

**CCGR**

Centre for Corporate Governance Research

Working Paper  
No. 6/2011

December 2011  
Revised March 2012

## **When Does Cash Matter?**

**Paul Ehling and David Haushalter**

© Paul Ehling and David Haushalter 2011. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission, provided that full credit, including © notice, is given to the source. This paper can be downloaded without charge from the CCGR website <http://www.bi.no/ccgr>

# When does cash matter?

PAUL EHLING and DAVID HAUSHALTER\*

March 2012

## Abstract

We examine the association between a firm's cash holdings and its performance. Using a large sample of private companies, we find that the importance of cash for a firm's performance varies substantially with its size and the conditions it faces. When there are negative shocks to industry or macroeconomic conditions, there is a positive association between cash holdings and performance for small firms. This association is much weaker for large firms. There is no association between cash holdings and performance for other types of conditions, regardless of the firm's size. Consistent with the benefits from cash holdings depending on a firm's ability – and willingness – to use external financing, small firms borrow less than large firms during negative shocks.

---

\* We have received valuable comments from Øyvind Bøhren, Michelle Lowry, Richard Priestley, doctoral students at Penn State University and from workshop participants at Banco de España, BI, CCGR, House of Finance at Goethe-Universität, Queens University, and the University of Iowa. Jing Yu and Ling Yue provided excellent research assistance. We gratefully acknowledge the funding provided by the Centre for Corporate Governance Research (CCGR) at BI Norwegian Business School. Part of this research was conducted while the first author was a Research Fellow at Banco de España. The views expressed are those of the authors and should not be attributed to the Banco de España.

Contact information: Paul Ehling, BI Norwegian Business School, Nydalsveien 37, 0442 Oslo, Norway, Tel: +47 464 10 505, email: [paul.ehling@bi.no](mailto:paul.ehling@bi.no).

David Haushalter, Smeal College of Business, The Pennsylvania State University, University Park, PA 16802, Tel: (814) 863-7969, email: [dhaushalter@psu.edu](mailto:dhaushalter@psu.edu).

## **When does cash matter?**

### **Abstract**

We examine the association between a firm's cash holdings and its performance. Using a large sample of private companies, we find that the importance of cash for a firm's performance varies substantially with its size and the conditions it faces. When there are negative shocks to industry or macroeconomic conditions, there is a positive association between cash holdings and performance for small firms. This association is much weaker for large firms. There is no association between cash holdings and performance for other types of conditions, regardless of the firm's size. Consistent with the benefits from cash holdings depending on a firm's ability – and willingness – to use external financing, small firms borrow less than large firms during negative shocks.

## INTRODUCTION

The literature on the value of corporate cash holdings is somewhat divided. There is compelling evidence in Harford (1999), Dittmar and Mahrt-Smith (2007), Harford, Mansi, and Maxwell (2008), Nikolov and Whited (2010) and other studies indicating that high cash holdings can reflect – or even lead to – agency problems that destroy shareholder value.

There are also, however, well developed arguments for cash holdings increasing shareholder value. Most notably, a line of literature including Opler, Pinkowitz, Stulz, and Williamson (1999), Almedia, Campello, and Weisbach (2004), Bates, Kahle, and Stulz (2009) and others emphasize the precautionary benefits of cash and show that firms more likely to face financial constraints hoard relatively more cash. A general theme of these arguments is that high cash holdings can provide a valuable hedge against downturns in internal cash flow. Cash holdings can reduce a firm's dependence on external financing during these downturns and increase its ability to take on value increasing projects.

Given the concerns of agency problems, an important issue is when, or even whether, the precautionary use of cash adds value.<sup>1</sup> Although it seems clear that firms that are more likely to face constraints hold more cash, what is less clear are the ways

---

<sup>1</sup>The value of cash holdings is also studied by Harford, Mikkelsen, and Partch (2003), Faulkender and Wang (2006), Acharya, Almeida, and Campello (2007), Denis and Sibilkov (2010), Duchin, Ozbas, and Sensoy (2010), and Fresard (2010). Similar to our analysis, Harford, Mikkelsen, and Partch (2003) and Duchin, Ozbas and Sensoy (2010) examine performance around shocks. Harford et al (2003) study industry downturns. Duchin, et al (2010) study performance around the subprime financial crisis. These papers focus on publicly listed firms in the U.S. and show that a firm's performance and investment around these events is positively associated with its cash holdings. Faulkender and Wang (2006) find a greater value is placed on cash holdings if a firm is financially constrained. Acharya, Almeida, and Campello (2007) show that cash holdings are greater for firms facing difficulties financing investment opportunities. Denis and Sibilkov (2010) find that cash holdings enable constrained firms to fund value increasing investments. Fresard (2010) finds firms that hold more cash than rivals realize greater subsequent increases in market share, especially in competitive market and around shocks to competition.

in which these firms benefit from cash holdings, when these benefits are realized, and which firms benefit the most from holding more cash. To shed further light on some of these issues, we empirically examine the cash holdings of more than 238,000 private companies from 2000 to 2009. Of particular interest is the association between a firm's cash holdings and its performance when industry or macroeconomic conditions change substantially, which we label as shocks, and whether this association can be explained by firms' characteristics.

Our sample is from a database of all limited liability firms incorporated in Norway and includes a firm's annual balance sheet and income statement as well as information on its ownership and compensation structure and the relationships between its owners, officers, and directors. Our focus is on private firms, which account for more than 99.9% of the observations in the database. This sample offers several benefits. First, it features both substantial costs of external financing and substantial variation in these costs. For example, as discussed by Hennessy and Whited (2007), a firm's size is arguably the best proxy for the costs of external financing. The value of assets of the sample firms ranges from an average of less than 0.54 mm NOK for the smallest quartile to more than 24.7 mm NOK for the largest quartile.<sup>2</sup> Second, given the size of the firms in the sample, derivatives are unlikely to be widely used, making cash as a primary means of risk management. Finally, as discussed by Goa, Harford, and Li (2010), because these firms are closely held, agency conflicts between owners and managers are of less concern. Therefore, precautionary concerns rather than agency problems are particularly important in the firm's choice of cash holdings.

---

<sup>2</sup> The exchange rate of USD/NOK during the sample period ranges from roughly 5 to 9 (monthly averages). Source: [www.norges-bank.no](http://www.norges-bank.no).

Our primary finding is that although there are benefits from high cash holdings, these benefits are largely limited to very small firms around negative shocks. For example, we first sort firms based on size and examine performance around industry shocks. For small firms around negative shocks, firms with more cash do better. In particular, the change in a firm's sales around a negative shock is positively associated with the fraction of its assets it held in cash. We find no association, however, between cash holdings and the change in sales when there is a positive shock or in the year prior to a shock. The findings hold after controlling for a firm's prior sales growth and other characteristics. Results are similar when performance is measured using a firm's probability of survival and when we focus performance around the global financial crisis rather than industry specific shocks. For large firms, cash holdings appear less important around shocks. There is some evidence that the cash holdings of large firms are important for changes in investment and assets around shocks – especially around macroeconomic shocks. We find no evidence, however, that cash holdings are associated with changes in a firm's sales or the probability of its survival.

These results indicate that the benefits from cash holdings, as shown in Faulkender and Wang (2006), Acharya, Almeida, and Campello (2007), and Denis and Sibilkov (2010), and Fresard (2010) are especially important when firms face negative shocks. The findings also indicate that the benefits from holding more cash around negative shocks, like those described by Harford, Mikkelsen, and Partch (2003), are greatest for small firms. For large firms the benefits of cash holdings for managing shocks are less clear.

The results raise the question of why cash holdings around negative shocks matter more for small firms than large. Additional analysis indicates that at least part

of the answer lies in differences in a firm's access to, and willingness to use, additional credit. In particular, small firms cut back on debt when there are negative shocks, regardless of cash holdings or the type of shock. There is no evidence that small firms make up for this decrease in debt financing with an increase in equity financing. Moreover, a form of capital that does increase for small firms with low cash is the use of supplier financing, which can be particularly costly. In contrast, the median large firm increases its use of debt during negative industry shocks. The increase in debt is greatest for the large firms with low cash holdings. We also note, however, that the type of shock matters for large firms. During negative macroeconomic shocks, large firms reduce debt. This reduction in debt is greatest for the large firms with low cash.

Collectively, the results indicate that although there can be benefits from holding more cash, these benefits vary substantially across firms and conditions. Under normal operating conditions, few firms seem to benefit from greater cash holdings. When negative shocks do occur, cash holdings appear to be an important source of financing for small firms. For large firms, the ability to use external financing reduces the importance of internal financing around shocks. The benefits of cash holdings that do exist for large firms are primarily around negative macroeconomic shocks. Therefore, similar to arguments in Duchin, Ozbas, and Sensoy (2010), we conclude that for large firms, cash holdings matter most when a shock reduces the supply of external financing.

In addition to having implications for the literature on cash holdings, our paper relates to the literature on the financial policies of small and private businesses. First, similar to Petersen and Rajan (1994), Petersen and Rajan (1997), and Brav (2009), we explore forms of financing for small businesses. These papers show that private firms

depend primarily on debt financing and that banking relationships and financing from suppliers are especially important for small private businesses. Our findings indicate that when access to these forms of external financing is most limited, cash holdings are also a valuable form of financing. Second, like Vickery (2008) our findings provide insights into risk management by small businesses. Vickery shows that small firms adjust their interest rate exposure to manage the risk of changes in the availability of credit. Our study shows how cash can be used to manage similar types of risks.

## **DATA**

We investigate the cash holdings of private firms using data from the Centre for Corporate Governance Research (CCGR) at BI Norwegian Business School.<sup>3</sup> To our knowledge, the database has the most extensive collection of financial information on private firms that exists. It includes more than 238,000 firms incorporated in Norway. It has fifteen years of accounting data, nine years of governance data, credit ratings for each firm, and extensive data on ownership.

The availability of these data arises because Norwegian law mandates every limited liability firm to publish an annual report with an income statement, a balance sheet, accompanying notes, board of directors' report, and an auditor's report. The rules governing the structure and contents, which must be audited by a publicly certified auditor, apply to all limited liability firms. Each firm must publish the identity of its CEO, directors, and owners, as well as the fraction of equity held by each owner. If a firm fails to submit this information within seventeen months after a fiscal year end, automatic liquidation is triggered. In addition to these data, CCGR

---

<sup>3</sup> See <http://www.bi.no/ccgr>.

also identify family relationships by blood and marriage for all owners, officers, and directors.

