The effect of cash reserves on corporate investment and performance in industry downturns

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Abstract:
We investigate whether large cash reserves are beneficial in industry downturns. In a sample of firms from industries experiencing a substantial decline in sales growth, we find that firms with greater cash reserves invest more during and immediately following the downturn, and that cash reserves reduce the direct effect of the sales decline on investment. Further, we find that the ability to continue investing during a downturn is beneficial, resulting in better operating performance and post-downturn sales growth. In a control group of industries not experiencing downturns, cash reserves also contribute to increased investment, but this investment reduces performance. We conclude that in non-downturn periods, cash reserves are harmful in that they lead to overinvestment, but that their effect reverses in downturns, when they provide a beneficial source of internal financing for continued investment.

1. Introduction

During profitable times a firm's payouts often do not keep pace with its cash flows. Managers prefer to build up cash reserves instead. The typical rationale is that a cash stockpile ensures a firm's continued access to funds for investment during a downturn, preserving the firm's competitive position and survival. Skeptical investors, however, argue that stockpiles of cash tend to be spent in ways that reduce firm value and that losses in value more than offset any benefits of cash reserves. We study whether cash reserves provide a financing cushion that sustains a firm's investment and enhances performance during an industry downturn.

Our sample is firms from eight industries that experienced a downturn during the period 1980 through 1998. We define a downturn as a widespread and substantial decline in sales following a period of growth in sales. We investigate the sample firms over a seven-year period centered on the year of the downturn. We estimate how cash reserves affect investment spending during and after the downturn and how cash reserves through their effect on spending affect operating performance.

Some prior research uncovers negative consequences of substantial holdings of cash and equivalents outside of industry downturns. For example, Blanchard, Lopez-de-Silanes, and Shleifer (1994) find that in a sample of 11 firms that received a cash windfall from a lawsuit, cash tends to be spent in ways that serve the personal interests of managers. Harford (1999) measures the abnormal cash holdings of firms in general. He finds that abnormal holdings of cash are associated with greater spending on acquisitions that reduce firm value and harm performance. Allen and McConnell (1998) investigate how a parent uses the proceeds from an initial public offering of stock in a subsidiary.

They find that a parent company's stock price falls when the parent retains the proceeds and its stock price increases when proceeds are paid to stockholders or creditors. These studies suggest a cost of substantial windfalls or build-ups of cash reserves. However, Opler, Pinkowitz, Stulz, and Williamson (1999) and Mikkelson and Partch (2002) do not find that operating performance suffers in firms with large holdings of cash and equivalents. We are aware of no study that documents benefits of cash reserves.

Our study contributes by investigating the consequences of cash reserves in an industry downturn, conditions when the benefits of cash reserves arguably are the greatest. In the year defined as the industry downturn, the 642 firms in our sample experience a median decline in sales of 6.4%. The decline follows a three-year period in which the median average annual sales growth was 8.0%. We test whether the levels of cash reserves held by firms in an industry downturn explain how much firms invest and how well they perform following the industry sales shock. We compare the experience of firms in the downturn industries to firms in control industries that did not experience a downturn in sales.

We hypothesize that cash reserves enhance spending by firms in an industry downturn. For both the sample and control firms we find that higher cash holdings lead to greater increases in investment. However, the effect of a sales shock on investment is most pronounced for firms with low cash holdings in an industry downturn. This evidence supports the argument that cash reserves reduce the effects of costly external financing on a firm's investment. However, we expect, but do not find, a stronger effect of cash reserves on spending for the sub-sample of firms that face higher financing costs.

We also hypothesize that cash reserves enhance the performance of a firm in an industry downturn if cash reserves substitute for costly outside financing. Alternatively, we hypothesize that cash reserves harm performance if managerial agency problems worsen in an industry downturn. We find that cash reserves are positively associated with changes in performance, as measured by operating return on assets and sales growth, for firms in an industry downturn. In addition, the positive effect on performance for firms in a downturn is greater for firms that should face higher financing costs. We conclude that cash reserves can benefit a firm by alleviating financing costs in an industry downturn. Outside of an industry downturn, we find that cash reserves have a negative association with changes in performance. In short, cash reserves tend to benefit firms in periods of industry downturns and tend to harm firms in other periods.

2. Hypotheses

We discuss three hypotheses about how cash reserves influence investment spending and operating performance in an industry that experiences a significant downturn. The first hypothesis, financing frictions, implies that cash reserves enable firms with significant costs of external financing to finance profitable investment during and following a downturn. The second hypothesis, reduced spending discipline, assumes profitable investment opportunities decline in an industry downturn. As a result, cash reserves insulate managers with poor incentives from the spending discipline created by reduced cash flow. The third hypothesis, substitute financing, implies that sources of

external financing closely substitute for internal funds. Firms with low cash reserves can finance profitable investment externally during and following an industry downturn.

