	0.1844	0.0009	0.0675	0.3788	0.0234

**Table 1, Panel B: Financial Policies Using Equally-Weighted Averages**

This table examines the means of the time series of firm financial policy variables, on an equal-weighted basis, from the first quarter of 2005 to the first quarter of 2009. We begin with quarterly data collected from the CRSP/Compustat Merged (CCM) Fundamentals Quarterly database for 1980-2009. We delete observations with negative total assets (ATQ), negative sales (SALEQ), negative cash and marketable securities (CHQ), cash and marketable securities greater than total assets, and firms not incorporated in the U.S. We also eliminate all financial firms, which we define as firms with SIC codes between 6000 and 6999 and utilities, which we define as firms with SIC codes between 4900 and 4949. LT stands for long-term debt. Other variable definitions are provided in the Appendix.

Quarter	N	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
2005Q1	3597	0.2302	0.0046	0.0053	0.0118	0.1903	0.0123	0.0255
2005Q2	3578	0.2242	0.0019	0.0035	0.0078	0.1909	0.0137	0.0331
2005Q3	3539	0.2237	0.0042	0.0065	0.0120	0.1901	0.0138	0.0333
2005Q4	3501	0.2303	0.0034	0.0041	0.0141	0.1899	0.0148	0.0453
2006Q1	3495	0.2253	0.0051	0.0064	0.0152	0.1905	0.0138	0.0244
2006Q2	3478	0.2229	0.0060	0.0070	0.0104	0.1903	0.0150	0.0300
2006Q3	3475	0.2182	0.0052	0.0083	0.0048	0.1949	0.0146	0.0313
2006Q4	3413	0.2222	0.0056	0.0061	0.0143	0.1966	0.0153	0.0409
2007Q1	3389	0.2194	0.0075	0.0081	0.0087	0.1996	0.0140	0.0245
2007Q2	3357	0.2193	0.0079	0.0105	0.0142	0.2028	0.0150	0.0301
2007Q3	3323	0.2179	0.0065	0.0092	0.0079	0.2053	0.0150	0.0313
2007Q4	3293	0.2208	0.0063	0.0086	0.0083	0.2077	0.0156	0.0407
2008Q1	3312	0.2043	0.0084	0.0104	0.0005	0.2140	0.0137	0.0226
2008Q2	3250	0.1992	0.0054	0.0062	0.0033	0.2156	0.0149	0.0326
2008Q3	3220	0.1957	0.0045	0.0081	0.0021	0.2230	0.0144	0.0320
2008Q4	3160	0.2008	-0.0002	-0.0004	(0.0000)	0.2349	0.0131	0.0305
2009Q1	3126	0.2015	-0.0015	-0.0045	0.0030	0.2331	0.0097	0.0131
<b>Avg 1983-2004</b>		0.1605	0.0049	0.0086	0.0125	0.2417	0.0184	0.0272
<b>Avg 1990-2004</b>		0.1721	0.0044	0.0074	0.0138	0.2317	0.0172	0.0288
Min		0.1215	-0.0020	-0.0013	0.0027	0.1912	0.0105	0.0120
Max		0.2316	0.0144	0.0197	0.0354	0.2830	0.0275	0.0426
Std. Dev.		0.0319	0.0034	0.0050	0.0055	0.0239	0.0035	0.0070
<b>Post crisis vs pre crisis</b>								
Avg (2007Q3-2008Q2)		0.2105	0.0066	0.0086	0.0050	0.2107	0.0148	0.0318
Avg (2006Q3-2007Q2)		0.2198	0.0065	0.0082	0.0105	0.1985	0.0147	0.0317
Difference		-0.0092	0.0001	0.0004	-0.0055	0.0122	0.0001	0.0001
Ttest pre vs post crisis		0.0034	0.8549	0.6294	0.0001	0.0011	0.7855	0.9726
<b>Post vs pre Lehman</b>								
2009Q1		0.2015	-0.0015	-0.0045	0.0030	0.2331	0.0097	0.0131
2008Q3		0.1957	0.0045	0.0081	0.0021	0.2230	0.0144	0.0320
2007Q2		0.2193	0.0079	0.0105	0.0142	0.2028	0.0150	0.0301
Diff. (2009Q1 - 2008Q3)		0.0058	-0.0060	-0.0126	0.0010	0.0101	-0.0046	-0.0189
Paired Diff.		0.0070	-0.0057	-0.0124	0.0013	0.0161	-0.0049	-0.0203
Ttest 2008Q3=2009Q1*		0.0001	0.0001	0.0001	0.1426	0.0001	0.0001	0.0001
Diff. (2009Q1 - 2007Q2)		-0.0178	-0.0094	-0.0150	-0.0112	0.0303	-0.0053	-0.0171
Paired Diff.		-0.0196	-0.0096	-0.0163	-0.0109	0.0348	-0.0061	-0.0202
Ttest 2007Q2=2009Q1		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

**Table 2: Summary Statistics on Lines of Credit**

This table examines data on lines of credit for a random sample of 300 firms chosen as of the second quarter of 2007. We follow the approach in Sufi (2009) in sampling the firms. % new drawdown is the percentage of firms in that quarter that draw down a line of credit. Drawdown to loc is the ratio of the amount drawn down to the firm's total line of credit. Line\_assets is the ratio of lines of credit to total assets. Draw\_assets is the ratio of new drawdowns in that quarter to total assets.

DATACQTR	_FREQ_	% new	drawdown	Aggregate sample		Equal-weighted sample	
		drawdown	to loc	line_assets	draw_assets	line_assets	draw_assets
2007Q1	283	0.0565	0.1371	0.0940	0.0003	0.1764	0.0015
2007Q2	300	0.0700	0.2017	0.0979	0.0009	0.1804	0.0037
2007Q3	293	0.0580	0.1008	0.0969	0.0010	0.1755	0.0017
2007Q4	279	0.3441	0.2564	0.0984	0.0146	0.1757	0.0217
2008Q1	277	0.0866	0.3039	0.0967	0.0020	0.1718	0.0056
2008Q2	265	0.0528	0.1205	0.0901	0.0004	0.1719	0.0012
2008Q3	262	0.0763	0.2685	0.0932	0.0031	0.1770	0.0053
2008Q4	252	0.3056	0.1921	0.1023	0.0070	0.1921	0.0144
2009Q1	246	0.0610	0.1795	0.1041	0.0007	0.1707	0.0014

**Table 3: Financial Policies by Size, Debt Rating, and Financial Constraint Groupings**

This table examines the means of the time series of firm financial policy variables, on an equal-weighted basis, from the first quarter of 2005 to the first quarter of 2009 for firms categorized according to size, debt, rating, and financial constraint. Panel A examines size quintiles, which are formed quarterly by dividing all NYSE firms into five quintiles based on assets; we then assign the non-NYSE firms to these quintiles. Panel B examines firms by debt rating. We divide firms quarterly into firms with an investment grade rating, a speculative rating, and no rating using the S&P long-term rating (*spltrm*) available on Compustat. Panel C examines financially constrained vs. unconstrained firms. We examine whether a firm is financially constrained as of the second quarter of 2007, and define a firm to be constrained if it (1) does not pay dividends, (2) does not have net equity repurchases, (3) does not have a credit rating, and (4) has a Tobin's q greater than one (defined as the market value of the assets divided by the book value, where market value of assets is book value minus book equity plus market value of equity). Variable definitions are provided in the Appendix.

