How Do Firms Finance Large Cash Flow Requirements?

Zhangkai Huang
Department of Finance
Guanghua School of Management
Peking University

Colin Mayer
Saïd Business School
University of Oxford

Oren Sussman
Saïd Business School
University of Oxford

12 October 2007

How Do Firms Finance Large Cash Flow Requirements?

Abstract

How do firms finance large cash flow requirements? We examine this in the context of firms that are subject to substantial cash flow requirements. We find that trade credit, inventory and cash stock reductions are all important in the short term for mild requirements. Larger and longer cash flow shortages give rise to more equity than debt finance. After the shocks, firms gradually adjust their leverage back to pre-shock levels by retiring debt and issuing equity. Financing patterns during a shock are consistent with a pecking-order theory of finance, whereas the adjustment afterwards is consistent with a trade-off theory.

JEL Classification: G32

Key Words: Cash flow shocks, equity issues, trade-off theory, pecking-order theory.

1. Introduction

How do firms respond to funding requirements? According to one set of theories that view firms as having a target capital structure, the answer is in the same way as they do to more modest requirements. As far as possible, they select a mixture of debt and equity that retains their preferred capital structure and to the extent that they are forced to deviate from this then they subsequently adjust back to their optimum. This trade-off theory views particular forms of financing as being linearly related to total financing requirements.

According to another set of theories that view firms as having a pecking order of preferred forms of finance, the answer is very different. Myers (1984) suggests that modest financing requirements are met from internal sources, larger requirements that cannot be funded internally require the use of debt and only once retained earnings and debt capacity have been exhausted will firms turn to new equity sources. In contrast to the first set of trade-off theories, this pecking order theory suggests strong non-linearities in the response of firms to different levels of funding.

The trade-off and the pecking order theories have different empirical implications. The trade-off view has two important predictions for firms' capital structure choices: a) there is a cross-sectional relation between average debt ratios and variables which could proxy the costs and benefits of debt, and b) there is reversion towards target debt ratios if there is a deviation from the optimum. Studies by Bradley, Jarrell and Kim (1984), Titman and Wessels (1988), Smith and Watts (1992), Graham (1996) and Rajan and Zingales (1995) try to investigate the relation between firms' capital structure with firm characteristics, e.g. size, growth and tax status. Jalivand and Harris (1984) and Auerbach (1985) report significant adjustment coefficients in target-adjustment models, which are consistent with the trade-off predictions. More recently, Hovakimian, Opler and Titman (2001) report that deviations from potential leverage targets could predict firms' capital structure choices. Fama and French (2002) also find that firms' debt ratios slowly adjust towards their targets. Leary and Roberts (2005) attribute this to adjustment costs when firms rebalance their capital structures. They find that firms respond to equity issuance and equity price shocks by rebalancing their leverage over the next one to four years. Using a different specification, Flannery and Rangan (2006) find that firms

adjust towards their long-run target at a rate of more than 30% a year, and much of this can be attributed to targeting behaviour. Mean-reverting leverage is consistent with survey results of Graham and Harvey (2001) who find that most managers claim to have leverage targets.

Shyam-Sunder and Myers (1999) propose a unique prediction of the pecking order theory. In a pecking order framework, firms first issue debt to finance deficits and changes in debt ratios are thereby driven by external financing needs. Shyam-Sunder and Myers (1999) argue that if this is the case, one should expect a coefficient of one in a regression of net debt issues on financing deficits. They find evidence of this in a sample of 157 firms that traded continuously from 1971 to 1989. However, using a much larger sample, Frank and Goyal (2003) find that net equity issues track financing deficits closely while net debt does not.

This paper differs from existing papers by focusing on the dynamics of financing patterns when firms face large financing requirements. It identifies firms that are subject to large cash flow shocks and examines their response during and around the large perturbations. It relates the financing behaviour of firms to the size and duration of shocks and examines the determinants of firms' chosen forms of finance. It analyses the way in which leverage responds during and after the cash flow shocks. By identifying large perturbations to cash flows, the paper focuses on regions of potential non-linearities and displacements from optimal capital structures. It is therefore able to provide new evidence on both impact responses of firms to financing requirements and the dynamics of adjustments around these events. It thus captures the key features of the competing capital structure theories.