A. Financing frictions

As we stated earlier, managers often justify cash reserves as a means to preserve a firm's ability to make value-increasing investments. During an industry downturn internally generated funds diminish so that firms rely more upon cash reserves or external sources of funds to finance investment. One line of argument is that the costs of obtaining funds externally depend on industry conditions, such as in the theory advanced by Shleifer and Vishny (1992) and supported empirically by Pulvino (1998). When industry conditions deteriorate sufficiently, increased financing costs deter firms without ample internal sources of funds from taking what otherwise would be value-increasing investments.

Another line of argument is based on the pecking order theory of Myers and Majluf (1984). They argue that cash reserves are a lower cost source of financing than external financing because outside investors face information costs in valuing a firm. In an industry downturn, cash reserves preserve a firm's ability to finance investment internally. Firms without ample cash reserves face higher costs of funding profitable investment opportunities.

Almeida, Campello, and Weisbach (2002) blend these two lines of argument in their model of the trade-off between current and future investment made by firms with significant external financing costs. They argue that firms with costly external finance will tend to increase the substitution of future for current investment in an economic

downturn. All of the arguments, therefore, imply that in an industry downturn a firm with ample cash reserves has a competitive advantage over a rival that faces significant costs of external financing due to low cash reserves.

The financing frictions hypothesis implies firms with greater cash reserves will undertake more investment during and following an industry downturn than do rivals with lower cash reserves. In addition, investment by high cash firms is less sensitive to a decrease in revenues than is the investment of low cash rivals. The decrease in investment will be most pronounced for cash poor firms that face high incremental costs of financing externally rather than internally. Firms that hold greater cash reserves in an industry downturn undertake more profitable investments and subsequently experience better performance than industry rivals whose investment is deterred by the lack of internal funds.

The financing frictions hypothesis requires several assumptions. One assumption is managers and stockholders' interests are aligned, so the additional investment facilitated by cash reserves is value-increasing. Another assumption is that profitable investment opportunities in the downturn industry do not decline, or at least do not decline so much that all firms' profitable investment opportunities can be financed internally. Furthermore, it is assumed that a firm's incremental cost of external financing above internal financing does not entirely explain holdings of cash reserves prior to an industry downturn.

B. Reduced spending discipline

A competing hypothesis, which we call the reduced spending discipline hypothesis, also assumes that cash reserves are a relatively low cost source of financing. In addition, the hypothesis assumes that an industry downturn is associated with a reduction in profitable investment opportunities. Finally, the hypothesis assumes that managers' interests are not well-aligned with stockholders and, as suggested by Jensen's (1986) theory of agency costs of free cash flow, managers have personal incentives to spend available cash. Consequently, the incremental costs of external finance as well as the decrease in investment opportunities impede manager's personal incentives to overinvest.

The reduced spending discipline hypothesis implies that large cash reserves insulate managers from the consequences of a decrease in internally generated cash flow. For example, large cash reserves keep managers from having to justify planned uses for funds at times when profitable investment opportunities contract. Similar to the financing frictions hypothesis, the reduced spending discipline hypothesis implies that firms with greater cash reserves will invest more during and following an industry downturn, and investment by cash rich firms will be less sensitive to a decline in revenues.

The distinguishing implication of the reduced spending discipline hypothesis is that the additional investment made possible by cash reserves reduces firm value. In addition, greater investment by cash rich firms will be observed for firms whose managers have weak incentives to maximize value and face ineffective oversight. Relative to industry rivals, the hypothesis implies cash rich firms perform worse in

downturns than their industry rivals and that poorer performance is related to the additional investment made possible by cash reserves.

C. Substitution of alternative sources of financing

A third hypothesis, substitute financing, which follows from the Miller and Modigliani (1958) theory, implies that external sources of financing readily substitute for declines in internally sources of financing. The argument assumes that managers and stockholders' incentives are aligned, and that firms can obtain external funds from the sale of assets, issuing equity, or borrowing without incurring significant incremental costs. During an industry downturn firms without adequate cash reserves can costlessly finance investment from external sources. Consequently, investment is insensitive to how much cash a firm holds during an industry downturn. Subsequent to the downturn, performance does not differ between cash rich and cash poor firms. Of course, cash poor firms rely more on external financing during and following an industry downturn.

3. Sample

From 1980 through 1998 we identify years in which an industry grouping of companies underwent a significant decline in sales. As specified in more detail below, we define an industry to be in a downturn when a substantial majority of firms experience a decline in sales following a period of growth in sales. To assure that the downturn was not largely anticipated and planned for by accumulating cash reserves, we require that the reversal in sales growth, or shock, is accompanied by a decline in stock prices. Our tests focus on how holdings of cash reserves affect a firm's spending and financing behavior

during an industry downturn and on how spending by cash rich firms affects performance following a downturn.

We examine 47 of the 48 groupings of SIC classifications defined by Fama and French (1997). We exclude their banking industry classification in our study because financial services companies by their nature hold substantial liquid assets and their financial measures are often outliers relative to other industries. The industry groupings we use are diverse yet are few enough in number to have a sufficient number of firms for purposes of conducting cross-sectional tests.