**Panel A: Smallest vs Largest Firms**

	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
<b>Sizerank = 0 (smallest)</b>							
<b>Avg 1983-2004</b>	0.1946	0.0047	0.0092	0.0180	0.2152	0.0181	0.0200
<b>Avg 1990-2004</b>	0.2107	0.0040	0.0076	0.0199	0.1982	0.0168	0.0222
Min	0.1430	-0.0012	-0.0011	0.0055	0.1503	0.0049	0.0049
Max	0.2857	0.0120	0.0194	0.0487	0.2660	0.0394	0.0394
Std. Dev.	0.0412	0.0034	0.0052	0.0075	0.0347	0.0076	0.0076
<b>Post crisis vs pre crisis</b>							
Avg (2007Q3-2008Q2)	0.2697	0.0065	0.0083	0.0112	0.1646	0.0141	0.0241
Avg (2006Q3-2007Q2)	0.2785	0.0064	0.0083	0.0190	0.1554	0.0140	0.0247
Difference	-0.0087	0.0001	0.0000	-0.0079	0.0093	0.0002	-0.0006
Ttest	0.0833	0.8794	0.9997	0.0001	0.0316	0.7639	0.5152
<b>Post vs pre Lehman</b>							
2009Q1	0.2572	-0.0020	-0.0025	0.0052	0.1827	0.0085	0.0046
2008Q3	0.2514	0.0040	0.0086	0.0054	0.1779	0.0132	0.0248
2007Q2	0.2785	0.0072	0.0104	0.0254	0.1585	0.0141	0.0212
Diff. (2009Q1-2008Q3)	0.0058	-0.0060	-0.0111	-0.0002	0.0048	-0.0047	-0.0202
Paired Diff.	0.0050	-0.0055	-0.0108	0.0000	0.0141	-0.0049	-0.0217
Ttest 2008Q3=2009Q1*	0.0139	0.0001	0.0001	0.9880	0.0001	0.0001	0.0001
Diff. (2009Q1-2007Q2)	-0.0213	-0.0092	-0.0129	-0.0202	0.0242	-0.0056	-0.0166
Paired Diff.	-0.0316	-0.0094	-0.0143	-0.0214	0.0328	-0.0063	-0.0196
Ttest 2007Q2=2009Q1	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
<b>Sizerank = 4 (largest)</b>							
<b>Avg 1983-2004</b>	0.0631	0.0031	0.0052	-0.0014	0.2940	0.0189	0.0463
<b>Avg 1990-2004</b>	0.0622	0.0029	0.0044	-0.0016	0.3016	0.0178	0.0461
Min	0.0476	-0.0054	-0.0114	-0.0100	0.2347	0.0096	0.0259
Max	0.1069	0.0120	0.0167	0.0023	0.3267	0.0270	0.0656
Std. Dev.	0.0127	0.0039	0.0061	0.0021	0.0221	0.0039	0.0074
<b>Post crisis vs pre crisis</b>							
Avg (2007Q3-2008Q2)	0.0871	0.0043	0.0066	-0.0079	0.2758	0.0149	0.0451
Avg (2006Q3-2007Q2)	0.0922	0.0030	0.0042	-0.0081	0.2639	0.0148	0.0461
Difference	-0.0051	0.0013	0.0024	0.0002	0.0119	0.0000	-0.0009
Ttest	0.3281	0.4040	0.2781	0.7786	0.4076	0.9834	0.7703
<b>Post vs pre Lehman</b>							
2009Q1	0.0980	0.0083	-0.0001	-0.0014	0.3075	0.0105	0.0267
2008Q3	0.0856	0.0041	0.0021	-0.0058	0.2848	0.0152	0.0466
2007Q2	0.0897	0.0070	0.0072	-0.0095	0.2650	0.0151	0.0486
Diff. (2009Q1-2008Q3)	0.0123	0.0041	-0.0022	0.0044	0.0227	-0.0047	-0.0199
Paired Diff.	0.0118	0.0023	-0.0035	0.0051	0.0267	-0.0046	-0.0203
Ttest 2008Q3=2009Q1*	0.0001	0.4534	0.3620	0.0001	0.0001	0.0001	0.0001
Diff. (2009Q1-2007Q2)	0.0082	0.0012	-0.0073	0.0080	0.0425	-0.0046	-0.0219
Paired Diff.	0.0109	0.0002	-0.0120	0.0085	0.0428	-0.0050	-0.0230
Ttest 2007Q2=2009Q1	0.0632	0.9805	0.0085	0.0001	0.0001	0.0001	0.0001

**Panel B: Debt Rating**

	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
<b>Investment Grade</b>							
<b>Avg 1983-2004</b>	0.0603	0.0051	0.0073	-0.0019	0.2762	0.0188	0.0468
<b>Avg 1990-2004</b>	0.0577	0.0049	0.0068	-0.0022	0.2789	0.0180	0.0476
Min	0.0450	-0.0019	-0.0023	-0.0090	0.2330	0.0105	0.0267
Max	0.0980	0.0155	0.0204	0.0042	0.3075	0.0276	0.0611
Std. Dev.	0.0123	0.0034	0.0056	0.0023	0.0163	0.0039	0.0072
<b>Post crisis vs pre crisis</b>							
Avg (2007Q3-2008Q2)	0.0810	0.0080	0.0109	-0.0106	0.2469	0.0138	0.0505
Avg (2006Q3-2007Q2)	0.0821	0.0044	0.0060	-0.0097	0.2282	0.0139	0.0500
Difference	-0.0011	0.0036	0.0049	-0.0009	0.0187	-0.0001	0.0005
Ttest	0.7722	0.0248	0.0180	0.2234	0.0938	0.8942	0.8773
<b>Post vs pre Lehman</b>							
2009Q1	0.0947	0.0053	0.0001	-0.0014	0.2687	0.0100	0.0334
2008Q3	0.0828	0.0051	0.0065	-0.0084	0.2579	0.0134	0.0505
2007Q2	0.0804	0.0056	0.0069	-0.0106	0.2314	0.0137	0.0522
Diff. (2009Q1-2008Q3)	0.0119	0.0002	-0.0064	0.0069	0.0108	-0.0034	-0.0170
Paired Diff.	0.0105	0.0000	-0.0067	0.0072	0.0178	-0.0036	-0.0168
Ttest 2008Q3=2009Q1*	0.0001	0.9913	0.0545	0.0001	0.0001	0.0001	0.0001
Diff. (2009Q1-2007Q2)	0.0143	-0.0003	-0.0068	0.0092	0.0374	-0.0037	-0.0187
Paired Diff.	0.0128	-0.0005	-0.0068	0.0093	0.0405	-0.0042	-0.0197
Ttest 2007Q2=2009Q1	0.0021	0.8179	0.0079	0.0001	0.0001	0.0001	0.0001
	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
<b>Speculative</b>							
<b>Avg 1983-2004</b>	0.0942	0.0096	0.0125	0.0048	0.4471	0.0184	0.0316
<b>Avg 1990-2004</b>	0.0905	0.0087	0.0119	0.0065	0.4649	0.0186	0.0314
Min	0.0729	-0.0056	-0.0091	-0.0144	0.2398	0.0100	0.0118
Max	0.1332	0.0337	0.0446	0.0168	0.5266	0.0278	0.0602
Std. Dev.	0.0135	0.0087	0.0108	0.0055	0.0632	0.0041	0.0090
<b>Post crisis vs pre crisis</b>							
Avg (2007Q3-2008Q2)	0.0809	0.0057	0.0089	0.0010	0.4122	0.0189	0.0372
Avg (2006Q3-2007Q2)	0.0886	0.0134	0.0163	0.0022	0.4044	0.0184	0.0368
Difference	-0.0077	-0.0077	-0.0073	-0.0012	0.0078	0.0005	0.0004
Ttest	0.1047	0.0001	0.0031	0.3379	0.5918	0.5985	0.8755
<b>Post vs pre Lehman</b>							
2009Q1	0.0886	-0.0035	-0.0120	0.0007	0.4499	0.0122	0.0185
2008Q3	0.0803	0.0048	0.0068	0.0000	0.4204	0.0185	0.0397
2007Q2	0.0859	0.0168	0.0205	0.0018	0.4109	0.0197	0.0410