We construct our dataset starting from the universe of all firms in Norway (145,656 firms in 2000; 238,213 firms in 2009).<sup>4</sup> Using this dataset, we employ the following data selection criteria: we drop financial firms, public firms, non-limited liability firms, firms in which the largest owner is the Norwegian state, firms with missing industry codes, firms in which assets differ from liabilities plus shareholders equity by more than 2000 NOK, and firms in which financing related variables are in the tails of the variable distribution (bottom and top one percent). Finally, we also discard firms if the number of employees is less than three or if it has no sales. The remaining sample consists of 50,696 firms in 2000 up to 67,411 firms in 2009. A detailed breakdown of the construction of the sample and the variables used in the analysis is shown in Appendix 1.

### *Summary Statistics*

In Table 1 we sort the sample firms into quartiles by assets and report summary statistics. Many firms in the sample are extremely small when compared to publicly traded firms typically studied, although there are still substantial differences in size within the sample. Average sales are 1.7 mm NOK for the smallest quartile and 31 mm NOK for the largest quartile. The average number of employees ranges from 5.3 for the smallest quartile to 24.9 for the largest. Average assets are 0.54 mm NOK for the smallest quartile to 24.7 mm NOK for the largest quartile. The firms in

---

<sup>4</sup> Some of our variables represent averages over several years and thus contain data prior to 2000. We deflate all data to 1998 Norwegian Kroner (NOK). Results, however, are virtually identical if we do not deflate the data.

this “large” quartile might seem small when compared to public firms in the U.S.. Many of these firms, however, are quite large by Norwegian standards. For example, in 2005 the median public firm in Norway has 761 mm NOK assets; the median firm among the 200 largest in the sample has 8370 mm NOK in assets.

Firms are generally profitable and have positive sales growth. There is, however, substantial variation in the rate of growth and profitability within quartiles. For example, among the smallest quartile of firms, year to year sales growth is 23% on average but close to 0% for the median firm. Similarly, for the largest quartile of firms, year to year asset growth is 19% on average but only 4% for the median firm. Although both the mean and the median of return on assets is generally positive across quartiles, in untabulated analysis we find that the fraction of firms not generating positive income ranges from 44% for the smallest quartile to 23% for the largest quartile.

A noticeable difference across the quartiles is investment. The largest quartile of firms invests an average of 1.05 mm NOK and a median of 0.159 mm NOK. By comparison the second quartile only invests 0.05 mm NOK and the smallest quartile invests an average of 0.005 mm NOK. In additional untabulated analysis, we find that investment as a fraction of assets is an average of 4% for the largest two quartiles and 3% for the second quartile and close to 0% for the smallest quartile. Therefore, the greatest difference in investment is for the smallest quartile of firms.

Consistent with more constrained firms hoarding cash, cash holdings are greatest for the smallest firms. The ratio of cash to assets ranges from an average of 0.33 and a median of 0.26 for the smallest quartile to an average of 0.18 and a median of 0.10 for the largest quartile. This pattern in cash holdings is similar to that in Gao, Harford, and Li (2010) who find that among private firms in the U.S., cash holdings

are negatively associated with assets. There is also substantial variation of cash holdings within quartiles. The standard deviation of cash holdings is 28% for the smallest quartile and 20% for the largest quartile of firms.

Debt ratios are similar across quartiles. Medians for the quartiles fall between 78% and 82% and averages are between 73% and 87%. Substantial differences, however, exist in the composition of the debt. Consistent with the idea that small firms face difficulties raising long term debt, the ratio of short term debt to total debt for the smallest quartile is an average of 0.83 and the median is 1. For firms in the largest quartile, the average ratio of short term debt to long term debt is 0.65 and the median is 0.73. The high leverage ratio and dependence on short term debt among these firms in general is consistent with Brav (2009) who argues that these choices reflect private equity being more costly than public equity and the desire of owners to maintain control.

Although the majority of firms do not pay dividends, firms that do pay dividends pay out a large fraction of income. The median dividend payout (dividends to net income) is 0%. The average dividend payout, however, is 14% for the smallest quartile of firms and between 26% and 30% for the other quartiles.

Finally, most firms are closely held. The largest shareholder owns between 62% and 68% of the firm's shares on average. The fraction of the shares owned by the CEO declines from 53% for the smallest quartile to 25% for the largest quartile. The medians decline from 50% to 0%. Institutional ownership is almost non-existent. Institutions own an average of 0.28% of the smallest quartile firms and 1.7% of the largest. State ownership is of a similar magnitude.

The characteristics indicate that although all the firms are private, there are likely important differences in their access to external financing. The financing

policy choices, particularly cash holdings and use of long term debt, are consistent with the view of Hennessy and Whited (2007) and others that smaller firms face greater difficulties in obtaining external financing than larger firms.

To examine when – or if – cash holdings are of value, we focus on how a firm performs during years when there are large changes (what we label as “shocks”) to its operating environment that can have important effects on its cash flows. We examine whether a firm’s performance around these shocks, as well as during non-shock years, varies with its size and cash holdings.

## **ANALYSIS OF FIRM PERFORMANCE AROUND SHOCKS**

### *Industry shocks*

Our primary definition of a shock to a firm’s operating environment is based on changes in sales for a firm’s industry. Using data from 2000 to 2008, we sort all firms into one of eight industries (using NAICS codes). These industries include agriculture, manufacturing, energy, construction, service, trade, transport, and firms operating in multiple sectors. We then identify the industry-years with the largest change in sales. We classify the industry-years with a year to year change in sales that is in the bottom decile of all industry years as negative shocks and industry years in the top decile as positive shocks.<sup>5</sup>

Summary statistics for the industry years with positive and negative shocks are shown in Table 2. The industry-years with negative shocks include three different industries from seven different years. The decline in sales in the negative shock

---

<sup>5</sup> We have 72 industry-years. Therefore, we are not able to cut the sample into exactly the top and bottom decile. The cutoffs we use are the top and bottom 11% of the sample, i.e., eight industry years. The cutoff at eight industry-years (versus seven) is also at the point in which there are clearer differences in industry performance. For example, in the seventh and eighth worst industry-years, the decline in sales from the prior year is -7.65% and -7.22%. In the ninth worst industry-year, which we do not count as a negative shock, the decline in sales is only -4.35%.

group is at least -7.22%. The industry years with positive shocks include five different industries and five different years. The increase in sales for the positive shock group is 25% or more. Several of the industries that realized a positive shock have substantially more firms than industries that realize a decrease; therefore the number of firms we examine around positive shocks is greater than the firms around negative shocks.<sup>6</sup>

To examine the importance of these shocks at the firm level rather than at the industry level we estimate regressions using a framework similar to Gertler and Gilchrist (1994). Gertler and Gilchrist (1994) examine the differences in performance between large and small manufacturing firms around changes in monetary policy rather than in industry conditions. We estimate panel regressions on changes in sales, inventory, and short term debt using the entire sample from 2000 to 2008. A dummy variable that is set to one in any year in which a firm's industry realized a shock and zero otherwise is included as an explanatory variable in the regressions. Like Gertler and Gilchrist, we estimate regressions for small and large firms separately. For brevity in presenting the results, we classify firms in the two smallest quartiles as small firms and the firms in the two largest quartiles as large firms. Results are similar if we break the firms in quartiles.

The results from these regressions are shown in Table 3. The dependent variable used in each regression is shown in the first column and the coefficient on the dummy variable indicating a shock is shown in the next two columns. The regressions indicate that the events we identify as shocks do not simply reflect

---

<sup>6</sup> There are also year to year differences in the number of firms in the industries. We can determine entry and exit of firms operating in an industry. However, we cannot determine the reason for other differences: they might reflect changes in the collection methodology by the data provider, or some other aspect of the data. Because these differences are particularly notable for the multi-sector industry, we re-estimate the analysis without this industry. The findings from the analysis that excludes multi-sector are qualitatively similar to those presented here.

industry changes that are artifacts of the data (e.g., changes in firms included in the sample) or changes for just a handful of the most dominant firms in the industry. In particular, both large and small firms realize a significant change in sales around these shocks. For example when we use the change in the ratio of sales to assets as a dependent variable, the coefficient for the year of the negative industry shock is -0.11 for small firms and -0.08 for large firms. For the dummy indicating a positive industry shock, the coefficient is 0.17 for small firms and 0.12 for large firms. All of these coefficients are statistically significant showing that these are events that ripple throughout the firms in the industry.

The regressions also provide a comparison to the findings of Gertler and Gilchrist (1994). Gertler and Gilchrist examine changes in sales, inventory, and debt around changes in monetary policy. They find that, in general, small firms lose ground to large firms when the availability of credit tightens and do not make up this ground when credit loosens. Gertler and Gilchrist interpret the findings as evidence of small firms facing liquidity constraints. Similar to Gertler and Gilchrist, we find a significant reduction in inventory around negative shocks for small firms but not for large firms and no significant increases in inventory for small firms around positive shocks.<sup>7</sup> These findings are generally consistent with the idea that the effect of shocks can vary with a firm's size. Our interest turns to the importance of cash holdings in managing the effects of these shocks.

---

<sup>7</sup> Analysis of changes in sales and short term debt provides a less direct comparison to Gertler and Gilchrist for a couple of reasons. First, the change in sales around shocks in our sample largely reflects the way a shock is defined. Second, because the use of short term debt is increasing during the sample period, a negative coefficient on the change in short term debt during shock years can reflect a decrease in short term debt or an increase in short term debt just at a slower rate than non-shock years. In analysis we discuss below, we separately examine the cross sectional variation in the change in sales and short term debt around these shocks.

*Cash holdings, firm performance, and industry shocks*

In Table 4 we estimate regressions for the industry-years with negative shocks and the industry-years with positive shocks. The dependent variable in these regressions is the change in sales. By sample construction, all firms in our sample have sales. Only about 70% however have positive profits. As explanatory variables we include variables to control for cash holdings and wide range of other firm level operating characteristics that are described in the table.

Of primary interest for our analysis is the coefficient on cash holdings from these regressions. The regressions in Table 4a are estimated using the entire sample of firms around positive and negative shocks. The coefficients on cash holdings in these regressions are statistically insignificant. These findings indicate that, in general, more cash does not lead to better performance during shocks.

Next, based on arguments that a firm's access to the capital markets can vary with its size, we further sort the sample into small and large firms. The results from these regressions are shown in the first panel of Table 4b.

The regressions in Table 4b show differences in the importance of cash holdings between small and large firms and between positive and negative shocks. Among small firms, the level of cash holdings is positively associated with the change in sales around negative shocks. This finding indicates that the small firms that had greater cash holdings going into a negative shock did better than small firms with less cash. The coefficients on cash holdings in the other regressions are not significant. The findings indicate that benefits to small firms from additional cash holdings, at least in terms of changes in sales, are only apparent around negative shocks. For large firms, the benefits from additional cash holdings are less clear. The coefficient on cash holdings is not significant during positive or negative shocks.