We define an industry as undergoing a downturn if two conditions are met. First, in a particular year 75% or more of the firms in the industry experienced a decrease in sales following two years of positive sales growth. Furthermore, the median decline in sales growth among the industry firms must be at least one standard deviation of the median annual change in sales growth for the industry during the period 1980 through 1998. These conditions require that the reversal and decline in sales were widespread among industry firms and substantial in magnitude. Second, in the year of the sales decline, year 0, or the prior year, year -1, the median stock return of the industry firms must be at least one standard deviation below the median annual average stock return for the industry during 1980 through 1998. This condition implies that the industry downturn was largely unanticipated, presumably by both investors and managers of the firms in the industry experiencing the downturn.

Table 1 presents median measures of financial characteristics of the firms in the eight industries that met our criteria for an industry downturn. Three of the downturns occurred in 1985 in the apparel, non-metallic mining, and textiles industries. The other

five downturns occurred in 1991 in the business supplies, construction, construction materials, machinery and shipping containers industries. The number of firms in the downturn industries ranges from 29 in shipping containers to 185 in machinery. In year 0 the eight downturn industries have a total of 642 companies.

We report financial measures for three periods in Table 1. The period labeled downturn, or year 0, is the fiscal year that satisfies our definition of a downturn. The period labeled pre-downturn consists of the three fiscal years prior to the year of sales shock and the post-downturn period consists of the three fiscal years following the year of sales shock. As implied by our sample criteria, for each of the eight industries sales growth in year 0 is negative after a period of increases in sales. The first column, labeled full sample, shows that median average annual sales growth in the three years before the industry downturn is 6.8% for all firms in the eight industries. The median decrease in sales is 4.9% in year of the industry shock. Across the eight industries the median sales change in year 0 ranges from -15.0% for the non-metallic mining industry to -0.8% in the textiles industry. Following year 0, sales growth rebounds to the pre-downturn level. In the three years labeled post-downturn, the median average annual sales growth is 7.1%.

Cash to assets does not change dramatically from the pre-downturn period through the post-downturn period. For the full sample of firms in the eight downturn industries, median cash to assets increases from 0.040 to 0.042 in year 0 and is 0.043 in the post-downturn years. None of the eight industries displays a marked change in the ratio of cash to assets. Thus, firms do not appear to accumulate cash in anticipation of a downturn. In the year of the downturn there is considerable variation in cash positions within industries. The smallest interquartile range of cash to assets is 0.015 to 0.068 in

the apparel industry, while the largest interquartile range is 0.028 to 0.668 in the non-metallic mining industry. The interquartile ranges are not reported in the table.

Similar to the cash ratios, leverage ratios do not display much variation. For the full sample of firms in the downturn industries, the median leverage increases slightly from 0.258 to 0.261 from pre-downturn years to the downturn year and then falls to 0.245 in the post-downturn years. The direction of changes in median leverage varies among the eight industries in the years surrounding a downturn.

As one would expect in an industry downturn, median return on operating assets decreases in every industry from the pre-downturn years to the year of downturn. and then increases after the sales shock, as shown in Panel B. A less clear pattern is observed in market to book ratios. For each industry, the market to book ratio increases from the pre-downturn to the post-downturn period, but there is variation in the sign of the change from before to after the downturn. Based on the market to book ratios, investment opportunities do not consistently decline among the downturn industries

Panel C presents patterns in median measures of capital spending and of raising of capital scaled by assets around industry downturns. Capital spending is the sum of capital expenditures, acquisitions by cash payment, and research and development expenditures divided by beginning of year assets. Capital raising is the sum of equity and debt financing net of equity repurchases and debt retirements divided by beginning of year assets. For the full sample of firms, median capital spending to assets falls from 0.078 to 0.067 from the pre-downturn years to year 0. Median capital spending falls in every industry, which is consistent with the effects of financing frictions or a decline in investment opportunities. From the downturn year to the post-downturn years, median

spending declines further in five industries and spending recovers a portion of the previous decrease in the other three industries. In other words, the industry downturns are associated with a median decrease in capital spending that is not recovered in the three years after the sales shock. The levels and changes in the raising of capital do not display any noteworthy patterns and are considerably smaller in magnitude than the measures of capital spending.

We also analyze control firms from industries that did not undergo a downturn in sales. We randomly selected eleven industries among those not in our sample of eight downturn industries.[1] To avoid measuring the effects of a nearby industry downturn or economy-wide downturn, we analyze the eleven industries in the year 1986 or 1996. Both of these years are approximately five years away from the closest U.S. recession.

The second column of numbers in Table 1 presents financial characteristics for the 1,611 firms in the control industries around a pseudo downturn year, either 1986 or 1996. Since these firms were not in an industry downturn, sales growth is not negative in the row labeled downturn. Median sales growth is 15.4% in the pseudo downturn year. If anything, the control firms experience an upturn in sales. Average sales growth is 11.5% in the three pseudo pre-decline years and is 10.9% in the three pseudo post-decline years. Relative to the sample firms, the control firms at the median have more cash to assets, less financial leverage, lower return on assets, higher market to book ratio, and both greater spending and capital raising scaled by assets.

[1] The control industries are aircraft, candy and soda, communication, consumer goods, electronic equipment, medical equipment, petroleum and natural gas, precious metals, recreation, retail, and rubber and plastics.