	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
<b>Speculative, cont'd</b>							
Diff. (2009Q1-2008Q3)	0.0083	-0.0082	-0.0188	0.0006	0.0295	-0.0063	-0.0212
Paired Diff.	0.0090	-0.0086	-0.0195	0.0006	0.0316	-0.0064	-0.0249
Ttest 2008Q3=2009Q1*	0.0001	0.0025	0.0001	0.5091	0.0001	0.0001	0.0001
Diff. (2009Q -2007Q2)	0.0027	-0.0203	-0.0325	-0.0011	0.0390	-0.0075	-0.0225
Paired Diff.	-0.0004	-0.0214	-0.0360	-0.0022	0.0395	-0.0083	-0.0249
Ttest 2007Q2=2009Q1	0.5070	0.0001	0.0001	0.1746	0.0001	0.00017	0.0001
	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
<b>Unrated</b>							
<b>Avg 1983-2004</b>	0.1801	0.0044	0.0082	0.0148	0.2148	0.0180	0.0249
<b>Avg 1990-2004</b>	0.1962	0.0038	0.0069	0.0166	0.1990	0.0169	0.0264
Min	0.1215	-0.0013	-0.0015	0.0041	0.1428	0.0104	0.0120
Max	0.2755	0.0120	0.0171	0.0429	0.2676	0.0275	0.0416
Std. Dev.	0.0441	0.0032	0.0049	0.0067	0.0356	0.0035	0.0073
<b>Post crisis vs pre crisis</b>							
Avg (2007Q3-2008Q2)	0.2562	0.0067	0.0083	0.0080	0.1625	0.0141	0.0279
Avg (2006Q3-2007Q2)	0.2671	0.0054	0.0069	0.0152	0.1504	0.0141	0.0279
Difference	-0.0109	0.0013	0.0014	-0.0071	0.0121	0.0000	0.0000
Ttest	0.0147	0.0830	0.1540	0.0001	0.0018	0.9289	0.9646
<b>Post vs pre Lehman</b>							
2009Q1	0.2414	-0.0020	-0.0035	0.0042	0.1808	0.0091	0.0088
2008Q3	0.2370	0.0044	0.0087	0.0040	0.1751	0.0136	0.0274
2007Q2	0.2677	0.0063	0.0089	0.0204	0.1541	0.0142	0.0244
Diff. (2009Q1-2008Q3)	0.0044	-0.0064	-0.0122	0.0002	0.0057	-0.0045	-0.0186
Paired Diff.	0.0060	-0.0059	-0.0117	0.0006	0.0124	-0.0048	-0.0204
Ttest 2008Q3=2009Q1*	0.0006	0.0001	0.0001	0.6170	0.0001	0.0001	0.0001
Diff. (2009Q1-2007Q2)	-0.0263	-0.0083	-0.0124	-0.0162	0.0267	-0.0051	-0.0156
Paired Diff.	-0.0292	-0.0085	-0.0134	-0.0162	0.0328	-0.0059	-0.0192
Ttest 2007Q2=2009Q1	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

**Panel C: Unconstrained vs Constrained**

	Cash to assets	Net LT debt issuance	Net total debt issuance	Net equity issuance	Leverage	Capex	Operating cash flow
<b>Unconstrained</b>							
<b>Post crisis vs pre crisis</b>							
Avg (2007Q3-2008Q2)	0.1607	0.0060	0.0082	0.0008	0.2342	0.0145	0.0355
Avg (2006Q3-2007Q2)	0.1741	0.0055	0.0078	0.0058	0.2227	0.0149	0.0309
Difference	-0.0134	0.0005	0.0004	-0.0050	0.0115	-0.0004	-0.0004
Ttest	0.0001	0.4625	0.6731	0.0001	0.0084	0.3448	0.7817
<b>Post vs pre Lehman</b>							
2009Q1	0.1572	-0.0020	-0.0059	0.0009	0.2586	0.0097	0.0205
2008Q3	0.1499	0.0043	0.0072	-0.0001	0.2451	0.0138	0.0362
2007Q2	0.1741	0.0037	0.0071	0.0088	0.2260	0.0149	0.0355
Diff. (2009Q1 - 2008Q3)	0.0074	-0.0062	-0.0131	0.0011	0.0135	-0.0040	-0.0156
Paired Diff.	0.0093	-0.0064	-0.0133	0.0017	0.0160	-0.0042	-0.0166
Ttest 2008Q3=2009Q1*	0.0001	0.0001	0.0001	0.0487	0.0001	0.0001	0.0001
Diff. (2009Q1 - 2007Q2)	-0.0168	-0.0057	-0.0130	-0.0078	0.0326	-0.0052	-0.0150
Paired Diff.	-0.0117	-0.0066	-0.0142	-0.0059	0.0350	-0.0059	-0.0195
Ttest 2007Q2=2009Q1	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001
<b>Constrained</b>							
<b>Post crisis vs pre crisis</b>							
Avg (2007Q3-2008Q2)	0.3370	0.0073	0.0082	0.0118	0.1417	0.0147	0.0241
Avg (2006Q3-2007Q2)	0.3551	0.0099	0.0101	0.0245	0.1234	0.0147	0.0220
Difference	-0.0181	-0.0026	-0.0018	-0.0127	0.0183	-0.0001	0.0021
Ttest	0.0669	0.0194	0.2176	0.0001	0.0039	0.9201	0.4239
<b>Post vs pre Lehman</b>							
2009Q1	0.3109	0.0002	-0.0030	0.0076	0.1565	0.0095	-0.0033
2008Q3	0.3073	0.0045	0.0088	0.0042	0.1567	0.0144	0.0241
2007Q2	0.3577	0.0207	0.0210	0.0309	0.1321	0.0154	0.0123
Diff. (2009Q1 - 2008Q3)	0.0037	-0.0043	-0.0118	0.0033	-0.0002	-0.0049	-0.0274
Paired Diff.	0.0060	-0.0032	-0.0102	0.0030	0.0115	-0.0052	-0.0292
Ttest 2008Q3=2009Q1*	0.1116	0.1497	0.0013	0.2541	0.0057	0.0001	0.0001
Diff. (2009Q1 - 2007Q2)	-0.0468	-0.0205	-0.0240	-0.0234	0.0244	-0.0059	-0.0156
Paired Diff.	-0.0457	-0.0195	-0.0232	-0.0275	0.0342	-0.0068	-0.0227
Ttest 2007Q2=2009Q1	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