What emerges is strong evidence of non-linearities during the perturbations. Prior to the cash flow shocks, internal sources of finance are the dominant form of finance and most investment is funded from internal sources. The shock is primarily financed from trade credit and running down inventories and cash stocks. The relation between equity finance and financing need is convex: equity issuance is greater where the size of the shock is larger and the duration of the shock is longer. The response of firms to large cash flow shocks is therefore consistent with the pecking order theory. In contrast, after the perturbation, leverage adjusts in a way that is consistent with the trade-off theory. It rises during the shock in response to the

issuance of debt and loss in assets but it then falls back as both dividends and debt are reduced and more equity issues occur.

The financing behaviour of firms can therefore be summarized as being pecking-order during the perturbation and trade-off after the perturbation. This conclusion is not inconsistent with the existing literature but the large perturbation nature of the exercise brings out this result more clearly than has been the case to date. Our results can be compared with recent results about the dynamic effects of profitability on firms' capital structure choices. Fama and French (2002) report that short-term variations in earnings are absorbed by debt and firms adjust their leverage slowly towards the target. Examining firms with dual debt and equity issues, Hovakimian *et al* (2004) find that unprofitable firms issue equity to offset excessive leverage due to accumulated losses. Kayhan and Titman (2007) find that financial deficits have a strong influence on capital structure changes but such effects are partially reversed over long horizons.

The rest of the paper is organised as follows: Section 2 explains how we select firms with cash flow shocks; Section 3 describes their financing responses to the shocks; Section 4 presents regression results analysing the determinants of the financing responses and Section 5 discusses the implications of the results. Section 6 concludes the paper.

2. Methodology

Our data is drawn from U.S. firms included in Compustat over the period 1988 to 2004 inclusive. Firms are required to have at least five years of continuous data. The financing figures are drawn from firms' cash flow statements and are deflated using the Consumer Price Index (to fixed 1983 dollars). The cash flows are aggregated as follows:

cash flow + debt + equity + trade credit + cash from internal reserves + other sources = fixed investment + inventory investment + dividends + other uses,

where cash flow is defined as income plus depreciation, correcting for all other accounting losses and gains. Omitting firms with adding-up errors exceeding ±2% of total assets, we get a population of 4327 firms, to which the filter is applied.

For each firm-year, we calculate the standard deviation of cash flows in the previous four years. We define an earnings shock if there is a drop in cash flow of at least three standard deviations below the historical mean in the previous four years. We regard the firm as having recovered from the shock when the cash flow returns to above one standard deviation below the mean.

According to these definitions, 1235 of the 4327 firms suffered a shock once during the sample period. Flow of funds variables are deflated by the average book value of assets in the four years prior to the shock. 96 outliers with extreme observations on debt and equity around the shock at the one percentile level of both ends of the distribution are dropped as are 70 firms that experience shocks in the year 2004 since information is not available on what happens to them subsequently. Similarly, 46 firms that have shocks in 2003 and do not recover in 2004 are excluded for the same reason. The result is a working panel of 1023 firms.

Table 1 reports descriptive statistics for the four nested samples described above (the population, the filtered sample, excluding outliers and the working panel). It shows that the filtered sample is quite similar to the unfiltered one. Even where the two samples differ, for example in relation to market-to-book ratios which are slightly lower in the filtered sample, the difference falls far short of one standard deviation. Panel B shows the distribution of stock exchange listings, again recording only small differences between the four samples. Panel C reports the results of a probit regression where the dependent variable receives a value of one if the firm is included in the respective sample and zero otherwise. One variable that is highly significant in all of the regressions is the duration of firm data: the number of consecutive years for which the firm reports data to Compustat. As one might expect, the longer the reporting period, the more likely it is that a negative earning shock is captured within the sample. Apart from duration, the only variable that is significant in some of the regressions is the market-to-book ratio. It therefore seems legitimate to conclude that our filtered sample is not strongly affected by selection bias.

The dynamic structure of the sample enables us to follow firms for several years after the shock has occurred. Defining the event time as period zero, Figure 1 records that the cash flows of 347 firms recover one year after the shock. We classify the

firms in the sample as suffering from temporary and prolonged shocks accordingly. Note also that 196 firms were delisted (due to either bankruptcy or takeovers) before we could observe the full duration of the shock and below we report results on the financing behaviour of this truncated sample of firms.

3. Financing Responses to Cash Flow Shortages

3.1 Flow of Funds

In this section, we examine the way in which firms respond to cash flow shortages. Table 2 describes the movement in flow of funds and valuations around the time of the cash flow shocks ($t = 0$). Panel A refers to means and Panel B to medians. The flow variables are scaled by the average book value of assets over the four years prior to the shock. We cut the sample at the 50^{th} percentile of average book assets and report descriptive statistics for small firms separately in Table 3.