4. Evidence

We begin our analysis by comparing various financial measures of firms in downturn industries grouped by quintiles of cash and equivalents to assets in year -1. The first measure, cash to assets minus the industry median, shows the largest change for the firms in the quintile of highest cash holdings. From before to after the decline median industry-adjusted cash falls by a third, from 0.190 to 0.124. Industry-adjusted cash ratios do not change appreciably in the other quintiles of firms. Consistent with this variation across quintiles in changes in cash ratios, capital spending increases from before to after the decline only for the quintile of firms with the highest cash ratio. Capital raising is most apparent for the firms in the lowest four quintiles of cash holdings and the industry decline appreciably reduces the raising of capital in each of these groups of firms.

Leverage ratios display little change from before to after the industry declines. However, as Opler, Pinkowitz, Stulz, and Williamson (1999) and others document, firms with lower cash to assets tend to have higher leverage ratios.

Our hypotheses imply that cash reserves potentially explain the performance of firms. We measure performance by the growth rate in sales, industry-adjusted return on assets, as well as the rate of survivorship of firms. We measure the rate of survival of firms until three years following the year of the industry downturn. From year -1 to year +3, the total number of sample firms declines from 640 firms to 608 firms, or by 5.0%. The rate of decline of firms is close to 5% for every quintile of cash holdings. Higher holdings of cash relative to assets do not appear to lead to higher rates of survival.

Consistent with our definition of an industry downturn, all of the quintiles of firms grouped by cash to assets display a negative shock to sales growth. However, only

the firms in the highest quintile of cash to assets experience an increase in sales growth following the downturn. For the high cash firms the median rate of growth in sales increases from 0.075 in the pre-downturn years to 0.139 in the post-downturn years. All of the other groups of firms recover after the downturn to experience sales growth, but all of the median rates of growth following the downturn are below the pre-downturn rates of growth.

The quintile of firms with the highest cash ratios also displays the highest median industry-adjusted return on assets. Only for firms with the highest cash ratio quintile is the median adjusted return on assets positive in the year of the shock as well in the post-downturn period. However, median adjusted return on assets falls from the before to after year 0. That is, the firms with the highest cash ratio begin with a relatively high return on assets, but like other firms they experience a decline in performance during the industry downturn. Next we estimate regressions to identify more precisely the role that cash plays in industry downturns.

In Table 3 we investigate determinants of the change in spending from before the industry downturn, years -3 through -1, to after the downturn, years 1 through +3. The first column regresses total spending, which is the sum of capital expenditures, cash acquisition expenditures, and research and development expenditures, on characteristics of firms in the eight downturn industries. The third column presents the same regression specification for the firms in the eleven control industries.

The effects on the change in spending are similar between the two samples. The first row of estimates shows that industry-adjusted cash to assets in year -1 is positively

related to the change in spending. For both the downturn and control samples, firms with more cash increase their spending more, or decrease it by less.

The second row shows that sales growth in year is positively related to the change in investment. For downturn firms, this means that a larger decrease in sales in year 0 leads to a greater decrease in spending from before to after year 0. The same effect is observed for the control firms. Most of these firms, however, experience positive sales growth in year 0. The third row presents coefficients on an interaction between sales growth rate in year 0 and negative industry-adjusted cash to assets. The financing frictions and the reduced spending discipline hypotheses imply that investment should be more sensitive to decrease in cash flow for firms with low cash reserves. The positive and significant coefficients for the downturn sample and the insignificant coefficient for the control firms means that the effect of a sales shock on investment is greater in an industry downturn. We examine how this effect relates to operating performance in the next table. The other rows of Table 3 represent controls for spending.

To measure the effects of cash and spending on operating performance we regress the change in operating return on assets from years -3 through -1 to years 1 to 3 or to years 2 and 3 on various characteristics of firms. Columns 1 and 2 of Table 4 are regressions on the sample of firms in the eight downturn industries. Columns 3 and 4 are regressions on control firms defined as firms in industries that did not undergo a downturn. We examine two measures of change in the operating return on assets. In columns 1 and 3, the change is from years -3 through -1 to years 1 through 3, while in columns 2 and 4, the change is from years -3 through -1 to years 2 and 3. Because the second set of specifications regresses performance in years 2 and 3 on investment in

years 0 and 1, it avoids an overlap in the years used to measure investment and operating performance.

The first row of Table 4 shows no relation between industry-adjusted cash to assets in year -1 and the change in operating performance for the downturn firms. The effect is negative for the control firms. The latter effect suggests that outside of industry downturns performance suffers for firms with higher industry-adjusted holdings of cash. The second row shows that the change in total spending from the interval of years -3 through -1 to the interval of years 1 to 3 is positively related to changes in operating performance. The spending by firms with positive industry-adjusted cash to assets in an industry downturn neither benefits nor harms operating performance. This suggests that the effect of an industry sales shock on investment spending does not measurably affect subsequent operating performance. There is statistically weak evidence in row 3 that the effect of spending on subsequent performance is reduced among control firms with positive industry-adjusted cash. The results suggest greater benefits in an industry downturn of spending by firms with positive industry-adjusted cash to assets.