**Table 4: Expected and unexpected cash holdings, net debt issuance and net equity issuance**

Panel A examines the determinants of cash holdings. Panel B examines the determinants of debt issuance, whether debt issuance is defined as the change in long-term and short-term debt. Panel C examines the determinants of equity issuance. Robust standard errors are reported in brackets. \*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% level. Variable definitions are provided in the Appendix.

**Panel A: Quarterly Cash/assets**

	(1) 1995Q1- 2009Q1	(2) Smallest firms	(3) Largest firms	(4) Investment	(5) Speculative	(6) Unrated
Sigma12	1.4888*** (0.000)	1.7493*** (0.000)	0.3179*** (0.000)	0.2746*** (0.000)	0.5106*** (0.000)	1.6722*** (0.000)
Market-to-book	0.0203*** (0.000)	0.0204*** (0.000)	0.0166*** (0.000)	0.0164*** (0.000)	0.0360*** (0.000)	0.0199*** (0.000)
Size	-0.0046*** (0.000)	0.0106*** (0.000)	-0.0021** (0.041)	-0.0027*** (0.000)	-0.0059*** (0.000)	0.0008** (0.012)
Operating cash flow	0.0415*** (0.000)	0.0091 (0.136)	0.1123*** (0.000)	0.1232*** (0.000)	-0.0123 (0.386)	0.0205*** (0.000)
NWC	-0.2643*** (0.000)	-0.2869*** (0.000)	-0.1722*** (0.000)	-0.0854*** (0.000)	-0.1771*** (0.000)	-0.2852*** (0.000)
Capex	-1.0653*** (0.000)	-1.1622*** (0.000)	-0.5009*** (0.000)	-0.7476*** (0.000)	-0.3640*** (0.000)	-1.1952*** (0.000)
Leverage	-0.3538*** (0.000)	-0.4339*** (0.000)	-0.1449*** (0.000)	-0.1687*** (0.000)	-0.1150*** (0.000)	-0.4264*** (0.000)
R&D	0.3889*** (0.000)	0.3329*** (0.000)	0.6829*** (0.000)	0.6665*** (0.000)	1.1383*** (0.000)	0.3485*** (0.000)
Rdmiss	-0.0132*** (0.000)	-0.0236*** (0.000)	0.0049*** (0.003)	0.0153*** (0.000)	0.0053*** (0.000)	-0.0208*** (0.000)
Divdum	-0.0439*** (0.000)	-0.0282*** (0.000)	-0.0574*** (0.000)	-0.0255*** (0.000)	-0.0255*** (0.000)	-0.0336*** (0.000)
Acquisitions	-0.5514*** (0.000)	-0.6394*** (0.000)	-0.3616*** (0.000)	-0.3146*** (0.000)	-0.5487*** (0.000)	-0.5948*** (0.000)
Net equity Issuance	0.2489*** (0.000)	0.2310*** (0.000)	0.2577*** (0.003)	0.1118*** (0.003)	0.2674*** (0.000)	0.2428*** (0.000)
Net LT debt Issuance	0.3171*** (0.000)	0.3266*** (0.000)	0.1944*** (0.000)	0.2184*** (0.000)	0.2910*** (0.000)	0.3336*** (0.000)
dqtr2	0.0008 (0.479)	0.0001 (0.945)	0.0006 (0.811)	0.0012 (0.478)	0.0019 (0.424)	0.0004 (0.781)
dqtr3	0.0021* (0.067)	0.0014 (0.347)	0.0019 (0.462)	0.0027 (0.100)	0.0023 (0.325)	0.0017 (0.218)
dqtr4	0.0055*** (0.000)	0.0050*** (0.001)	0.0039 (0.144)	0.0067*** (0.000)	0.0040* (0.081)	0.0050*** (0.000)
dum051	0.0259***	0.0248***	0.0252***	0.0244***	-0.0040	0.0287***

	(0.000)	(0.000)	(0.000)	(0.000)	(0.390)	(0.000)
dum052	0.0248***	0.0242***	0.0258***	0.0239***	-0.0061	0.0278***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.170)	(0.000)
dum053	0.0205***	0.0200***	0.0277***	0.0205***	-0.0069	0.0227***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.145)	(0.000)
dum054	0.0246***	0.0237***	0.0262***	0.0209***	0.0024	0.0265***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.627)	(0.000)
dum061	0.0213***	0.0188***	0.0198***	0.0212***	-0.0021	0.0229***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.677)	(0.000)
dum062	0.0233***	0.0227***	0.0181***	0.0151***	-0.0036	0.0263***
	(0.000)	(0.000)	(0.003)	(0.000)	(0.457)	(0.000)
dum063	0.0214***	0.0194***	0.0162***	0.0115***	-0.0023	0.0241***
	(0.000)	(0.000)	(0.004)	(0.005)	(0.627)	(0.000)
dum064	0.0210***	0.0177***	0.0187***	0.0124***	-0.0041	0.0226***
	(0.000)	(0.000)	(0.002)	(0.004)	(0.375)	(0.000)
dum071	0.0266***	0.0234***	0.0171***	0.0137***	-0.0047	0.0301***
	(0.000)	(0.000)	(0.005)	(0.001)	(0.345)	(0.000)
dum072	0.0258***	0.0223***	0.0156***	0.0122***	-0.0064	0.0286***
	(0.000)	(0.000)	(0.008)	(0.003)	(0.182)	(0.000)
dum073	0.0268***	0.0250***	0.0150***	0.0106**	-0.0058	0.0307***
	(0.000)	(0.000)	(0.008)	(0.012)	(0.209)	(0.000)
dum074	0.0259***	0.0250***	0.0102*	0.0094**	-0.0070	0.0299***
	(0.000)	(0.000)	(0.065)	(0.022)	(0.106)	(0.000)
dum081	0.0200***	0.0189***	0.0110**	0.0154***	-0.0110***	0.0221***
	(0.000)	(0.000)	(0.032)	(0.000)	(0.007)	(0.000)
dum082	0.0140***	0.0130***	0.0096*	0.0151***	-0.0138***	0.0152***
	(0.000)	(0.003)	(0.069)	(0.000)	(0.001)	(0.000)
dum083	0.0154***	0.0131***	0.0094*	0.0168***	-0.0054	0.0157***
	(0.000)	(0.005)	(0.058)	(0.000)	(0.170)	(0.000)
dum084	0.0256***	0.0244***	0.0117**	0.0204***	0.0017	0.0279***
	(0.000)	(0.000)	(0.014)	(0.000)	(0.710)	(0.000)
dum091	0.0460***	0.0327**	0.0439***	0.0778***	0.0173	0.0387***
	(0.000)	(0.023)	(0.005)	(0.000)	(0.210)	(0.002)
Constant	0.2913***	0.0373***	0.1549***	0.1415***	0.2046***	0.2083***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	182,301	120,764	10,135	16,828	21,581	143,892
Adjusted R-squared	0.454	0.446	0.431	0.382	0.395	0.450