One explanation for a positive association between cash holdings and changes in sales is that cash holdings provide a valuable hedge for small firms against industry downturns. A potential alternative explanation is that faster growing companies hold more cash. In other words, cash holdings are a proxy for firm's performance (although it is not clear for why this would only be the case for small firms and only around negative shocks.) We find no evidence to support this alternative explanation. In particular, in the results shown in Table 4b, the average sales growth for past sales is included in these regressions.<sup>8</sup> Therefore, the results exist after controlling for the firm's past performance. In addition, in the last two columns of Table 4b we estimate regressions on the change in sales for firms in years when shocks do not occur. The idea for these regressions is that if cash holdings reflect a firm's growth rate in general, we would expect to find a positive correlation between cash holdings and sales growth in non-shock years as well. We, however, find no evidence that cash holdings are associated with sales growth in non-cash years for small or large firms.

Overall, the findings in Table 4b are consistent with cash providing a valuable hedge. The findings, however, also show that more cash is not always better. In particular, small firms benefit from holding more cash only when there is a negative shock. Large firms do not appear to benefit from holding more cash around shocks. Therefore, although holding cash can be a valuable hedge, who benefits and when they do so appears to be quite limited.

---

<sup>8</sup> The results shown for regressions on changes in sales (Table 4a, 4b, 5, and 9) also include the sales growth for the past year  $t-1$ . Results are similar if we exclude the sales growth for year  $t-1$  from these specifications. In addition, a lagged measure for high hedging needs (HHN) is included in these regressions to control for sales growth fuelled by recently executed growth options that required large cash positions. Results for the association between cash holdings and firm performance in negative shock industry-years are the similar if regressions are estimated with contemporaneous HHN rather than lagged HHN.

### *Macroeconomic shocks*

Next we consider shocks at the macroeconomic level. We focus on whether the performance of companies around the global financial crisis is associated with their cash holdings heading into the crisis. Although the global financial crisis became widespread in 2008, much of the effect on the industries in Norway was felt in 2009. For example, the median industry in 2009 realized a decrease in sales of 12.02%. By comparison, in the second worst year in Norway during our sample period (1999), the decrease in sales for the median industry was 1.41%. Also around this time, the availability of credit across the economy tightened substantially. For example, the Norges Bank's Survey of Bank Lending indicates a trend of tightening credit standards from 2007 until the third quarter of 2009.<sup>9</sup> Therefore, this event was not only a large shock to firm's internal cash flows, but also occurred when access to external financing was especially limited.

We conduct our analysis using the firms that existed at the end of 2009 and sort the sample firms by size.<sup>10</sup> We then estimate regressions on the change in sales in 2009 using the control variables from Table 4. These regressions are shown in Table 5.

The results from these regressions are similar to those in Table 4b. During 2009, the coefficient on the cash holdings variable is significantly positive for small firms but not for large. This finding shows that, among the small companies, the ones with more cash did better through the crisis. For larger firms, performance around this crisis did not vary with cash holdings. The results indicate that there are benefits of cash holdings for small firms around downturns at the macroeconomic level as well

---

<sup>9</sup> See <http://www.norges-bank.no/en/about/published/publications/norges-banks-survey-of-bank-lending/>. For further discussion about the effects of the global financial crisis on Norway also see: <http://www.imf.org/external/np/sec/pn/2010/pn1014.htm>

<sup>10</sup> We examine the survivorship of firms through a shock later in the analysis.

as at the industry level. The benefits of additional cash holdings for larger firms around these events are less clear.

#### *Changes in operations around shocks*

Although the data limit our ability to pinpoint the ways that cash is used to help sales (e.g., we do not observe changes in advertising expenditures or maintenance), we can observe other changes in firms' operating activities. To study the importance of cash for other activities, we examine changes in inventory, employees, investment, dividends, and assets.

We start by sorting the sample by size and examine changes around shocks for small and large firms. The findings indicate that around negative industry shocks small firms generally make larger cuts to operations than large firms. For example, as shown in the first two columns of Panel A in Table 6, the median small firm reduces its inventory by 2.4%, its assets by 3.9%, and its investments by 79.5%. By comparison, the median large firm increases assets by 1.3%, increases inventory by 3.6%, and decreases its investments by 67%. As shown in Panel B, results are similar when we examine the macroeconomic shocks. Again we find a larger decrease in inventory, assets, and investment for small firms than large.

Next, to examine the importance of cash holdings for these changes, we further sort the sample by cash holdings. As shown in columns 4 to 9 of Table 6, cash holdings are important in several ways. For example, around the negative industry shocks shown in Panel A, the greatest reduction in investment and in assets is for the firms with the least amount of cash. Low cash small firms reduce investment by 83% and reduce assets by 5% while small firms with high cash reduce investment by 75% and assets by 2.5%. For large firms, the primary difference is that the reduction in

investment by low cash firms of 73% is significantly greater than the reduction in investment by high cash firms of 57%.

The importance of cash holdings becomes more apparent in Panel B when we examine changes around the macroeconomic shock of 2009. For small firms, the reduction in inventory and assets is greater for firms with low cash holdings. Although there are large cuts in investment regardless of cash holdings, the cuts are slightly greater for firms with high cash. For large firms, there are clear differences in the changes in operations between high cash and low cash firms. Inventory, investment, and assets are all reduced by a greater extent by the large firms with low cash holdings.

A comparison of Panel A to Panel B shows that the benefits of cash vary with the type of shock. A potential reason for this variation is that the effect of a shock on capital market conditions can depend on the shock. For example, industry specific shocks likely have little effect on bank lending or the availability of other forms external financing. Therefore, a company facing a decrease in internal financing because of an industry shock can increase its use of external financing and lose little ground to counterparts with more cash. Macroeconomic shocks, however, can have a much bigger effect on the availability of external financing. (See for example, the Norges Bank's Survey discussed earlier.) When negative macroeconomic shocks occur, offsetting a decrease in internal financing with external financing becomes more difficult and firms with low cash holdings are at a greater disadvantage. The findings indicate the importance of the type of shock for the benefits of cash holdings varies the most for large firms, which are the firms that more commonly use external financing.

## **ANALYSIS OF CASH HOLDINGS AND FINANCING**

The findings show that the benefits of cash holdings vary with a firm's size and the operating conditions it faces. To better understand these results we examine questions that focus on the financing decisions leading up to and at the time of the shock.

### *Why are there differences in cash holdings?*

To better understand why some firms hold more cash than others, we first analyze the cross sectional variation in cash holdings. Of interest is the extent to which the differences in cash holdings reflect differences in historical operating performance and prior external financing activities.

To examine a firm's sources of cash we follow an approach similar to Kim and Weisbach (2008), Hertz and Li (2010), and McLean (2011) and regress the firm's cash holdings at the beginning of the shock year (t-1) on potential sources of the cash. The explanatory variables in the analysis include the firm's operating cash flow, dividend payout, debt issues, equity issues, and historical cash holdings. We sort the sample into large and small firms and also by high and low cash. The findings are shown in Table 7. Regressions in Panel A are estimated using the past four years of data. The regressions in Panel B use the average value of these variables for the past four years.

The sources of cash are similar between large and small firms. Internal financing is important for both groups. In particular, the variation in cash is associated with the current year's operating cash flow. The operating cash flow in prior years (i.e., year t-2 and year t-3) are also statistically significant for large firms, although not for small firms. When we examine the variation in cash holdings using

the average values from prior years, operating cash flow is only statistically significant for larger firms. Stronger results are found for the firm's choice of a payout policy, measured using  $(OPCF-DIV)/OPCF$ . Firms that, on average, retained a larger fraction of their operating cash have more cash at the time of the shock. This is true for both small and large firms. Moreover, unlike operating cash flow, the variables for payout policy in prior years are significant for small firms. Therefore, the variation in cash holdings is not just a function of which firms generated cash but also the extent to which they retained the cash.

There is little evidence that the variation in cash holdings arises from differences in external financing. For both small and large firms, there is no consistent association between changes in debt or equity and cash holdings. For the few cases in which change in debt is significant, the coefficient is negative indicating that firms with more borrowing did not result in greater cash holdings.

The strongest results are for historical cash holdings. For both large and small firms, cash holdings at the time of the shock ( $t-1$ ) are positively associated with cash holdings three years prior to the shock ( $t-4$ ). This persistence is consistent with a firm choosing a cash holdings policy rather than cash building up randomly.

The results indicate that cash holdings largely reflect corporate cash management policies. Firms with greater cash holdings retain a larger fraction of the cash from operations and have historically kept high levels of cash. These findings hold for large and small firms. The results are consistent with cash being held for precautionary reasons, especially in small firms, rather than just being a residual effect of greater profitability.

### *How do firms finance themselves when shocks occur?*

We next examine the variation in firms' use of external financing around negative shocks. This analysis is motivated by the findings in Tables 4 and 5 that the availability of internal capital, in the form of cash, at the time of a shock is associated with the performance of small firms but not large. Therefore, of particular interest are the differences in how small and large firms finance themselves around these events. We examine this issue by sorting firms by size and cash holdings and then examining the use of various forms of external financing in the year of the shock. Results from this analysis are shown in Table 8.

### *Industry Shocks*

In Panel A we examine changes around negative industry shocks and scale these changes by assets in the year prior to the shock. The findings show a clear difference in the use of debt around shocks between large and small firms. The fraction of debt to assets increases by 1.46% for the median large and decreases by 2.15% for the median small firm. In other words, large firms respond to negative industry shocks by borrowing more while small firms are borrowing less.

Differences in the use of debt become more apparent when we further sort the sample by cash holdings. Consistent with firms borrowing to make up for a shortage of internal financing (cash), we find that large firms with less cash increase debt to assets by 2.02%. Large firms with more cash only increase debt to assets by 0.41%. There is no evidence, however, of low cash small firms borrowing more than high cash small firms around shocks. In fact, low cash small firms reduce debt by more than high cash small firms (-2.56% versus -1.58%.) There is also no evidence that

small low cash firms, or small firms in general, make up for this reduction in debt by increasing equity financing.

An examination of changes to the maturity structure of the debt shows a shift from long term debt to short term debt.<sup>11</sup> The extent of this shift helps explain the differences in borrowing between large and small firms. For example, among large firms, the ratio of short term debt to assets increases by 2.55% for low cash and by 1.19% for high cash. Long term debt, however, decreases by 1.72% for low cash and by 0.43% for high cash. For small firms, long term debt decreases by 2.60% for low cash and by 0.04% for high cash.<sup>12</sup> Although small firms increase their use of short term debt, they do so to a much lesser extent than large firms. In addition, there is no significant difference in this increase between high cash and low cash small firms. Therefore, the increase in debt for large firms, especially low cash large firms, and decrease for small firms is mostly due to differences in the use of short term debt.