Rows 4 and 5 present estimates for regressions where the change in spending precedes the measurement of performance. These variable definitions correspond to the idea that investment leads to effects on performance. The coefficients on the change in spending suggest that performance is related positively to spending for the downturn firms but not for the control firms.

An alternative performance metric we study is sales growth. Table 5 presents regressions on the change in sales growth rate from before to after year 0. Row 1 shows that the change in sales growth for firms in downturn industries is greater for higher cash

holdings, while the change in sales growth is lower for higher cash firms in the control industries. Rows 2 and 3 show a positive association between the change in spending and the change in sales growth. However, for firms with positive industry-adjusted holdings of cash the effects of spending differ between the two samples. Again, cash holdings are positively associated with the change in sales growth for the firms in downturn industries, while the effect of cash holdings on the change in sales growth is negative for the firms in the control industries.

The evidence to this point indicates that the effects of cash reserves change when a firm's industry is in a downturn. For a firm in a downturn industry the results indicate that low cash reserves lead to less spending and that a firm with greater cash reserves tends to experience greater improvements in operating return on assets and in sales growth. These findings support the implications of the financing frictions hypothesis. In addition, outside of an industry downturn a larger amount of cash holdings is associated with poorer performance. The effect of cash is amplified by spending undertaken by a firm with positive industry adjusted cash holdings. These findings support the argument that agency problems of cash flow are present outside of an industry downturn.

We further investigate the implications of financing frictions by examining the effects of cash among smaller, non-dividend paying companies. We believe that smaller firms that do not pay dividends face higher financing costs and therefore will experience larger effects on spending and performance in an industry downturn. In Table 6 we re-estimate the regressions on the change in spending by the firms in the downturn industries. We add a variable for the cash holdings of small, non-dividend paying firms. Small firms are those in the lowest quartile of total assets. Financing frictions implies

that the coefficient on the cash holdings of small, non-dividend paying firms should be negative. However, we do not find a significant effect on the change in spending that would support the influence of costly external financing.

Table 7 reports regressions on changes in performance metrics with a variable added for cash holdings of small, non-dividend paying firms. The coefficients on the industry-adjusted cash holdings of small, non-dividend paying firms are positive and significant at about the 0.12 and 0.06 levels in the two regressions. The coefficients imply that performance improves more from before to after a downturn for firms with greater cash holdings that also have higher financing costs. This evidence supports the idea that in a downturn cash reserves reduce the costs of financing and enhance performance.

5. Conclusion

We investigate how cash reserves affect the spending and performance of firms in an industry that experiences a significant downturn in sales. One view is that cash reserves mitigate cutbacks in profitable investment due to reduced cash flow and higher financing costs. An opposing view is that cash reserves enable managers to invest excessively at times when cash flow and profitable investment opportunities decrease.

To test these arguments we study a sample of 642 firms in eight industries that experienced an unanticipated and widespread reversal in sales growth. We compare the effects of cash reserves on firms in a downturn industry to the effects of cash reserves on control firms in industries that did not experience a downturn.

We find support for the argument that cash reserves enable firms in a downturn industry to increase their investment spending. We also find evidence that the effect of spending in the presence of greater cash reserves leads to greater improvements in performance. We conclude that cash reserves benefit the capital spending and subsequent performance of firms in an industry downturn.

We also find evidence that cash reserves might detract from the performance of firms when their industry is not in a downturn. Cash reserves lead to greater spending both during and outside of industry downturns, but outside of downturns larger cash reserves are negatively associated with changes in performance. We conclude that the effect of cash reserves on performance differs between an industry downturn and other times.

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Table 1

Median firm characteristics of firms before, during and following industry downturns for the full sample, the control sample, and the eight downturn industries

Panel A: Sales growth, holdings of cash and equivalents, and financial leverage

	Full sample N=642	**Control firms** N=1611	**Apparel** (1985) N=63	**Non-metallic mining** (1985) N=46	**Textiles** (1985) N=53	**Business supplies** (1991) N=55	**Construction** (1991) N=69	**Construction materials** (1991) N=142	**Machinery** (1991) N=185	**Shipping containers** (1991) N=29
Sales growth										
Pre-downturn	0.068	0.115	0.058	-0.027	0.062	0.068	0.117	0.068	0.113	0.104
Downturn	-0.049	0.154	-0.042	-0.150	-0.039	-0.040	-0.134	-0.049	-0.059	-0.008
Post-downturn	0.071	0.109	0.057	0.133	0.107	0.051	0.104	0.087	0.071	0.062
Cash / Assets										
Pre-downturn	0.040	0.089	0.040	0.040	0.033	0.024	0.054	0.034	0.048	0.025
Downturn	0.042	0.089	0.044	0.042	0.024	0.028	0.077	0.039	0.046	0.019
Post-downturn	0.043	0.082	0.045	0.036	0.028	0.023	0.068	0.043	0.049	0.031
Leverage										
Pre-downturn	0.258	0.194	0.230	0.181	0.230	0.241	0.329	0.290	0.258	0.315
Downturn	0.261	0.205	0.208	0.177	0.207	0.250	0.304	0.274	0.261	0.326
Post-downturn	0.245	0.227	0.205	0.167	0.277	0.284	0.272	0.245	0.239	0.317