Prior to the shock, firms finance their activities from a mixture of internal and external sources. The sum of issuance of debt and equity is approximately equal to internal cash flow. In particular, on average there is a substantial amount of new equity issues. However, Table 3 reveals that this is primarily attributable to small firms: they raise a substantial amount of new equity finance. Large firms issue much less equity and as a consequence, Panel B of Table 2 shows that median levels of equity (and debt) issuance are substantially below the means, and frequently equal to zero. For large firms, internal cash flow is the dominant source of finance prior to the cash flow shock.

When the cash flow shock comes, the average cash flow drops from around 7% of historical average assets before the shock to around –10%. This large drop in cash flow has a significant impact on the balance sheets of firms: the mean value of total assets drops from $1123.65 million before the shock to $1053.95 million, and the median drops from $108.65 million to $91.77 million. There is also a substantial drop in market to book ratios, which drop from a mean of 2.19 two years before the shock to 1.77 in the year of the shock. As a consequence, the market value of assets falls by even more than the book value.

The response of firms to the cash flow shock is striking. There is no increase in equity issuance on average and only some increase in debt issuance. Most of the shortfall in financing is met from a combination of falls in inventories, a switch from being net providers to net users of trade credit and the running down of cash stocks. Inventory accumulation falls from 1.96% of total assets before the shock to a reduction of 1.56% in the year of the shock. Firms switch from being net providers of trade credit averaging 1.15% of their assets to net users of trade credit at on average 3.51% of their assets in the year of the shock. Cash stocks are run down by on average 2.83% of assets in the year of the shock having been built up at the rate of around 2% of assets prior to the shock. The medians as well as the means also bring out the importance of these three sources. In contrast the medians record no movement in debt and new equity issuance. Another interesting response is the decline in fixed investment. Investment falls from around 9.6% of assets prior to the shock to 6.56% in the year of the shock. To summarize, the immediate response of firms to cash flow shocks is to use a combination of inventories, trade credit, cash stocks to meet their cash needs and only use external sources of financing to a modest extent. As a consequence, there are marked reductions in fixed investment.

In the three years after the shock, cash flow begins to climb back up to its pre-shock level, reaching 3.68% and 5.11% of assets two and three years after the shock respectively. Movements in market valuation closely follow cash flows. There is a significant drop in the market-to-book ratio at the time of the shock before it moves back towards its pre-shock level two years later.

The financing behaviour of firms is equally interesting after the shock. The mean value of debt issuance declines appreciably and, according to the medians, firms on average repay debt. The mean value of equity issuance remains at its pre-shock level and the median level actually increases two years after the shock. Net issuance of securities therefore moves in the direction of equity after the shock.

After the shock, the three main sources of finance during the shock, inventories, trade credit and cash stocks, begin to move back to their pre-shock levels. Accumulation of inventories and cash balances resume two years after the shock and there is a small net provision of trade credit on average in the three years after the

shock. Fixed investment drops to 6.56% of assets during the shock and 6.02% one year later, and starts to rise two years after the shock in line with cash flow.

There seems to be a lagged response in dividend payment. The mean level of dividends falls one year after the shock from 1.06% to 0.76% of assets. However, as the medians record, many firms do not pay dividends at all, making interpretation of the mean difficult. We therefore record the behaviour of firms that did pay dividends at least once prior to the cash flow shock. We find that their dividends remained well below their pre-cash flow shock level for at least four years after the shock[1].

In sum, during the shock trade credit and reductions in inventories and cash stocks play an important part in meeting financing shortfalls. After the shock, there is a marked increase in equity relative to debt. As the following section records, this is reflected in subsequent declines in leverage. Our observations are robust to the size of firms: as Table 3 shows, apart from being subject to larger drops in cash flow, small firms display similar financing responses to the whole sample.

3.2 Leverage

Table 4 reports book and market leverage around the cash flow shock. As noted in Table 2, the cash flow shocks cause reductions in book values of assets and even larger falls in market values of assets. These lead to increases in both book and market measures of leverage when the cash flow shock arrives.

Leverage gradually adjusts towards its pre-shock level. After the cash flow shock, the low levels of debt issuance (and possible repayment), the cut-back in dividends, the continuing issuance of new equity and the rise in the market to book ratio of assets reported in Table 2 all contribute to the move of leverage towards pre-shock levels. The post-shock leverage adjustment is more obvious when we measure leverage as debt over assets rather than as liabilities over assets.