There are also significant differences in the use of trade credit, which is arguably the most important source of short-term finance. (See for example Peterson and Rajan (1997)). We measure changes in trade credit (also referred to as supplier financing) as the net change in a firm's accounts payables minus its accounts receivables. We scale this net change by assets. A positive change indicates that a firm is increasing its net use of trade credit (i.e., using more trade credit than it is granting) while a negative change indicates a decrease in the use of trade credit. There is a slight decrease in the use of trade credit for large firms but not small. What stands out, however, is the difference between high cash and low cash firms. Small

---

<sup>11</sup> The change in short term debt shown here includes accounts payable. Results are similar if we exclude accounts payable from the calculation of short term debt. We also examine changes in accounts payable separately in this table.

<sup>12</sup> In additional untabulated analysis there is some evidence that one of the sources of the decrease in long term debt is a decrease in liabilities to financial institutions, although in general these changes seem to be spread across various sources of long term debt.

firms with low cash increase their use of trade credit by 0.08% while small firms with high cash reduce their reliance on trade credit by 0.14%. Similarly, large firms with low cash increase trade credit by 0.13% while large firms with high cash reduce trade credit by 0.36%. As discussed in Petersen and Rajan (1994), trade credit is among the most expensive form of credit. To the extent that an increase in trade credit financing reflects firms stretching out their payables because they cannot obtain other forms of financing, a shortage of cash can be especially costly. At the same time, if holding more cash enables firms to provide more trade credit, additional cash holdings can be beneficial.

In the final row of Panel A, we examine the changes in cash holdings. Of primary interest is the extent to which firms use internal capital to fund operations during shocks. The findings show that for high cash firms, cash is an important source of financing. For example, cash decreases by 2.45% for large high cash firms and by 3.31% for large low cash firms. There is little evidence that low cash firms use cash to fund operations during shocks. In fact, low cash firms slightly increase cash holdings. This increase in cash holdings is 0.03% for large low cash firms and 0.42% for small low cash firms. The findings indicate that firms with greater cash holdings manage negative shocks using cash while low cash firms use external financing or cut back on operations. The results for large firms can be compared to Daniel, Denis, and Naveen (2010) who examine how firms react to cash shortfalls.<sup>13</sup> They find that firms realizing cash shortfalls issue debt rather than using cash holdings. We find similar results for the low cash firms in our sample. For the large high cash firms, however, we find that they both issue debt and use cash.

---

<sup>13</sup> Here our discussion focuses on the large firms in our sample because they are closer in size – albeit still much smaller – to the firms in Compustat that are studied in Daniel et al.

Overall, the findings in Panel A support the idea that large firms have a greater ability to access the external capital market when internal funding falls short. It is difficult to know whether to interpret the lack of borrowing by small firms, especially small low cash firms, as a supply or demand affect. One explanation is that small firms have very limited access to the non-supplier credit markets around negative shocks. This explanation is consistent with survey evidence indicating that the constraints around a shock vary with firm size. For example, in the March 2009 Duke / CFO Magazine survey, only 27% of firms with less than \$25 million reported that they had the ability to obtain external funding to finance attractive investment projects compared to roughly 54% of the firms with more than \$25 million in sales.<sup>14</sup> An alternative explanation is that the owners, who are likely often poorly diversified, are not willing to take on additional credit around these events (other than stretching out payables) because their concerns have shifted from growth to survival.<sup>15</sup> In either case, the availability of internal financing can be especially valuable.

### *Macroeconomic Shocks*

In Panel B of Table 8 we focus on changes in financing around macroeconomic shocks. Although the results for small firms are similar to the results using industry shocks, results differ substantially for large firms. The biggest difference is in the use of debt. For the median large firm, the fraction of debt to assets decreases by 2.52%. Moreover, the 2.95% reduction in debt for large low cash firms exceeds the 1.77% reduction for and the large high cash firms. Therefore,

---

<sup>14</sup> See question 12b of the March 2009 US survey <http://www.cfosurvey.org>. In another question of this survey (12a), companies are asked about financing during normal market conditions. Sixty-six percent of the firms with less than \$25 million reported the ability to obtain external funding to finance investment projects compared to 85% of firms with more than \$25 million.

<sup>15</sup> For a discussion of the concerns of small businesses following the most recent financial crisis and recession see “Small Firms Hunger for Sales, Not Credit,” The Wall Street Journal, August 5 2011.

unlike the results for the industry shocks, large firms with low amounts of cash are not making up for cash shortfalls by borrowing more. There is also no evidence that the large firms with low cash holdings increase their equity, increase their use of supplier financing, or use their existing cash holdings to fund operations. These results are consistent with evidence in Table 6 that there are greater differences in operating performance between high cash and low cash large firms around macroeconomic shocks than industry shocks. The findings suggest that the type of shock can be important for the value of cash holdings. In particular, for larger firms, cash holdings can be more valuable around shocks that also affect the availability of external financing.

## **ALTERNATIVE MEASURES**

### *Sorting based credit ratings*

The analysis to this point has focused on the use of a firm's size as a proxy for its access to the external capital market. Here we sort firms based on credit ratings. This approach is based on the idea that a firm's credit risk can have a similar effect as size for its access to the capital market. Similar to the earlier analysis, we are interested in the variation in the benefits of cash holdings around shocks. There are several important caveats to this analysis. One is that a firm's level of cash holdings might affect its credit rating. Therefore, the variation in cash holdings within ratings groups might be limited. Another is that managerial quality or similar characteristics might determine both a firm's cash holdings and ratings. Although we include control variables in our analysis, this is potentially still an issue of concern. A third is that these credit ratings might be a very noisy proxy for a bank's – or other capital provider's – view of a firm's credit risk.

The source of the credit ratings is the data provider for the CCGR database. In constructing the database, the data provider assigns a credit rating for all firms in the sample for the years 2000 - 2009. The ratings range from 1 to 100 with a lower rating indicating greater credit risk. The model used to arrive at a firm's credit rating is not disclosed by the provider. As shown in Table 1 there appears to be a positive association between a firm's size and its credit rating, although other characteristics are also likely important.

To examine the variation in the importance of a firm's cash holdings based on the extent of its credit risk, we sort firms into two groups: high and low credit risk. The high credit risk group is comprised of the firms with ratings below the median for the sample. We label this group Rating 1 and 2. The low credit risk group labeled Rating 3 and 4 includes firms with ratings that are above the sample median. We then estimate regressions within each group. The dependent variable in each regression is the change in sales during the year of a shock. Of interest is whether the performance around shocks of firms with similar credit risks varies with cash holdings. The explanatory variables are the variables used in Table 4b when firms were sorted in groups by the firm's size. We also consider the same positive and negative industry shocks as we do in Table 4b.

Unlike the results in Table 4b, the coefficient on the cash holdings variable is not significant in any of the regressions in Table 9. In other words, additional cash holdings do not appear to provide benefits to firms with good credit or – possibly more surprisingly – to firms with poor credit. These results (given the caveats discussed above) suggest that cash holdings alone are not necessarily an effective way for firms with poor credit risk to manage the risk from industry shocks.

### *Measuring performance using a firm's survival*

We also examine a firm's performance based on whether it survives a negative shock. A benefit of focusing on a firm's survival is that survival is probably the performance measure that its owners care about most.

To conduct our analysis we classify firms that remain in the sample from the beginning of a year to the beginning of the next year as a survivor for the year. Non-survivors are the firms that leave the sample during the year. We then estimate logistical regressions in which the dependent variable is set to 0 if the firm survives and 1 if not. Regressions are estimated for the year of the shock (year  $t$ ) and each year around the shock (i.e., year  $t-1$  and year  $t+1$ ). Otherwise, the regression specifications are identical to the regressions in Table 4. Results are in Table 10.

The primary finding from this analysis is that the coefficient on the cash holdings variable is significantly negative for small firms for years  $t$  and  $t+1$  relative to a shock. In other words, small firms with less cash are less likely to survive through the year of or the year after a shock.<sup>16</sup> These findings support arguments that for firms with limited access to the capital markets, a firm's cash holdings can be an important determinant for whether it survives through a negative shock. More cash, however, is not significant in any of the regressions using large firms. Therefore, similar to the results in which the change in sales is used as the measure of performance, benefits of additional cash holdings for the survival of large firms are less apparent.

---

<sup>16</sup> The results shown in Table 10 include firms that exited the sample for any reason, including a merger. If we exclude firms that merge from this analysis, the significance of the findings for small firms slightly increase.

### *Measuring performance using change in market share*

As an additional measure of performance around shocks we take an approach similar to Fresard (2010) and examine changes in market share. We define a firm's market share as its sales divided by total sales for all firms in its industry. We compute this measure in years before and after the shock. The change in market share is the difference in this measure between years (market share post-shock minus market share pre-shock). Pre-shock is year (t-1). The post-shock is measured through end of the shock year (t), end of the year after the shock (t+1), and through end of two years after the shock (t+2). The magnitude of the change in market share is generally very small. For example, the median percentage point change in market share is 0.002 for small firms and 0.013 for large firms. We then estimate regressions like that in Table 10 except the dependent variable is the change in a firm's market share around a shock rather than a variable indicating whether a firm survived a shock.

The results shown in Table 11 provide some evidence that for small firms higher cash holdings lead to larger increases in market share around negative shocks. In the regressions estimated on small firms, the coefficient on the cash holdings variable is positive, although only statistically significant (at the 10% level) through the end of the shock year. There is no evidence, however, that large firms realize the same benefits around shocks. For regressions estimated using the sample of larger firms, the coefficient on cash holdings is negative and statistically significant through both year one and year two after the shock.

### *Other specifications*

We also consider various robustness checks in untabulated analysis. For example, we repeat the regressions in Tables 4b and 5 but sort the firms into quartiles

instead of into small and large. These alternative regression specifications support our main conclusions. Further, our results are essentially unchanged when we sort firms into small and large or into quartiles based on all firms that pass our filters instead of only firms that are hit by industry or macro shocks.

## **CONCLUSION**

The value of corporate cash holdings has been widely debated within the literature. At the heart of the debate is the tension between the potential agency problems of keeping “extra” cash around versus the precautionary benefits from doing so. We add to this debate by examining whether firms realize benefits from cash holdings and, if so, when benefits are realized.

To conduct our analysis, we use a large sample of private companies that vary substantially in size. We examine changes in performance around large changes in industry or macroeconomic conditions. Consistent with benefits of precautionary cash holdings, we find that small firms with more cash do better when negative shocks occur. There is less evidence, however, of larger businesses benefiting from holding more cash around shocks or that small firms benefit from holding more cash when positive shocks occur.