Table 1 (continued)

Panel B: Return on assets and market to book ratio

	Full sample N=642	**Control sample** N=1611	**Apparel** (1985) N=63	**Non-metallic mining** (1985) N=46	**Textiles** (1985) N=53	**Business supplies** (1991) N=55	**Construction** (1991) N=69	**Construction materials** (1991) N=142	**Machinery** (1991) N=185	**Shipping containers** (1991) N=29
Return on assets										
Pre-downturn	0.138	0.036	0.150	0.021	0.159	0.185	0.094	0.138	0.128	0.176
Downturn	0.095	0.031	0.095	-0.005	0.136	0.122	0.059	0.110	0.082	0.142
Post-downturn	0.117	0.010	0.117	0.047	0.164	0.126	0.087	0.138	0.117	0.163
Market to book										
Pre-downturn	1.106	1.494	1.013	1.158	0.949	1.181	1.081	1.106	1.171	1.229
Downturn	1.152	1.638	1.166	1.095	1.031	1.187	1.154	1.090	1.152	1.266
Post-downturn	1.242	1.503	1.047	1.195	1.075	1.278	1.089	1.242	1.363	1.395

Panel C: Capital spending and raising scaled by assets

	Full sample N=642	**Control sample** N=1611	**Apparel** (1985) N=63	**Non-metallic mining** (1985) N=46	**Textiles** (1985) N=53	**Business supplies** (1991) N=55	**Construction** (1991) N=69	**Construction materials** (1991) N=142	**Machinery** (1991) N=185	**Shipping containers** (1991) N=29
Spending										
Pre-downturn	0.078	0.113	0.046	0.063	0.078	0.104	0.051	0.071	0.088	0.103
Downturn	0.067	0.124	0.038	0.041	0.075	0.075	0.030	0.055	0.067	0.070
Post-downturn	0.066	0.116	0.030	0.040	0.074	0.066	0.025	0.061	0.075	0.093
Raising										
Pre-downturn	-0.002	0.008	-0.002	0.020	-0.004	0.002	0.006	-0.005	-0.002	-0.002
Downturn	-0.004	0.018	-0.006	0.000	0.000	-0.002	-0.006	-0.007	-0.004	-0.002
Post-downturn	-0.003	0.009	-0.004	0.010	0.001	0.001	0.002	-0.004	-0.003	0.001

Table 2

Median measures of characteristics of firms in industries that experience a downturn grouped by quintiles of industry adjusted measures of cash and equivalents to assets

	Quintiles by industry adjusted cash reserves divided by assets in the year prior to the downturn				
Firm attribute	**First (lowest)**	**Second**	**Third**	**Fourth**	**Fifth (highest)**
Industry adjusted cash / assets					
Pre-downturn	-0.027	-0.018	-0.001	0.042	0.190
Downturn	-0.028	-0.016	-0.006	0.036	0.169
Post-downturn	-0.024	-0.012	-0.000	0.034	0.124
Leverage ratio					
Pre-downturn	0.357	0.333	0.271	0.219	0.118
Downturn	0.363	0.322	0.292	0.204	0.082
Post-downturn	0.319	0.302	0.282	0.198	0.121
Sales growth					
Pre-downturn	0.077	0.092	0.094	0.097	0.075
Downturn	-0.057	-0.045	-0.077	-0.053	-0.043
Post-downturn	0.074	0.070	0.060	0.053	0.139
Industry-adjusted return on assets					
Pre-downturn	-0.006	-0.004	-0.010	0.005	0.016
Downturn	-0.007	-0.001	-0.019	0.012	0.016
Post-downturn	-0.006	-0.010	-0.013	-0.008	0.005
Number of firms					
Year -1	124	130	130	130	126
Downturn	123	126	129	128	123
Year +3	118	123	126	122	119
Capital spending					
Pre-downturn	0.103	0.097	0.090	0.094	0.076
Downturn	0.049	0.055	0.064	0.066	0.055
Post-downturn	0.071	0.066	0.070	0.062	0.083
Capital raising					
Pre-downturn	0.019	0.020	0.014	0.007	0.000
Downturn	0.000	-0.010	-0.004	-0.003	-0.001
Post-downturn	0.003	0.005	0.001	-0.003	0.000

Table 3

Regressions of changes in total capital spending on firm characteristics for firms in eight industries that undergo a downturn and for firms in eleven control industries

(p-values of t-statistics in parentheses)