**Panel B: Net Total Debt Issuance**

	(1) 1995Q1- 2009Q1	(2) Smallest firms	(6) Largest firms	(7) Investment	(8) Speculative	(9) Unrated
lag_dqsize	-0.0087*** (0.000)	-0.0085*** (0.000)	-0.0113*** (0.004)	-0.0198*** (0.000)	-0.0021 (0.584)	-0.0094*** (0.000)
lag_ocf	-0.0094*** (0.001)	-0.0139*** (0.000)	0.0057 (0.770)	0.0242** (0.031)	0.0166 (0.118)	-0.0113*** (0.000)
lag_dividends	0.0820* (0.057)	-0.0752 (0.201)	0.2592** (0.030)	0.5385*** (0.000)	0.1661 (0.371)	0.0043 (0.932)
divdum	-0.0029*** (0.000)	0.0004 (0.529)	-0.0069*** (0.000)	-0.0074*** (0.000)	-0.0037*** (0.005)	-0.0013** (0.015)
lag2_leverage	-0.0098*** (0.000)	-0.0128*** (0.000)	-0.0118*** (0.002)	-0.0278*** (0.000)	-0.0365*** (0.000)	-0.0120*** (0.000)
lag_ngbe	0.0035*** (0.006)	0.0050*** (0.003)	0.0027 (0.464)	0.0066 (0.216)	-0.0012 (0.563)	0.0063*** (0.000)
lag2_logmc	-0.0002** (0.049)	-0.0003 (0.102)	0.0001 (0.758)	-0.0014*** (0.000)	-0.0026*** (0.000)	-0.0006*** (0.000)
lag_MB	0.0019*** (0.000)	0.0019*** (0.000)	0.0007 (0.108)	0.0013** (0.018)	0.0088*** (0.000)	0.0019*** (0.000)
lag2_cash	-0.0158*** (0.000)	-0.0168*** (0.000)	-0.0166*** (0.006)	-0.0224*** (0.000)	-0.0161*** (0.005)	-0.0151*** (0.000)
lag2_stdebt	-0.0295*** (0.000)	-0.0278*** (0.000)	-0.0147 (0.221)	-0.0224*** (0.009)	-0.0123 (0.174)	-0.0290*** (0.000)
lag_R&D	-0.0188* (0.062)	-0.0085 (0.436)	-0.0472 (0.366)	-0.0408 (0.430)	-0.2986*** (0.000)	-0.0124 (0.231)
lag_capex	0.3138*** (0.000)	0.2997*** (0.000)	0.3204*** (0.000)	0.2746*** (0.000)	0.4637*** (0.000)	0.2853*** (0.000)
dqtr2	-0.0013** (0.018)	0.0000 (0.950)	-0.0003 (0.862)	-0.0013 (0.392)	-0.0016 (0.393)	-0.0009 (0.121)
dqtr3	0.0000 (0.970)	0.0013** (0.040)	0.0004 (0.811)	0.0004 (0.792)	-0.0025 (0.172)	0.0006 (0.300)
dqtr4	-0.0037*** (0.000)	-0.0026*** (0.000)	-0.0037** (0.028)	-0.0035** (0.017)	-0.0029 (0.124)	-0.0035*** (0.000)
dum051	-0.0039*** (0.001)	-0.0023 (0.118)	-0.0094*** (0.008)	-0.0064** (0.041)	-0.0095*** (0.005)	-0.0027** (0.034)
dum052	-0.0031*** (0.005)	-0.0029** (0.040)	-0.0029 (0.466)	-0.0056** (0.028)	-0.0026 (0.492)	-0.0030** (0.015)
dum053	-0.0018 (0.110)	-0.0025* (0.083)	0.0016 (0.696)	0.0033 (0.357)	-0.0021 (0.515)	-0.0027** (0.033)
dum054	-0.0004 (0.722)	-0.0022 (0.155)	0.0011 (0.691)	0.0021 (0.472)	-0.0059* (0.087)	-0.0003 (0.831)

dum061	-0.0030*** (0.006)	-0.0014 (0.333)	-0.0021 (0.606)	-0.0068*** (0.007)	-0.0028 (0.466)	-0.0029** (0.019)
dum062	-0.0003 (0.797)	-0.0025* (0.089)	0.0055 (0.170)	0.0035 (0.213)	-0.0024 (0.481)	-0.0009 (0.507)
dum063	-0.0006 (0.568)	-0.0007 (0.613)	-0.0035 (0.265)	-0.0026 (0.334)	0.0031 (0.418)	-0.0013 (0.284)
dum064	0.0015 (0.240)	0.0020 (0.246)	0.0015 (0.624)	0.0005 (0.868)	0.0029 (0.441)	0.0008 (0.601)
dum071	-0.0008 (0.529)	0.0005 (0.758)	-0.0058** (0.015)	-0.0037 (0.171)	-0.0001 (0.982)	-0.0009 (0.508)
dum072	0.0029** (0.024)	0.0022 (0.187)	0.0048 (0.173)	0.0023 (0.436)	0.0084* (0.052)	0.0015 (0.286)
dum073	0.0004 (0.755)	-0.0010 (0.539)	0.0009 (0.778)	0.0047* (0.069)	-0.0032 (0.392)	0.0004 (0.804)
dum074	0.0037*** (0.006)	0.0020 (0.252)	0.0048* (0.077)	0.0086*** (0.010)	-0.0016 (0.670)	0.0038** (0.015)
dum081	0.0008 (0.479)	0.0027* (0.079)	-0.0046* (0.058)	-0.0012 (0.632)	-0.0046 (0.105)	0.0023* (0.089)
dum082	-0.0009 (0.381)	-0.0003 (0.848)	0.0018 (0.491)	0.0033 (0.174)	-0.0068*** (0.005)	-0.0001 (0.961)
dum083	-0.0003 (0.822)	-0.0004 (0.805)	-0.0031 (0.174)	-0.0000 (0.995)	-0.0030 (0.298)	0.0005 (0.710)
dum084	-0.0052*** (0.000)	-0.0059*** (0.000)	0.0014 (0.650)	-0.0001 (0.969)	-0.0117*** (0.000)	-0.0045*** (0.000)
dum091	-0.0129*** (0.000)	-0.0092*** (0.000)	-0.0099*** (0.001)	-0.0107*** (0.000)	-0.0238*** (0.000)	-0.0103*** (0.000)
Constant	0.0082*** (0.000)	0.0079*** (0.000)	0.0064 (0.122)	0.0248*** (0.000)	0.0282*** (0.000)	0.0095*** (0.000)
Observations	182,604	118,572	11,470	18,673	22,741	141,190
Adjusted R-squared	0.018	0.018	0.020	0.022	0.041	0.017