Additional analysis indicates that financing activities during shocks vary with a firm’s size. Large firms adjust to a decrease in cash flow from a negative shock by increasing debt. This increase is particularly large among the large firms with low cash holdings and during industry shocks that likely have limited effect on the availability of external financing. In contrast, small firms generally cut back in their use of debt around negative shocks. An exception is supplier financing, which firms with low cash increase. One explanation for this difference in financing activities

between large and small firms is a decrease in the availability of credit for small firms during negative shocks. It is also possible, however, that small firms are not willing to take on more debt during negative shocks, even if debt is available, because owners become more focused on the firm's survival than its growth. With these possibilities in mind, an interpretation of the findings is that the importance of cash holdings depends not only on a firm's ability to take on more debt when negative shocks occur but also its willingness to do so.

The results from our study show that the value of precautionary cash holdings differs across firms, even among private firms. For the smallest firms that make the most limited use of external financing, the benefits from holding more cash to manage the risks of negative shocks are greatest. For larger firms, these benefits are less clear especially if the shock has a limited effect on credit conditions. Therefore much of the value of large firms holding more cash must come from other risks (e.g., product market risks) or non-precautionary reasons.

## REFERENCES

- Acharya, Viral V., Heitor Almeida, and Murillo Campello, 2007. "Is Cash Negative Debt? A Hedging Perspective on Corporate Financial Policies," *Journal of Financial Intermediation* 16, 515-554.
- Almeida, Heitor, Murillo Campello, and Michael Weisbach, 2004. "The Cash Flow Sensitivity of Cash," *Journal of Finance* 59, 1777-1804.
- Bates, Thomas, Kathleen Kahle, and Rene Stulz, 2009, "Why do U.S. Firms Hold So Much More Cash than They Used To?," *Journal of Finance* 64, 1985-2021.
- Brav, Omer, 2009, "Access to Capital, Capital Structure, and the Funding of the Firm," *Journal of Finance* 64, 263-308.
- Daniel, Naveen, Denis, David, and Lalitha Naveen, 2010, "Sources of financial flexibility: Evidence from cash shortfalls," Working Paper, University of Pittsburgh.
- Denis, David and Valeriy Sibilkov, 2010, "Financial Constraints, Investment, and the Value of Cash Holdings," *Review of Financial Studies* 23, 247-269.
- Dittmar, Amy and Jan Mahrt-Smith, 2007, "Corporate Governance and the Value of Cash Holdings," *Journal of Financial Economics* 83, 599-634.
- Duchin, Ran, Ozbas, Oguzhan, and Berk Sensoy, 2010, "Costly External Finance, Corporate Investment, and Subprime Mortgage Credit Crisis," *Journal of Financial Economics* 97, 418-435.
- Faulkender, Michael and Rong Wang, 2006, "Corporate Financial Policy and the Value of Cash," *Journal of Finance* 61, 1957-1990.
- Fresard, Laurent, 2010, "Financial Strength and Product Market Behavior: The Real Effects of Corporate Cash Holdings," *Journal of Finance* 65, 1097-1122.
- Gertler, Mark and Simon Gilchrist, 1994, "Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms," *The Quarterly Journal of Economics* 109, 309-340.
- Goa, Huasheng, Jarrad Harford, and Kai Li, 2011, "Determinants of Corporate Cash Policy: Insights from Private Firms," Working Paper, University of Washington.
- Harford, Jarrad, 1999, "Corporate Cash Reserves and Acquisitions," *Journal of Finance* 54, 1969-1997.
- Harford, Jarrad, Sattar Mansi, and William Maxwell, 2008, "Corporate Governance and Firm Cash Holdings in the U.S.," *Journal of Financial Economics* 87, 535-555.

- Harford, Jarrad, Mikkelson, Wayne and Megan Partch, 2003, "The effect of cash reserves on corporate investment and performance in industry downturns," Working Paper, University of Washington.
- Hennessy, Christopher A. and Toni M. Whited, 2007. "How Costly Is External Financing? Evidence from a Structural Estimation," *Journal of Finance* 62, 1705-1745.
- Hertzel, Michael and Zhi Li, 2010, "Behavioral and Rational Explanations of Stock Price Performance around SEOs: Evidence from a Decomposition of Market-to-Book Ratios," *Journal of Financial and Quantitative Analysis* 45, 935-958.
- Kim, Woojin and Michael Weisbach. 2008, "Motivations for Public Equity Offers: An International Perspective." *Journal of Financial Economics*, 87, 281–307.
- McLean, David, 2011. "Share Issuance and Cash Savings," *Journal of Financial Economics* 99, 693-715.
- Nikolov, Boris and Toni Whited, 2010, "Agency Conflicts and Cash: Estimates from a Structural Model," Working Paper, University of Rochester.
- Opler, Tim, Lee Pinkowitz, Rene Stulz, and Rohan Williamson, 1999, "The Determinants and Implications of Corporate Cash Holdings," *Journal of Financial Economics* 52, 3-46.
- Petersen, Mitchell and Raghuram G. Rajan, 1994, "The Benefits of Lending Relationships: Evidence from Small Business Data," *Journal of Finance* 49, 3-37.
- Petersen, Mitchell and Raghuram G. Rajan, 1997, "Trade Credit: Theories and Evidence," *Review of Financial Studies* 10, 661-91.
- Vickery, James 2008. "How and Why Do Small Firms Manage Interest Rate Risk?," *Journal of Financial Economics* 87, 446-470.

## Appendix

### Sample Construction

This table shows the construction of the initial sample for our analysis. The full sample is all firms in the Centre for Corporate Governance Research (CCGR) database.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Full sample	145656	149468	153912	155996	158259	182689	208971	222196	233955	238213
Drop if financial variable is the tails of distribution*	22614	28507	31734	31309	31426	30373	33001	35206	39752	41601
Drop if the largest owner is state	957	1048	1059	1081	1075	1067	1066	1094	1090	13
Drop financial firms & missing-industry-code firms	4346	5135	4923	3723	4168	9926	22797	23301	25671	15519
Drop extreme unbalanced obs.**	420	450	380	1260	759	5593	298	253	370	264
Drop if number of employees < 3	37065	36385	37069	38243	37995	40571	41064	41833	40898	38917
Drop if zero sales	28035	26772	27222	27527	29202	34286	44698	50514	53053	68242
Sample after all filters	52219	51171	51525	52853	53634	60873	66047	69995	73121	73657
Drop if the firm is listed on Oslo Børs or Oslo Axess	19	17	18	18	20	15	21	15	13	14
Sample after dropping listed firms	52200	51154	51507	52835	53614	60858	66026	69980	73108	73643
Drop non-limited liability firms	1504	1387	2065	2187	2248	3713	4316	4804	6212	6232
Final sample	50696	49767	49442	50648	51366	57145	61710	65176	66896	67411

\* Tails are top and bottom 1%. Done to minimize the effect of extreme observations that likely contain errors.

\*\* Balance sheet is classified as unbalanced if the absolute value of the difference between assets and liabilities plus shareholder equity exceeds 2000NOK.

Appendix. Continued

**Definition of Variables**

This table shows the construction of the main variables. The cash holdings variable is defined as cash and other liquid securities, similar to Acharya et al. (2007). The other variables are constructed by the Centre for Corporate Governance Research (CCGR). Definitions of control variables are provided in the tables.

Cash holding =	Investments in listed companies + Investments in listed bonds + Investment in other traded financial instruments + Other financial instruments + Cash and cash equivalents + Other current assets
Investment =	Change in R&D + change of Total fixed assets (tangible) - Depreciation – Impairment and write-down of fixed assets and intangible assets
Sales =	Revenue (other operating revenue is not included)
Short term debt =	Convertible loans + Certificate loans w/ less than 1 yr maturity + Liabilities to financial institutions + Accounts payable + Tax payable + Public duties payable + Dividends + Debts to companies in same group + Bank overdraft + Other short term liabilities
Long term debt =	Pension liabilities + Deferred tax + Other provisions + Provisions + Convertible Bonds + Bonds + Liabilities to financial institutions + Subordinated loan capital + Long term liabilities groups + Other long-term liabilities
Total debt =	Short term debt + Long term debt
Net income =	Income after tax and after extraordinary revenue and expenses

**Table 1: Descriptive Statistics**

This table reports descriptive statistics (mean, median, standard deviation) of sample firms (all private firms from Norway that pass our filters). Firms are sorted on size (assets) into quartiles with 1=smallest and 4=largest quartile. Firm characteristics are grouped into the following categories: firm size; growth, profits, investment & age; financing; owners and others. The sample ranges from 2000 to 2009; variables based on changes include data from 1999. Values are in NOK.

	Size			
	1=smallest	2	3	4=largest
<b>SIZE</b>				
	1663823	4574974	9474186	30970340
Sales	1346919	3751912	7719500	21435076
	1884514	4166405	8357836	30361214
	539203.6	1697959.6	4106222.6	24687658
Assets	541315.4	1655951.3	3899792.0	13651551
	278912.6	436240.3	1136599.4	33125025.0
	5.27	6.76	9.90	24.91
# of Employees	4	5	8	16
	4.89	6.83	9.69	38.11
<b>GROWTH, PROFITS, INVESTMENT &amp; AGE</b>				
	0.23	0.19	0.18	0.19
Sales Growth	-0.00	0.03	0.04	0.04
	1.17	0.90	0.83	0.85
	0.09	0.14	0.16	0.19
Asset Growth	-0.05	0.01	0.03	0.05
	0.85	0.69	0.67	0.72
	-0.01	0.07	0.09	0.08
Return on Assets	0.03	0.07	0.08	0.07
	0.33	0.20	0.17	0.16
	4998.4	50174.2	153663.7	1058965
Investment	0	0	26256.9	159165.0
	192832.4	392044.0	836089.0	9569643
	7.6	9.8	11.4	14.5
Firm Age (in years)	5	7	9	11
	9.1	9.8	10.6	13.9
<b>FINANCING</b>				
	0.33	0.27	0.23	0.18
Cash Holdings / Assets	0.26	0.19	0.16	0.10
	0.28	0.23	0.22	0.20
	0.87	0.81	0.78	0.73
Total Debt / Assets	0.78	0.82	0.82	0.78
	0.61	0.29	0.23	0.22

Table 1. Continued

	0.83	0.76	0.71	0.65
ST Debt / Total Debt	1	0.88	0.81	0.73
	0.27	0.28	0.30	0.323
	0.140676	0.267693	0.301961	0.263365
Dividends / Net Income	0	0	0	0
	0.419524	0.539174	0.554338	0.527301
	0.40	0.48	0.54	0.63
Rating	0.44	0.5	0.57	0.66
	0.18	0.17	0.17	0.17
<b>OWNERS</b>				
	52.59	48.85	41.75	24.70
CEO Share	50	50	36.66	0
	37.18	37.59	37.94	34.07
	68.17	67.37	65.57	62.07
Largest Owner's Share	60	60	60	52
	27.69	27.50	27.99	29.36
	0.60	0.65	0.628	0.48
Family Firm (dummy)	1	1	1	0
	0.49	0.48	0.49	0.50
	0.31	0.70	1.20	1.82
Institutional Share	0	0	0	0
	4.84	7.45	9.81	11.54
	0.19	0.23	0.352	1.01
State Share	0	0	0	0
	3.22	3.71	4.50	7.64
	0.65	0.68	0.64	0.47
CEO in Largest Family	1	1	1	0
	0.48	0.46	0.48	0.50
<b>OTHER</b>				
Number of observations	136433	145807	146106	141911
Number of Unique Firms	52125	50636	45248	36451

**Table 2: Negative and Positive Industry Sales Growth Shocks**

This table reports descriptive statistics (year, mean sales growth, and the number of firms: N) of industry sales growth shocks. Industry sales growth shocks are defined by the following cut-off levels: -7.2 percent (bottom 11 percent) for negative shocks and 24.9 percent (top 11 percent) for positive shocks over 2000 - 2008; changes in 2000 include data from 1999.