	Downturn firms		Control firms	
	Mean total spending in yrs 1 through 3 minus mean in yrs -3 through -1	Mean total spending in yrs 0 and 1 minus mean in yrs -3 through -1	Mean total spending in yrs 1 through 3 minus mean in yrs -3 through -1	Mean total spending in yrs 0 and 1 minus mean in yrs -3 through -1
Industry-adjusted cash to assets in yr -1	0.150 (0.00)	0.98 (0.00)	0.140 (0.00)	0.150 (0.00)
Industry-adjusted sales growth in yr 0	-0.036 (0.05)	0.027 (0.11)	-0.019 (0.04)	0.036 (0.00)
Industry-adjusted sales growth in yr 0 for firms with negative industry adjusted cash to assets in yr –1	0.062 (0.02)	0.029 (0.26)	0.007 (0.60)	-0.035 (0.01)
Industry-adjusted market to book in yr -1	-0.012 (0.02)	-0.014 (0.00)	-0.001 (0.72)	-0.002 (0.44)
Industry-adjusted short-term debt leverage in yr -1	-0.004 (0.89)	-0.022 (0.44)	-0.028 (0.50)	-0.118 (0.01)
Industry-adjusted long-term debt leverage in yr -1	0.002 (0.92)	-0.042 (0.07)	-0.030 (0.23)	0.007 (0.79)
Industry-adjusted market value of assets in yr -1	-0.003 (0.34)	-0.003 (0.42)	0.326 (0.80)	0.206 (0.88)
Change in average net external financing for same period as change in spending[a]	0.362 (0.00)	0.285 (0.00)	0.174 (0.00)	0.166 (0.00)
Change in average net external financing for same period as change in spending for firms with negative ind-adj cash to assets in year –1	0.119 (0.02)	0.025 (0.56)	0.115 (0.00)	0.011 (0.56)
Intercept	0.004 (0.32)	0.001 (0.77)	-0.007 (0.15)	-0.007 (0.20)
Adjusted R^2	0.36	0.33	0.37	0.30
F-statistic (p-value)	32.9 (0.00)	29.6 (0.00)	69.0 (0.00)	50.0 (0.00)

[a] To be consistent with the measurement of the dependent variable, the change in external financing is measured from years –3 through –1 to years +1 through +3 for columns 1 and 3 and to years 0 and 1 for columns 2 and 4.

Table 4
Regressions of change in operating return on assets from before to after an industry downturn on firm characteristics for firms in eight industries that undergo a downturn and for firms in eleven control industries

	Downturn firms		Control firms	
	Mean operating return on assets in yrs 1 through 3 minus mean in yrs -3 through -1	Mean return on assets in yrs 2 and 3 minus mean in yrs -3 through -1	Mean operating return on assets in yrs 1 through 3 minus mean in yrs -3 through -1	Mean return on assets in yrs 2 and 3 minus mean in yrs -3 through -1
Industry-adjusted cash to assets in yr –1	-0.035 (0.48)	0.028 (0.62)	-0.093 (0.03)	-0.079 (0.11)
Mean spending in yrs 1 through 3 minus mean spending in yrs -3 through -1	0.348 (0.00)		0.181 (0.00)	
Mean spending in yrs 0 through 3 minus mean spending in yrs -3 through -1 for firms with positive industry adjusted cash to assets in yr –1	0.069 (0.53)		-0.124 (0.11)	
Mean spending in yrs 0 and 1 minus mean spending in yrs -3 through -1		0.237 (0.02)		0.061 (0.35)
Mean spending in yrs 0 and 1 minus mean spending in yrs -3 through -1 for firms with positive industry adjusted cash to assets in yr –1		0.012 (0.93)		-0.106 (0.22)
Ind-adj sales growth in yr 0	0.136 (0.00)	0.122 (0.00)	0.091 (0.00)	0.079 (0.00)
Ind-adj sales growth in yr 0 for firms with positive industry adjusted cash to assets in yr –1	-0.063 (0.11)	-0.056 (0.21)	-0.062 (0.00)	-0.064 (0.01)
Industry-adjusted market to book in yr –1	0.002 (0.75)	-0.008 (0.36)	0.005 (0.14)	0.004 (0.35)
Industry-adjusted short-term leverage in yr -1	0.089 (0.05)	0.120 (0.02)	-0.001 (0.99)	-0.033 (0.65)
Industry-adjusted long-term leverage in yr -1	0.063 (0.07)	0.079 (0.05)	0.023 (0.46)	0.029 (0.50)
Industry-adjusted market value of assets in yr –1	0.696 (0.89)	2.010 (0.73)	0.403 (0.84)	0.901 (0.68)
Adjusted R^2	0.13	0.07	0.05	0.02
F-statistic (p-value)	9.6 (0.00)	5.0 (0.00)	6.4 (0.00)	3.3 (0.00)

Table 5

Regressions of change in sales growth from before to after an industry downturn on firm characteristics for firms in eight downturn industries and for firms in eleven control industries