3.3 Delisted Firms

As previously noted, in each year some firms in the sample are delisted. Since their financing behaviour may be different from other firms, in Table 5 we record their financing behaviour separately. Not surprisingly, these are the firms that display the

[1] Detailed results are available on request.

most dramatic drops in their cash flows. The cash flow of firms which are delisted immediately after the shock drops from 2.56% of assets to –15.23%, and for firms which are delisted one and two years after the initial shock, cash flows drop from on average 5.41% to –17.45% and from 5.88% to –10.85% respectively. As in the whole sample, delisted firms do not for the most part finance much of their cash flow loss from debt and equity. Contrasting Panels A, B and C suggests that firms which survive for two years (Panel C) finance a higher proportion of their cash flow loss from these sources - debt and equity issuance approximately cover cash flow losses at t=0. Delisted firms display a marked reduction in investment in period 0 and therefore provide an extreme illustration of many of the features of other financially distressed firms. They do not fund a high proportion of cash flow shocks from external sources and are instead forced to cutback significantly on investment.

4 Regressions

In this section we report the results of cross-sectional regressions on the 1023 firms in the working sample, excluding the 196 firms that are delisted at various stages, i.e. a sample of 827 observations.

4.1 Financing Responses

Table 6 reports the results of cross-sectional regressions of different forms of financing during the cash flow shock (time period 0). The dependent variables are debt issuance, equity issuance, trade credit, financing from inventories, running down of cash stocks, and dividend reductions. All the dependent variables are therefore measured as a financing response to cash flow shortages. The main explanatory variable is the (absolute) fall in cash earnings relative to the average historical level of cash earnings in the previous 4 years. A positive coefficient therefore indicates a response to cash flow shortage by accessing the particular form of finance in question. We also use the mean-historical level of source of finance (i.e. the dependent variable) in the past 4 years as an additional explanatory variable. All flow of funds variables are scaled by the average book assets in the past 4 years. We use the following firm characteristics as control variables: beginning-of-period Q, firm size (log of beginning-of-period book assets), beginning-of-period leverage (total debt over total book assets), and beginning-of-period collateral (fixed assets over total assets).

Table 6 reveals that there is a significant positive relation between cash flow shortages and sources of finance in the case of debt and equity issues, trade credit, cuts in inventory and dividends. The most significant marginal source is new equity where the marginal propensity to raise finance with respect to a unit cash flow reduction is 0.34, and the adjusted R-squared is 0.37. Equity finance also seems to be positively related to its historical level as indicated by the positive coefficient on the average equity issuance in the past 4 years. Q has a positive sign, suggesting that firms with higher market valuation tend to issue more equity. Collateral also helps the firm to issue more equity. Consistent with conventional wisdom, firm size has a negative impact and leverage has a positive impact on equity finance. These show that small firms and highly-levered firms are more likely to issue equity.

Table 6 suggests a 0.23 marginal propensity to raise debt. Historical issuance of debt has a negative but not significant impact. Indeed the only significant firm characteristic is collateral, which has a coefficient of 0.10. This suggests that firms' debt capacity during the shock depends on the level of their collateral.

Trade credit comes next in terms of marginal importance of financing, with a coefficient of 0.20 on cash flow reduction. Firms' historical use of trade credit significantly limits their ability to finance the cash flow shortage by account payables as evidenced by a coefficient of –0.69 on the average net trade credit in the past 4 years. Leverage has a small positive impact on trade credit, suggesting that highly-levered firms use more trade credit, but this is only significant at the 10% level.

The marginal propensity to cut inventory accumulation is 0.08. Like the case of trade credit, firms' historical use of inventory finance limits their ability to finance the cash flow shortage by inventory reduction, as evidenced by a coefficient of –0.65 on the average inventory finance in the past 4 years. Q has negative impact and firm size has a positive impact, but the magnitude is very small.

There is a small marginal propensity of 0.01 to cut dividends. Consistent with conventional wisdom, dividend spending is positively related to past levels. Larger firms and firms with higher market valuations display smaller dividend cuts, but the effect is small. A higher leverage is associated with larger dividend reductions, but again the magnitude is small. As we have noted before, many firms do not pay

dividends at all, and this may make the regression results less informative. We therefore reran the dividend regressions on firms with dividend payment history prior to the shock. The marginal propensity to cut dividends rises to 0.04 in this case and it is significant at the 1% level.