NEGATIVE SHOCK			
INDUSTRY	Year	Industry Sales Growth	N
multisector	2007	-64.02%	659
energy	2000	-12.03%	143
energy	2004	-9.58%	251
multisector	2000	-9.32%	945
agriculture	2003	-8.79%	1374
energy	2005	-8.17%	257
agriculture	2001	-7.65%	1339
agriculture	2002	-7.22%	1320

  

POSITIVE SHOCK			
INDUSTRY	Year	Industry Sales Growth	N
energy	2002	24.93%	180
multisector	2004	26.16%	1991
energy	2006	26.98%	305
construction	2007	27.75%	8508
transport	2005	31.15%	3029
agriculture	2005	35.87%	1676
multisector	2003	37.36%	1587
multisector	2006	58.14%	3728

**Table 3: Effect of Negative and Positive Industry Sales Growth Shock**

The table shows coefficient estimates of industry sales growth shock dummy variables from panel regressions in the spirit of the multivariate regressions in Table 4 in Gertler and Gilchrist (1994). Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. Regressions contain the following variables with untabulated coefficients: 1 period lag of the shock (industry sales growth dummy variables), lagged dependent variables, GDP, Inflation, Short Term Rate, Industry and Year dummy variables plus a constant. Regressions are performed separately for negative and positive industry sales growth shocks (see Table 2). Main sample: all firms in an industry realizing a shock between 2000 to 2008; changes and lagged variables include data prior to 2000. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses.

Dep. Var.	Size: 1 & 2	Size: 3 & 4
NEGATIVE SHOCK		
$\Delta$ SALES / ASSETS (t-1)	-0.110** (-2.54)	-0.080*** (-4.56)
$\Delta$ INVENTORY / ASSETS (t-1)	-0.008* (-1.82)	-0.004 (-1.29)
$\Delta$ STD / ASSETS (t-1)	-0.030** (-2.05)	-0.021*** (-2.68)
POSITIVE SHOCK		
$\Delta$ SALES / ASSETS (t-1)	0.169*** (5.51)	0.124*** (8.37)
$\Delta$ INVENTORY / ASSETS (t-1)	0.001 (0.35)	0.002 (0.72)
$\Delta$ STD / ASSETS (t-1)	0.015* (1.72)	0.019*** (3.72)

**Table 4a: Cash Holdings and Firm Performance**

This table reports coefficient estimates of Cash Holding for OLS regressions with change in sales to assets during the year of an industry shock as the dependent variable. Explanatory variables with untabulated coefficients include Mean Sales Growth (computed from sales growth rates over t-1 and t-2; where t denotes the shock year), HHN (HHN is the Acharya, Almeida, and Campello (2007) measure of high hedging needs), lagged dependent variable, Industry Sales Growth (t, t-1, t-2, t-3),  $\Delta$  Number of Employees / Assets (t-1), Return on Assets (t-1), Account Payable Turnover (t-1), Account Payable (t-1) / Assets (t-1), Account Receivable (t-1) / Assets (t-1), the logarithm of Firm Age, Bank Overdraft (t-1) / Total Debt (t-1), Dividends (t-1) / Net Income (t-1), Rating, PP&E (t-1) + Inventory (t-1) / Assets (t-1), Total Debt (t-1) / PP&E (t-1) + Inventory (t-1), MRDOL (Mandelker and Rhee (1984) measure of operating leverage), Percentage change of debt, Percentage change of equity, CEO Share, Ownership Herfindahl, Institutional Share, State Share, Largest Owner's Share, Second Largest Owner's Share, and Family Firm, CEO member of Largest Family, Industry and Year dummy variables plus a constant. Main sample: all firms in an industry realizing a shock between 2000 to 2008, changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses.

	NEGATIVE SHOCK	POSITIVE SHOCK
Dep. Var. / In-Dep. Var.	$\Delta$ SALES / ASSETS (t-1)	$\Delta$ SALES / ASSETS (t-1)
Cash Holding (t-1) / Assets (t-1)	0.0715 (0.73)	-0.089 (-0.82)
Also includes control variables industry and year dummies		
<i>N</i>	2394	10711
adj. <i>R</i> <sup>2</sup>	0.139	0.106

**Table 4b: Cash Holdings, Firm Performance and Firm Size with Industry Shocks**

This table reports coefficient estimates for OLS regressions with change in sales to assets during the year of an industry shock as the dependent variable. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. Mean Sales Growth is computed from sales growth rates over t-1 and t-2; where t denotes the shock year. HHN is the Acharya, Almeida, and Campello (2007) measure of high hedging needs. Explanatory variables with untabulated coefficients include lagged dependent variable, Industry Sales Growth (t, t-1, t-2, t-3),  $\Delta$  Number of Employees / Assets (t-1), Return on Assets (t-1), Account Payable Turnover (t-1), Account Payable (t-1) / Assets (t-1), Account Receivable (t-1) / Assets (t-1), the logarithm of Firm Age, Bank Overdraft (t-1) / Total Debt (t-1), Dividends (t-1) / Net Income (t-1), Rating, PP&E (t-1) + Inventory (t-1) / Assets (t-1), Total Debt (t-1) / PP&E (t-1) + Inventory (t-1), MRDOL (Mandelker and Rhee (1984) measure of operating leverage), Percentage change of debt, Percentage change of equity, CEO Share, Ownership Herfindahl, Institutional Share, State Share, Largest Owner's Share, Second Largest Owner's Share, and Family Firm, CEO member of Largest Family, Industry and Year dummy variables plus a constant. Main sample: all firms in an industry realizing a shock between 2000 to 2008; changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. No shock sample corresponds to the pooled data after filters without all observations in negative industry shock. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses.

	NEGATIVE SHOCK		POSITIVE SHOCK		NO SHOCK (POOLED)	
	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4
Dep. Var. / In-Dep. Var.	$\Delta$ SALES / ASSETS (t-1)					
CASH HOLDING (t-1) / ASSETS (t-1)	0.331** (1.97)	-0.082 (-0.69)	-0.163 (-0.77)	-0.0210 (-0.17)	-0.0429 (-1.34)	0.027 (1.19)
MEAN SALES GROWTH	0.004 (0.27)	-0.000 (-0.24)	-0.000 (-0.37)	-0.002*** (-3.59)	-0.000 (-0.79)	0.000** (2.51)
HHN	0.106* (1.77)	-0.049 (-1.03)	0.168** (2.27)	0.141*** (3.11)	0.052*** (5.14)	0.100*** (9.65)
Also includes control variables industry and year dummies						
N	1037	1357	4291	6420	94342	123303
adj. R <sup>2</sup>	0.142	0.194	0.055	0.222	0.074	0.112

Including macro variables (changes in GDP, inflation, and over-night lending rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions. HHN is estimated using data: t, t-1, t-2. Using HHN based on data t-1, t+1 or t, t+1, t+2 (consistent with Acharya, Almeida, and Campello (2007)) yield qualitatively similar results. Sorts on size are performed only for firms that experience a (positive / negative) shock. Global sorts based on all firms that pass our filters yield qualitatively similar regressions results.

**Table 5: Cash Holdings, Firm Performance and Firm Size with Macro Shock**

This table reports coefficient estimates for OLS regressions with change in sales to assets during 2009 as the dependent variable. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. Mean Sales Growth is computed from sales growth rates over t-1 and t-2; where t denotes the shock year. HHN is the Acharya, Almeida, and Campello (2007) measure of high hedging needs. Explanatory variables with untabulated coefficients include lagged dependent variable, Industry Sales Growth (t, t-1, t-2, t-3),  $\Delta$  Number of Employees / Assets (t-1), Return on Assets (t-1), Account Payable Turnover (t-1), Account Payable (t-1) / Assets (t-1), Account Receivable (t-1) / Assets (t-1), the logarithm of Firm Age, Bank Overdraft (t-1) / Total Debt (t-1), Dividends (t-1) / Net Income (t-1), Rating, PP&E (t-1) + Inventory (t-1) / Assets (t-1), Total Debt (t-1) / PP&E (t-1) + Inventory (t-1), MRDOL (Mandelker and Rhee (1984) measure of operating leverage), Percentage change of debt, Percentage change of equity, CEO Share, Ownership Herfindahl, Institutional Share, State Share, Largest Owner's Share, Second Largest Owner's Share, and Family Firm, CEO member of Largest Family, Industry and Year dummy variables plus a constant. Sample: 2009; changes and lagged variables include data prior to 2009. Macro shock is defined as negative GDP growth rate: In our sample only 2009 shows negative GDP growth. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses.

Dep. Var. / In-Dep. Var.	NEGATIVE MACRO SHOCK	
	Size: 1 & 2	Size: 3 & 4
	$\Delta$ SALES / ASSETS (t-1)	$\Delta$ SALES / ASSETS (t-1)
CASH HOLDING (t-1) / ASSETS (t-1)	0.199** (2.03)	0.022 (0.64)
Mean Sales Growth	0.008 (0.96)	0.000 (0.42)
HHN	-0.010 (-0.32)	0.031 (0.95)
Also includes control variables industry and year dummies		
<i>N</i>	12109	16793
adj. $R^2$	0.065	0.064

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

In the regressions HHN are backward looking using data: t, t-1, t-2.

Global sorts based on all firms that pass our filters yield qualitatively similar results.

Including macro variables ( $\Delta$  GDP, Inflation and Average Over-Night Lending Rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions.

**Table 6: Changes around Shocks**

This table reports median percentage change in operational and financial activities during the year of a shock. Main sample for negative industry shocks: 2000 to 2008; changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. Macroeconomic shock sample: 2009; changes and lagged variables include data prior to 2009.