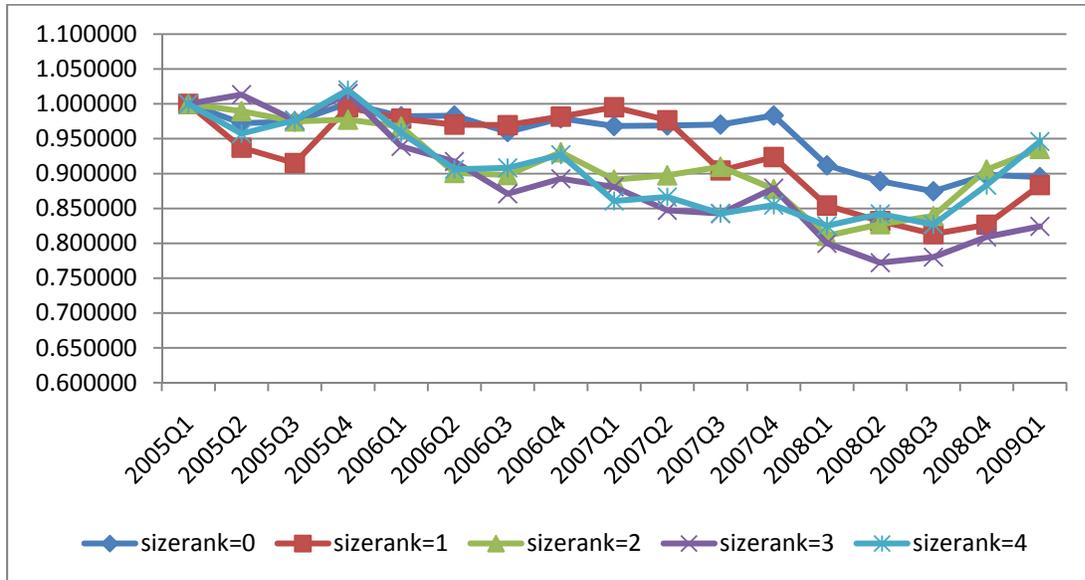
**Panel C: Net Equity Issuance**

	(1) 1995Q1- 2009Q1	(2) Smallest firms	(6) Largest firms	(7) Investment	(8) Speculative	(9) Unrated
lag_dqsize	-0.0002 (0.890)	-0.0041** (0.018)	0.0091*** (0.000)	0.0097*** (0.000)	0.0092*** (0.000)	-0.0021 (0.167)
lag_ocf	-0.0737*** (0.000)	-0.0726*** (0.000)	-0.0333*** (0.000)	-0.0307*** (0.000)	-0.0235*** (0.000)	-0.0726*** (0.000)
lag_dividends	-0.5862*** (0.000)	-0.6322*** (0.000)	-0.2162*** (0.000)	0.0214 (0.620)	0.0386 (0.779)	-0.6028*** (0.000)
divdum	0.0014*** (0.000)	0.0006 (0.272)	0.0001 (0.892)	-0.0003 (0.409)	-0.0008 (0.279)	0.0011** (0.011)
lag2_leverage	0.0118*** (0.000)	0.0040*** (0.004)	0.0142*** (0.000)	0.0158*** (0.000)	0.0048*** (0.009)	0.0085*** (0.000)
lag_ngbe	-0.0016 (0.159)	-0.0002 (0.913)	-0.0018 (0.182)	-0.0092*** (0.000)	-0.0024** (0.043)	0.0008 (0.641)
lag2_logmc	-0.0036*** (0.000)	-0.0042*** (0.000)	-0.0008*** (0.000)	-0.0004*** (0.001)	-0.0012*** (0.000)	-0.0043*** (0.000)
lag_MB	0.0099*** (0.000)	0.0117*** (0.000)	-0.0006** (0.035)	-0.0017*** (0.000)	0.0054*** (0.000)	0.0108*** (0.000)
lag2_cash	-0.0199*** (0.000)	-0.0224*** (0.000)	-0.0025 (0.556)	-0.0129*** (0.000)	-0.0023 (0.520)	-0.0201*** (0.000)
lag2_stdebt	0.0015 (0.476)	0.0077*** (0.004)	-0.0157*** (0.000)	-0.0156*** (0.000)	0.0023 (0.599)	0.0027 (0.266)
lag_R&D	0.3464*** (0.000)	0.3464*** (0.000)	0.1109*** (0.000)	0.1260*** (0.000)	0.0105 (0.781)	0.3434*** (0.000)
lag_capex	0.1432*** (0.000)	0.1617*** (0.000)	0.1025*** (0.000)	0.0411*** (0.000)	0.0969*** (0.000)	0.1523*** (0.000)
dqtr2	-0.0008 (0.107)	-0.0008 (0.237)	-0.0002 (0.741)	-0.0000 (0.949)	-0.0004 (0.717)	-0.0007 (0.252)
dqtr3	-0.0029*** (0.000)	-0.0030*** (0.000)	-0.0019*** (0.005)	-0.0016*** (0.001)	-0.0018* (0.083)	-0.0030*** (0.000)
dqtr4	-0.0005 (0.323)	-0.0001 (0.899)	-0.0009 (0.147)	-0.0003 (0.447)	-0.0014 (0.177)	-0.0002 (0.683)
dum051	0.0001 (0.922)	-0.0004 (0.805)	-0.0021** (0.035)	-0.0004 (0.642)	-0.0029* (0.056)	-0.0002 (0.870)
dum052	-0.0016* (0.085)	-0.0015 (0.281)	-0.0033*** (0.006)	-0.0029*** (0.004)	-0.0022 (0.127)	-0.0020* (0.093)
dum053	0.0028*** (0.006)	0.0037** (0.014)	-0.0016 (0.143)	-0.0017* (0.081)	-0.0004 (0.782)	0.0033** (0.012)
dum054	0.0005	0.0014	-0.0025**	-0.0022**	-0.0000	0.0003