	Sample firms		Control firms	
	Mean sales growth in yrs 1 through 3 minus mean in yrs -3 through -1	Mean sales growth in yrs 2 and 3 minus mean in yrs -3 through -1	Mean sales growth in yrs 1 through 3 minus mean in yrs -3 through -1	Mean sales growth in yrs 2 and 3 minus mean in yrs -3 through -1
Industry-adjusted cash to assets in yr -1	0.763 (0.00)	0.957 (0.00)	-0.303 (0.03)	-0.536 (0.00)
Mean spending in yrs 0 through 3 minus mean spending in yrs -3 through -1	1.146 (0.00)		1.412 (0.00)	
Mean spending in yrs 0 through 3 minus mean spending in yrs -3 through -1 for firms with positive industry adjusted cash to assets in yr -1	0.604 (0.05)		-0.204 (0.41)	
Mean spending in yrs 0 and 1 minus mean spending in yrs -3 through -1		0.670 (0.013)		0.615 (0.00)
Mean spending in yrs 0 and 1 minus mean spending in yrs -3 through -1 for firms with positive industry adjusted cash to assets in yr -1		0.610 (0.089)		-0.216 (0.45)
Industry-adjusted market to book in yr -1	-0.116 (0.00)	-0.173 (0.00)	-0.044 (0.00)	-0.055 (0.00)
Industry-adjusted short-term leverage in yr -1	0.144 (0.27)	0.237 (0.09)	-0.410 (0.05)	-0.506 (0.03)
Industry-adjusted long-term leverage in yr -1	0.007 (0.94)	0.046 (0.67)	-0.033 (0.79)	-0.138 (0.33)
Industry-adjusted market value of assets in yr -1	0.026 (0.08)	0.037 (0.02)	0.007 (0.27)	0.009 (0.20)
Intercept	-0.060 (0.00)	-0.072 (0.00)	-0.041 (0.11)	-0.055 (0.07)
Adjusted R^2	0.25	0.21	0.12	0.05
F-statistic (p-value)	25.1 (0.00)	18.7 (0.00)	21.5 (0.00)	8.0 (0.00)

Table 6

Regressions of changes in total capital spending on firm characteristics for firms in eight downturn industries and for firms in eleven control industries

	Sample firms	Control firms
	Mean total spending in yrs 1 through 3 minus mean in yrs -3 through -1	Mean total spending in yrs 1 through 3 minus mean in yrs -3 through -1
Industry-adjusted cash to assets in yr -1	0.148 (0.00)	0.109 (0.00)
Industry-adjusted cash to assets in yr -1 for non-dividend paying firms in the lowest firm size quartile	-0.009 (0.91)	-0.076 (0.29)
Industry-adjusted sales growth in yr -1	-0.010 (0.48)	0.043 (0.00)
Sales growth in yr 0 for small non-dividend firms[a] with negative industry adjusted cash to assets in yr –1	0.019 (0.67)	-0.004 (0.92)
Industry-adjusted market to book in yr -1	-0.010 (0.04)	-0.013 (0.01)
Industry-adjusted short-term debt leverage in yr -1	-0.008 (0.80)	-0.023 (0.44)
Industry-adjusted long-term debt leverage in yr -1	-0.002 (0.95)	-0.042 (0.07)
Industry-adjusted market value of assets in yr –1	-3.678 (0.29)	-2.90 (0.39)
Change in average net external financing from yrs -1 through -3 to yrs 1 through 3	0.397 (0.00)	0.300 (0.00)
Change in average net external financing from yrs -1 through -3 to yrs 1 through 3 for small non-dividend firms with negative industry-adjusted cash to assets in yr -1	0.038 (0.70)	-0.072 (0.39)
Intercept	0.004 (0.37)	0.001 (0.83)
Adjusted R^2	0.34	0.33
F-statistic (p-value)	27.9 (0.00)	26.7 (0.00)

[a] Small, non-dividend firms are defined as firms in the lowest quartile of size for the sample that do not pay a dividend.

Table 7

Regressions of change in operating return on assets from before to after an industry downturn on firm characteristics for firms in eight downturn industries

	Mean operating return on assets in yrs 1 through 3 minus mean in yrs -3 through -1	Mean sales growth in yrs 1 through 3 minus mean in yrs -3 through -1
Industry-adjusted cash to assets in yr -1	-0.043 (0.40)	0.676 (0.00)
Industry-adjusted cash to assets in yr -1 for non-dividend paying firms in the lowest firm size quartile	0.172 (0.12)	0.583 (0.06)
Mean spending in yrs 0 through 3 minus mean spending in yrs -3 through -1	0.349 (0.00)	1.150 (0.00)
Mean spending in yrs 0 through 3 minus mean spending in yrs -3 through -1 for firms with positive industry adjusted cash to assets in yr -1	0.051 (0.64)	0.567 (0.07)
Sales growth in yr 0	0.112 (0.00)	
Sales growth in yr 0 for small, non-divd firms with negative industry adjusted cash to assets in yr –1	-0.088 (0.17)	
Industry-adjusted market to book in yr -1	0.977 (0.89)	-0.115 (0.00)
Industry-adjusted short-term leverage in yr -1	0.083 (0.07)	0.138 (0.29)
Industry-adjusted long-term leverage in yr -1	0.064 (0.06)	0.008 (0.93)
Industry-adjusted market value of assets in yr –1	1.653 (0.75)	26.641 (0.07)
Intercept	-0.022 (0.00)	-0.060 (0.00)
Adjusted R^2	0.13	0.25
F-statistic (p-value)	8.8 (0.00)	22.5 (0.00)