	SMALL	LARGE	p- value	SMALL- LOW	SMALL- HIGH	p- value	LARGE- LOW	LARGE- HIGH	p- value
<b>PANEL A</b>									
<b>NEGATIVE SHOCK</b>									
Δ INVENTORY / INVENTORY (t-1)	-2.39***	3.57***	0.00	-2.89***	-2.38	0.13	2.50***	5.10***	0.15
Δ EMPLOYEES / EMPLOYEES (t-1)	0.00***	0.00***	0.11	0.00***	0.00***	0.72	0.00***	0.00***	0.91
Δ INVESTMENT / INVESTMENT (t-1)	-79.53***	-66.99***	0.00	-82.76***	-74.85***	0.06	-72.60***	-57.10***	0.01
Δ ASSETS / ASSETS (t-1)	-3.95***	1.34***	0.00	-4.96***	-2.50	0.00	1.23***	1.58***	0.82
N	2992	2996		1192	1477		1615	1254	
<b>PANEL B</b>									
<b>NEGATIVE MACRO SHOCK</b>									
Δ INVENTORY / INVENTORY (t-1)	-2.07***	-2.07***	0.06	-4.552***	-2.07	0.00	-3.94***	-0.80	0.00
Δ EMPLOYEES / EMPLOYEES (t-1)	0.00***	0.00***	0.00	0.00***	0.00***	0.00	0.00***	0.00***	0.00
Δ INVESTMENT / INVESTMENT (t-1)	-86.47***	-73.36***	0.00	-84.28***	-88.59***	0.00	-74.06***	-72.71***	0.02
Δ ASSETS / ASSETS (t-1)	-3.75***	-0.91***	0.00	-5.11***	-2.07	0.00	-2.03	1.84***	0.00
N	32948	34463		13438	17943		19750	14281	

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01 non-parametric test (wilcoxon/ rank sums) whether medians are zero.

Sorts on size are performed only for firms that experience a (positive / negative) industry shock or 2009 macro shock. Global sorts based on all firms that pass our filters yield qualitatively similar results.

**Table 7: Cash Savings**

This table reports coefficient estimates for OLS regressions with cash savings, measured as Cash Holding (t-1) / Assets (t-1), before negative industry sales growth rate shocks, NEGATIVE SHOCK, as dependent variable. The sources of cash savings, i.e., the explanatory variables, include Operating Cash Flows / Assets, (Operating Cash Flows - Dividends) / Operating Cash Flows,  $\Delta$  Debt / Assets,  $\Delta$  Equity / Assets with the following timing: t-1, t-2 and t-3 (in Panel A) or means thereof (in Panel B).  $\Delta$  Equity is defined as changes in paid-in capital and excludes retained earnings. The regressions also include the cash savings at t-4 and a constant as well as untabulated Industry and Year dummy variables. Operating Cash Flows - Dividends is set to zero if operating cash flows are negative or if dividends exceed operating cash flows. Main sample: 2000 to 2008; changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses.

	SMALL	LARGE	SMALL-HIGH	SMALL-LOW	LARGE-HIGH	LARGE-LOW
Dep. Var. / In-Dep. Var.	CASH (t-1) / ASSETS (t-1)					
PANEL A						
OPCF (t-1) / ASSETS (t-1)	0.083* (1.79)	0.136*** (8.43)	0.052 (1.27)	0.010*** (2.82)	0.122*** (7.04)	0.000 (0.01)
OPCF-DIV (t-1) / OPCF (t-1)	-0.005 (-0.28)	0.004 (0.49)	0.018 (1.08)	-0.001 (-0.56)	0.006 (0.57)	0.004** (2.49)
$\Delta$ DEBT (t-1) / ASSETS (t-2)	-0.003 (-1.11)	-0.000 (-0.49)	-0.000 (-0.01)	0.000 (0.28)	-0.003*** (-3.05)	0.000** (2.03)
$\Delta$ EQUITY (t-1) / ASSETS (t-2)	0.009 (0.22)	0.005 (0.29)	0.086 (1.23)	-0.008 (-1.31)	0.074*** (4.01)	0.001 (0.83)
OPCF (t-2) / ASSETS (t-2)	0.014 (1.40)	0.105*** (6.45)	0.025* (1.91)	-0.001*** (-2.95)	0.083*** (3.27)	0.001 (0.42)
OPCF-DIV (t-2) / OPCF (t-2)	0.026*** (2.65)	0.009 (1.18)	0.022 (1.52)	0.003 (1.40)	0.020* (1.69)	0.001 (0.81)
$\Delta$ DEBT (t-2) / ASSETS (t-3)	-0.000 (-0.45)	-0.000*** (-4.24)	-0.000 (-0.49)	-0.000*** (-5.09)	-0.001*** (-11.57)	-0.000*** (-4.50)
$\Delta$ EQUITY (t-2) / ASSETS (t-3)	-0.032 (-1.18)	-0.000 (-0.36)	0.010 (0.17)	0.001 (0.52)	-0.024** (-2.10)	0.000** (2.32)
OPCF (t-3) / ASSETS (t-3)	0.003 (1.01)	0.012** (2.00)	-0.002 (-0.12)	-0.000 (-0.19)	0.0325 (1.42)	0.001* (1.94)

Table 7. Continued

OPCF-DIV (t-3) / OPCF (t-3)	0.030*** (3.23)	0.037*** (5.46)	0.033** (2.34)	0.002 (0.79)	0.032*** (2.79)	0.000 (0.33)
Δ DEBT (t-3) / ASSETS (t-4)	-0.000*** (-2.67)	-0.000*** (-4.04)	-0.000*** (-4.06)	-0.000 (-0.19)	-0.000*** (-5.17)	0.000 (0.59)
Δ EQUITY (t-3) / ASSETS (t-4)	-0.008 (-0.46)	-0.000 (-0.26)	-0.004 (-0.19)	-0.006** (-2.38)	-0.000 (-0.89)	-0.000*** (-5.05)
CASH (t-4) / ASSETS (t-4)	0.534*** (16.87)	0.425*** (13.87)	0.445*** (13.14)	0.041*** (5.28)	0.421*** (12.06)	0.018*** (3.72)
CONSTANT	0.029** (2.11)	0.049*** (5.48)	0.128*** (6.27)	0.020*** (8.32)	0.196*** (4.66)	0.025*** (3.84)
<i>N</i>	1691	2278	911	780	1041	1237
adj. <i>R</i> <sup>2</sup>	0.373	0.357	0.303	0.090	0.331	0.094
PANEL B						
MEAN OPCF / ASSETS	0.011 (1.20)	0.108** (2.12)	0.058** (2.10)	0.000 (0.74)	0.250*** (5.67)	0.000 (0.22)
MEAN OPCF-DIV / OPCF	0.073*** (4.10)	0.084*** (4.58)	0.067*** (2.71)	0.005* (1.69)	0.055*** (2.63)	0.006*** (2.71)
MEAN Δ DEBT / ASSETS	-0.001** (-2.33)	-0.000 (-1.35)	-0.000*** (-3.26)	-0.001* (-1.86)	-0.001*** (-4.03)	0.000 (0.81)
MEAN Δ EQUITY / ASSETS	-0.043 (-0.79)	-0.001* (-1.74)	0.023 (0.32)	-0.011* (-1.93)	-0.001 (-1.06)	-0.000*** (-7.10)
CASH (t-4) / ASSETS (t-4)	0.533*** (16.59)	0.418*** (13.77)	0.439*** (12.78)	0.041*** (5.29)	0.392*** (11.14)	0.018*** (3.98)
CONSTANT	0.020 (1.57)	0.034*** (3.23)	0.135*** (6.65)	0.018*** (7.97)	0.189*** (4.32)	0.023*** (3.56)
<i>N</i>	1691	2278	911	780	1041	1237
adj. <i>R</i> <sup>2</sup>	0.348	0.305	0.295	0.084	0.301	0.094

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 8: Source of Ex-Post Financing**

This table reports median percentage change for sources of ex-post financing, i.e., financing over a shock year. Main sample for negative industry shocks: 2000 to 2008; changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. The macroeconomic shock sample is all firms in 2009; changes and lagged variables include data prior to 2009.

	SMALL	LARGE	p-value	SMALL- LOW	SMALL- HIGH	p-value	LARGE- LOW	LARGE- HIGH	p-value
<b>PANEL A</b>									
<b>NEGATIVE SHOCK</b>									
$\Delta$ DEBT / ASSETS (t-1)	-2.15***	1.46***	0.00	-2.56***	-1.58	0.10	2.02***	0.41***	0.00
$\Delta$ LONG-TERM DEBT / ASSETS (t-1)	-0.61***	-1.05***	0.00	-2.60***	-0.04***	0.00	-1.72***	-0.43***	0.11
$\Delta$ SHORT-TERM DEBT / ASSETS (t-1)	0.62***	1.93***	0.00	0.72**	0.52***	0.59	2.55***	1.19***	0.00
$\Delta$ EQUITY / ASSETS (t-1)	-0.17***	-0.07***	0.00	-0.16***	-0.17***	0.24	-0.07***	-0.05***	0.03
$\Delta$ (AP-AR) / ASSETS (t-1)	0.00	-0.03	0.05	0.08**	-0.14***	0.00	0.13*	-0.36***	0.00
$\Delta$ CASH HOLDING / ASSETS (t-1)	0.00	0.00	0.98	0.42***	-3.31***	0.00	0.03***	-2.45***	0.00
N	2992	2996		1192	1477		1615	1254	
<b>PANEL B</b>									
<b>NEGATIVE MACRO SHOCK</b>									
$\Delta$ DEBT / ASSETS (t-1)	-3.22***	-2.52***	0.00	-3.84***	-2.72***	0.00	-2.95***	-1.77***	0.00
$\Delta$ LONG-TERM DEBT / ASSETS (t-1)	0.00***	-0.15***	0.09	-0.20***	0.00***	0.00	-1.23***	0.00***	0.00
$\Delta$ SHORT-TERM DEBT / ASSETS (t-1)	-0.84***	-0.60***	0.00	-0.44***	-1.30***	0.02	-0.52***	-0.79***	0.70
$\Delta$ EQUITY / ASSETS (t-1)	-0.24***	-0.08***	0.00	-0.24***	-0.24***	0.00	-0.09***	-0.07***	0.05
$\Delta$ (AP-AR) / ASSETS (t-1)	0.00***	0.00***	0.00	0.13***	0.00**	0.00	0.00***	0.00***	0.00
$\Delta$ CASH HOLDING / ASSETS (t-1)	-0.00***	0.15***	0.00	0.54***	-3.30***	0.00	0.26***	-0.97***	0.00
N	32948	34463		13438	17943		19750	14281	

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01 come from non-parametric tests (wilcoxon/ rank sums) whether medians are zero.