	(0.636)	(0.390)	(0.044)	(0.028)	(0.990)	(0.843)
dum061	0.0028**	0.0041**	-0.0030**	-0.0017	-0.0043***	0.0039***
	(0.013)	(0.016)	(0.020)	(0.113)	(0.000)	(0.008)
dum062	-0.0025**	-0.0013	-0.0044***	-0.0083***	-0.0045***	-0.0023
	(0.019)	(0.442)	(0.010)	(0.000)	(0.006)	(0.104)
dum063	-0.0022***	-0.0028**	-0.0054***	-0.0058***	-0.0037***	-0.0025**
	(0.009)	(0.026)	(0.000)	(0.000)	(0.009)	(0.022)
dum064	0.0021*	0.0030*	-0.0026***	-0.0023**	-0.0034**	0.0030**
	(0.069)	(0.093)	(0.005)	(0.025)	(0.025)	(0.045)
dum071	-0.0018*	-0.0025*	-0.0049***	-0.0056***	-0.0013	-0.0024**
	(0.066)	(0.084)	(0.000)	(0.000)	(0.584)	(0.042)
dum072	0.0018	0.0053***	-0.0070***	-0.0064***	-0.0041**	0.0035**
	(0.129)	(0.005)	(0.000)	(0.000)	(0.023)	(0.026)
dum073	-0.0009	0.0003	-0.0069***	-0.0087***	-0.0046**	0.0000
	(0.424)	(0.850)	(0.000)	(0.000)	(0.013)	(0.984)
dum074	-0.0023**	-0.0016	-0.0051***	-0.0055***	-0.0026	-0.0025*
	(0.040)	(0.344)	(0.000)	(0.006)	(0.129)	(0.084)
dum081	-0.0069***	-0.0082***	-0.0059***	-0.0074***	-0.0067***	-0.0080***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
dum082	-0.0026***	-0.0043***	-0.0012	-0.0025**	-0.0032***	-0.0036***
	(0.000)	(0.000)	(0.352)	(0.024)	(0.006)	(0.000)
dum083	-0.0014*	-0.0029**	-0.0015	-0.0030***	-0.0039***	-0.0018*
	(0.061)	(0.011)	(0.114)	(0.001)	(0.000)	(0.066)
dum084	-0.0043***	-0.0083***	0.0001	-0.0007	-0.0013	-0.0066***
	(0.000)	(0.000)	(0.913)	(0.300)	(0.360)	(0.000)
dum091	0.0007	-0.0018*	0.0008	0.0021***	-0.0021**	-0.0002
	(0.251)	(0.065)	(0.363)	(0.006)	(0.020)	(0.787)
Constant	0.0061***	0.0061***	0.0036**	0.0009	0.0028	0.0075***
	(0.000)	(0.000)	(0.021)	(0.316)	(0.127)	(0.000)
Observations	184,186	119,498	11,589	18,786	22,986	142,414
Adjusted R-squared	0.117	0.123	0.085	0.076	0.024	0.123

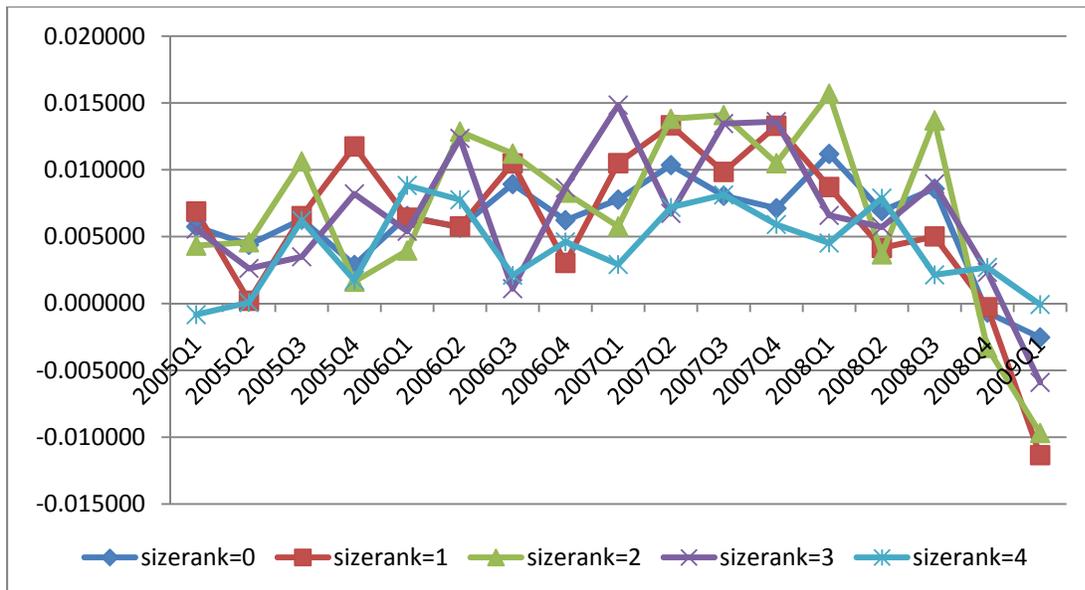
**Figure 1: Cash/Assets by Size Groupings**

We use NYSE cutoffs for firm size quintiles and normalize the average cash/assets ratio to 1 at the start of the credit boom. Sizerank = 0 (4) are the smallest (largest) firms.



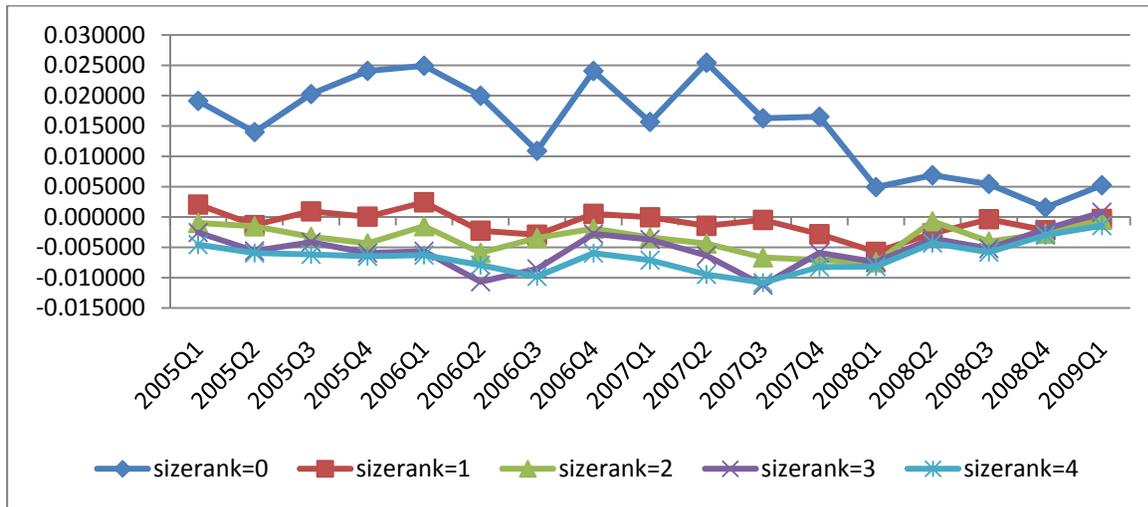
**Figure 2: Net Debt Issuance by Size Groupings**

We use NYSE cutoffs for firm size quintiles. Sizerank = 0 (4) are the smallest (largest) firms.



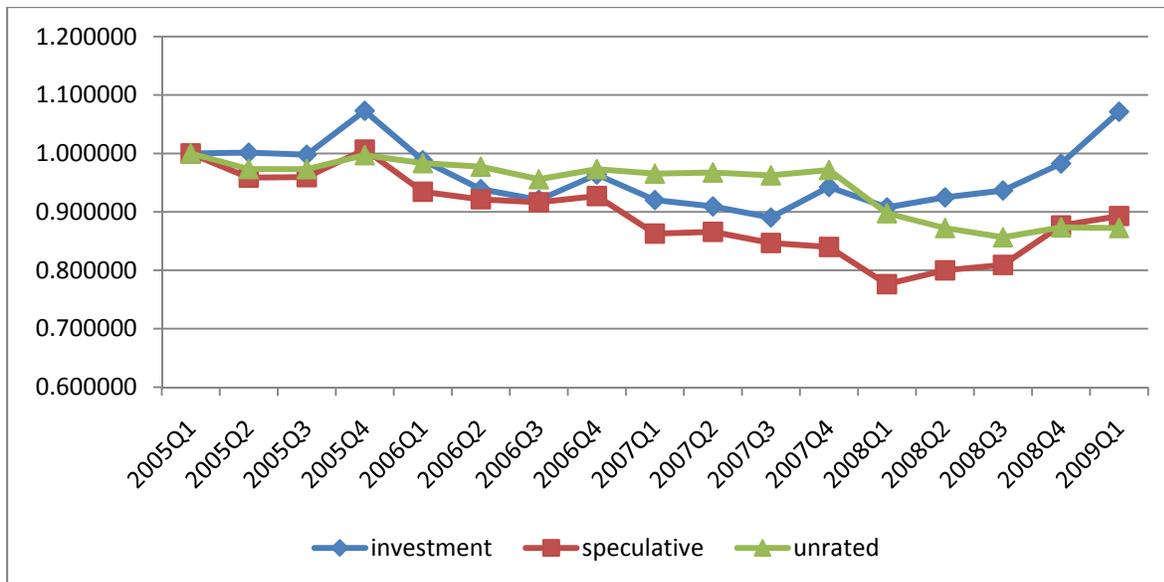
**Figure 3: Net Equity Issuance by Size Groupings**

We use NYSE cutoffs for firm size quintiles. Sizerank = 0 (4) are the smallest (largest) firms.



**Figure 4: Cash/Assets by Rating Groupings**

We divide firms quarterly into firms with an investment grade rating, a speculative rating, and no rating using the S&P long-term rating (*spltrcm*) available on Compustat.



## Appendix

All variables are quarterly, unless otherwise noted. For variables reported on a year-to-date basis, the quarterly value is calculated by subtracting the lagged value from the current value; in the first quarter of a fiscal year, the lagged value is set equal to zero. Variables names preceded by “lag” are the value of that variable in the previous quarter; variable names preceded by lag2 are the value of that variable two quarters prior.

Variable name	Description
Avgtint	Average of monthly intermediate term treasuries during the quarter
Capex	capital expenditures ( <i>capxy</i> ) / lagged assets
Cash	cash and marketable securities ( <i>cheq</i> ) divided by assets
Divdum	dummy variable equal to one if firm paid dividends
Dividends	total cash dividends ( <i>dvy</i> ) minus preferred dividends ( <i>dvpq</i> ) paid during the quarter, divided by lagged assets
Dqsize	assets minus lagged assets, divided by lagged assets
Indmlev	median industry market leverage ratio in the previous quarter, based on the industry groupings in Fama and French (2002).
Leverage	long-term debt ( <i>dlttq</i> ) plus debt in current liabilities ( <i>dlcq</i> ), divided by assets ( <i>atq</i> )
logMC	log (market value of equity)
Size	log (book value of assets in 2009 dollars)
Mkt lev	long-term debt ( <i>dlttq</i> ) plus debt in current liabilities ( <i>dlcq</i> ), divided by long-term debt ( <i>dlttq</i> ) plus debt in current liabilities ( <i>dlcq</i> ) plus the market value of common equity
Sigma12	the median of the standard deviations of cash flow/assets over past 12 quarters for firms in the same industry, as defined by two-digit SIC code.
Net equity Issuance	equity issuance ( <i>sstky</i> ) minus aggregate equity repurchase ( <i>prstkcy</i> ), divided by lagged assets
Net LT debt Issuance	long-term debt issuance ( <i>dltisy</i> ) minus long-term debt retirement ( <i>dltry</i> ) divided by lagged assets
Net total debt issuance	change in long-term debt ( <i>dlttq</i> ) and debt in current liabilities ( <i>dlcq</i> ) during the quarter, divided by lagged assets
NgBE	dummy variable equal to one if book equity ( <i>ceqq</i> ) is less than 0
NWC	working capital ( <i>wcapq</i> ) minus cash, divided by assets

OCF (operating cash flow)	Operating cash flow calculated following Minton and Schrand (1999) as sales ( <i>saleq</i> ) less cost of goods sold ( <i>cogsq</i> ) less selling, general and administrative expenses ( <i>xsgaq</i> ) less the change in working capital for the period, divided by total assets ( <i>atq</i> ). Working capital is current assets other than cash and short-term investments less current liabilities and is calculated as the sum of the non-missing amounts for accounts receivable ( <i>rectq</i> ), inventory ( <i>invqtq</i> ), and other current assets ( <i>acoq</i> ) less the sum of the non-missing amounts for accounts payable ( <i>apq</i> ), income taxes payable ( <i>txpq</i> ), and other current liabilities ( <i>lcoq</i> ). If all components of working capital are missing in either the current quarter or the previous quarter, working capital and operating cash flow are both set equal to missing. Quarterly selling, general and administrative expenses exclude one-quarter of annual research and development costs ( <i>xrd</i> ) and advertising expenses ( <i>xad</i> ) when those data items are available.
Acquisitions	acquisitions ( <i>acqy</i> ) divided by assets
PPE	PPE ( <i>ppentq</i> ) divided by assets
MB	market-to-book calculated as book value of assets ( <i>atq</i> ) minus book value of common equity ( <i>ceqq</i> ) plus the market value of common equity ( <i>cshoq*prccq</i> )
Qspr_hy2	spread of Merrill Lynch US High Yield 100 Index over intermediate term treasuries, averaged over each month of the quarter
R&D	R&D ( <i>xrdq</i> ) / assets. If R&D is reported annually, then quarterly R&D is set equal to one-fourth of annual R&D. If R&D is missing, it is set equal to 0.
Rated	dummy variable equal to one if the S&P long-term rating ( <i>splticrm</i> ) available on Compustat is investment grade or speculative
Rdmiss	dummy variable equal to one if R&D is missing in Compustat
STDebt	change in debt in current liabilities ( <i>dlcq</i> ), divided by lagged assets