**Table 9: Cash Holdings, Firm Performance and Credit Rating with Industry Shocks**

The dependent variable is the change in sales to assets during the year of an industry shock. Firms are sorted by the credit rating assigned by the provider of the CCGR data. Rating 1 and 2 have a lower credit rating (i.e., higher credit risk) than the sample median. Rating 3 and 4 have a higher credit rating (i.e., lower credit risk) than the sample median. The table reports coefficient estimates for OLS regressions. Mean Sales Growth is computed from sales growth rates over t-1 and t-2; where t denotes the shock year. HHN is the Acharya, Almeida, and Campello (2007) measure of high hedging needs. Explanatory variables with untabulated coefficients include lagged dependent variable, Industry Sales Growth (t, t-1, t-2, t-3),  $\Delta$  Number of Employees / Assets (t-1), Return on Assets (t-1), Account Payable Turnover (t-1), Account Payable (t-1) / Assets (t-1), Account Receivable (t-1) / Assets (t-1), the logarithm of Firm Age, Bank Overdraft (t-1) / Total Debt (t-1), Dividends (t-1) / Net Income (t-1), Rating, PP&E (t-1) + Inventory (t-1) / Assets (t-1), Total Debt (t-1) / PP&E (t-1) + Inventory (t-1), MRDOL (Mandelker and Rhee (1984) measure of operating leverage), Percentage change of debt, Percentage change of equity, CEO Share, Ownership Herfindahl, Institutional Share, State Share, Largest Owner's Share, Second Largest Owner's Share, and Family Firm, CEO member of Largest Family, Industry and Year dummy variables plus a constant. Main sample: all firms in an industry realizing a shock between 2000 to 2008. Changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses.

Dep. Var. / In-Dep. Var.	NEGATIVE SHOCK		POSITIVE SHOCK	
	Rating: 1 & 2	Rating: 3 & 4	Rating: 1 & 2	Rating: 3 & 4
	$\Delta$ SALES / ASSETS (t-1)			
CASH HOLDING (t-1) / ASSETS (t-1)	0.140 (0.77)	0.009 (0.07)	-0.263 (-1.12)	0.018 (0.16)
Mean Sales Growth	0.001 (1.07)	-0.000 (-0.58)	-0.001 (-0.95)	-0.005*** (-2.78)
HHN	0.055 (1.13)	0.088 (1.00)	0.167*** (2.81)	0.170*** (2.71)
Also includes control variables industry and year dummies				
<i>N</i>	927	1467	4208	6503
adj. <i>R</i> <sup>2</sup>	0.073	0.187	0.040	0.292

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Including macro variables (change in GDP, inflation and average over-night lending rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions. In the regressions HHN are backward looking using data: t-1, t-2. Using HHN based on data t-1, t+1 or t, t+1, t+2 (consistent with Acharya, Almeida, and Campello (2007)) yield qualitatively similar results.

Sorts on rating are performed only for firms that experience a (positive / negative) shock. Global sorts based on all firms that pass our filters yield qualitatively similar regressions results.

**Table 10: Cash Holdings and Firm Exit with Negative Industry Shocks**

This table reports coefficient estimates of Cash Holding from logistical regressions with exit (1) or survival (0) as the dependent variable for firms in negative shock industries. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. Explanatory variables with untabulated coefficients include Mean Sales Growth (computed from sales growth rates over t-1 and t-2; where t denotes the shock year), HHN (HHN is the Acharya, Almeida, and Campello (2007) measure of high hedging needs),  $\Delta$  Sales (t-1) / Assets (t-2), Industry Sales Growth (t, t-1, t-2, t-3),  $\Delta$  Number of Employees / Assets (t-1), Return on Assets (t-1), Account Payable Turnover (t-1), Account Payable (t-1) / Assets (t-1), Account Receivable (t-1) / Assets (t-1), the logarithm of Firm Age, Bank Overdraft (t-1) / Total Debt (t-1), Dividends (t-1) / Net Income (t-1), Rating, PP&E (t-1) + Inventory (t-1) / Assets (t-1), Total Debt (t-1) / PP&E (t-1) + Inventory (t-1), MRDOL (Mandelker and Rhee (1984) measure of operating leverage), Percentage change of debt, Percentage change of equity, CEO Share, Ownership Herfindahl, Institutional Share, State Share, Largest Owner's Share, Second Largest Owner's Share, and Family Firm, CEO member of Largest Family, Industry and Year dummy variables plus a constant. Main sample: all firms in an industry realizing a shock between 2000 to 2008, changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses.

	t-1 EXIT		t EXIT		t+1 EXIT	
	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4
CASH HOLDING (t-1) / ASSETS (t-1)	-1.085 (-1.39)	-0.216 (-0.39)	-1.945*** (-2.96)	-0.187 (-0.40)	-2.172** (-2.75)	0.351 (0.68)
Also includes control variables industry and year dummies						
<i>N</i>	809	1324	1120	2002	1018	1357
<i>Prob. <math>\chi^2</math></i>	0.032	0.000	0.001	0.000	0.000	0.0001
<i>Pseudo R<sup>2</sup></i>	0.052	0.062	0.055	0.049	0.119	0.058

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

Including macro variables ( $\Delta$  GDP, Inflation and Average Over-Night Lending Rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions.

In the regressions HHN are backward looking using data: t, t-1, t-2.

Sorts on size are performed only for firms that experience a (negative) shock. Global sorts based on all firms that pass our filters yield qualitatively similar regressions results.

**Table 11: Cash Holdings and Changes in Market Share with Negative Industry Shocks**

This table reports coefficient estimates of Cash Holding from OLS regressions with change in market share as the dependent variable. Change in market share is defined as the change in the firm's sales divided by change in industry sales. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. Explanatory variables with untabulated coefficients include Mean Sales Growth (computed from sales growth rates over t-1 and t-2; where t denotes the shock year), HHN (HHN is the Acharya, Almeida, and Campello (2007) measure of high hedging needs),  $\Delta$  Sales (t-1) / Assets (t-2), Industry Sales Growth (t, t-1, t-2, t-3),  $\Delta$  Number of Employees / Assets (t-1), Return on Assets (t-1), Account Payable Turnover (t-1), Account Payable (t-1) / Assets (t-1), Account Receivable (t-1) / Assets (t-1), the logarithm of Firm Age, Bank Overdraft (t-1) / Total Debt (t-1), Dividends (t-1) / Net Income (t-1), Rating, PP&E (t-1) + Inventory (t-1) / Assets (t-1), Total Debt (t-1) / PP&E (t-1) + Inventory (t-1), MRDOL (Mandelker and Rhee (1984) measure of operating leverage), Percentage change of debt, Percentage change of equity, CEO Share, Ownership Herfindahl, Institutional Share, State Share, Largest Owner's Share, Second Largest Owner's Share, and Family Firm, CEO member of Largest Family, Industry and Year dummy variables plus a constant. Main sample: all firms in an industry realizing a shock between 2000 to 2008; changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses.

	from t-1 to t		from t-1 to t+1		from t-1 to t+2	
	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4	Size: 1& 2	Size: 3 & 4
CASH HOLDING (t-1) / ASSETS(t-1) <sup>a</sup>	0.007* (1.67)	-0.099 (-1.10)	0.008 (1.10)	-0.133* (-1.73)	0.010 (1.10)	-0.152* (-1.88)
Also includes control variables industry and year dummies						
<i>N</i>	1037	1357	892	1128	810	1067
<i>Adj R</i> <sup>2</sup>	0.235	0.263	0.116	0.281	0.145	0.113

\* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

<sup>a</sup>The coefficient on the cash holding variable is multiplied by 100 because of the small magnitude of the change in market share variable.

Including macro variables ( $\Delta$  GDP, Inflation and Average Over-Night Lending Rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions.

In the regressions HHN are backward looking using data: t, t-1, t-2.

Sorts on size are performed only for firms that experience a (negative) shock. Global sorts based on all firms that pass our filters yield qualitatively similar regressions results.

## **The CCGR Working Paper Series: Contents**

The papers may be downloaded without charge from our website <http://www.bi.edu/ccgr>

### **2007**

- 1/2007 **Ole-Kristian Hope and John Christian Langli:**  
**Auditor Independence in a Private Firm and Low Litigation Risk Setting**  
**Revised April 2009**  
**Accepted for publication in the *Accounting Review* June 2009**

### **2008**

- 1/2008 **Paul Ehling:**  
**Risk Management with Cash and Insurance in Non-Listed Firms**  
**Revised May 2009**

### **2009**

- 1/2009 **Øyvind Norli, Charlotte Ostergaard and Ibolya Schindele:**  
**Liquidity and Shareholder Activism**  
**Revised April 2010**

### **2010**

- 1/2010 **Roland E. Kidwell and Arne Nygaard:**  
**The Dual-Agency Problem Reconsidered: A Strategic Deviance Perspective**  
**on the Franchise Form of Organizing**  
**Revised September 2010**
- 2/2010 **Ole-Kristian Hope, John Christian Langli and Wayne B. Thomas:**  
**Agency Conflicts and Auditing in Private Firms**  
**March 2010**  
**Revised December 2011**
- 3/2010 **Mohammad Abdolmohammadi, Erlend Kvaal and John Christian Langli:**  
**Earnings Management Priorities of Private Family Firms**  
**November 2010**
- 4/2010 **Sturla Lyngnes Fjesme, Roni Michaely and Øyvind Norli:**  
**Using Brokerage Commissions to Secure IPO Allocations**  
**November 2010**

**2011**

- 1/2011 **Charlotte Ostergaard, Amir Sasson, and Bent E. Sørensen:**  
**The Marginal Value of Cash, Cash Flow Sensitivities, and Bank-Finance Shocks in Nonlisted Firms**  
January 2011
- 2/2011 **Sturla Lyngnes Fjesme:**  
**Laddering in Initial Public Offering Allocations**  
January 2011
- 3/2011 **Charlotte Ostergaard and David C. Smith:**  
**Corporate Governance Before There Was Corporate Law**  
April 2011
- 4/2011 **Sturla Lyngnes Fjesme and Øyvind Norli:**  
**Initial Public Offering or Initial Private Placement?**  
April 2011
- 5/2011 **Janis Berzin, Øyvind Bøhren and Bogdan Stacescu:**  
**Dividends and Stockholder Conflicts: A Comprehensive Test for Private Firms**  
December 2011
- 6/2011 **Paul Ehling and David Haushalter:**  
**When Does Cash Matter?**  
Revised March 2012

## Centre for Corporate Governance Research

The Centre for Corporate Governance Research (CCGR) conducts research on the relationship between corporate governance, firm behavior, and stakeholder welfare. Our projects pay particular attention to the governance of closely held firms and family firms, and the research teams come from different disciplines in several countries. Financing is provided by private sponsors and the Research Council of Norway.

The CCGR is organized by the Department of Financial Economics at BI Norwegian School of Management in Oslo, Norway (<http://www.bi.no>)

Centre for Corporate Governance Research  
BI Norwegian School of Management  
Nydalsveien 37  
N-0442 OSLO  
Norway  
<http://www.bi.edu/ccgr>