The ability to use cash stocks to fund deficits is dependent on the extent to which they have been run down in the past: the average use of cash stocks in the past 4 years has a large coefficient of –1.06. Leverage has a negative impact on firms' ability to use cash reserves, presumably because firms with higher leverage have to keep more cash to meet their interest payment requirements.

In the investment regression leverage has a positive sign, showing that firms with higher leverage are more likely to cut their investment,. Collateral has a negative sign, showing that firms with higher level of collateral invest more than other firms. Together with the debt and equity regressions these results suggest that firms with more collateral are able to raise more external finance and are therefore less likely to cut investment spending. Consistent with the empirical literature on fixed investment, Table 6 also shows that investment spending is positively related to its past level, and that firms with higher beginning-of-period Q invest more.

4.2 Non-Linearities

One important difference between the pecking-order theory and the static trade-off theory of capital structure is that the former has strong non-linear predictions. Our methodology allows us to test this by examining different levels of financing need, i.e. whether financing requirements are large or small and of long or short duration. The pecking-order predicts that there will be a strong equity response when cash flow shortages are large and last for a long period.

This is indeed what we see in Table 7. We divide firms according to the duration of the cash flow shortage. There are 347 firms whose cash flow returns to the historical level within one year. The rest (480 firms) experienced prolonged cash flow shortages. We also define firms as having large cash flow shortages if the cash flow reduction relative to its historical average is larger than 20% of book assets - there are 219 firms for which this is the case. We generate two dummy variables that indicate if the cash flow shortage is large and if it is prolonged and we include the interactive

variables in the regressions in Table 7. Thus the coefficients on these two interactive variables measure the marginal effect to raise various sources of finance where the cash flow shortage is large and prolonged relative to the whole sample.

What emerges is a strong non-linearity in equity finance. The two interactive variables both have positive and significant coefficients in the equity regression, while cash flow shortage itself loses significance. The marginal response to larger and longer cash flow shocks is 0.34 and 0.20 respectively. These suggest that equity finance is clustered in firms with larger and prolonged cash flow shortages. Consistent with the pecking-order theory, equity finance is less likely if cash flow shortage is mild or if it is of a temporary nature .

The patterns of debt and cash stock finance are also consistent with the pecking order theory. With the two interactive variables in the regression the marginal propensity to issue debt rises to 0.44 in Table 7, compared with 0.23 in the previous table. This is in line with the negative (although insignificant) coefficients on the two interactive variables. These suggest that debt finance is clustered in firms with mild and temporary cash flow shortages. Similarly, the use of cash stock has a significant marginal propensity of 0.35 and the two interactive variables have significant and negative coefficients, showing that firms cannot finance the cash flow shortage by cash reserves when the shock is large and prolonged.

The non-linearity effect is more pronounced among small firms in Table 8. Compared with the whole sample, the equity regression for small firms shows that the marginal equity response to larger and longer cash flow shocks increases to 0.41 and 0.35 respectively, and cash flow shortage itself is insignificant. The coefficient on debt finance increases to 0.60 when we control for large and prolonged cash flow shocks but debt finance is much less responsive when the shortage is large as shown by a significant coefficient of –0.25 on the first interactive variable. Similarly, the response-coefficient in the cash stock regression increases to 0.59 in this case, with a significant coefficient of –0.39 on the first interactive variable.

In summary, we pick up strong non-linearities in the regressions. At the margin, new equity accounts for one third of the source of funding for cash flow shortages. There is a particularly strong convex relation between the size and the

duration of cash flow shocks and equity issues, which is different from other sources of finance. Debt and cash stocks provide important sources of finance at the margin when the cash flow shortage is mild and temporary, and they are less important when the shock is large and prolonged. All these results suggest a pecking order of finance to meet cash flow shortages during the shock: firms use internal sources and debt first, and they turn to equity when there is a significant financing need.

4.2 Leverage Adjustment

One implication of the trade-off theory is that firms will correct for deviations from the potential optimal leverage. Table 4 shows that leverage rises in year 0 due to the cash flow shock, and it gradually falls afterwards. To capture this effect more clearly, we report regressions of partial leverage adjustment after the cash flow shock in Table 9. The dependent variable is cumulative leverage adjustment after the shock, which is taken to be the difference between leverage at the end of year 3 and year 0. Leverage deviation, the major explanatory variable, is measured as the difference between the actual leverage at the end of year 0 and the average leverage in the four years prior to the shock. A (negative) unit coefficient therefore represents a full 100% adjustment back to the pre-shock level. We use the same measures of leverage as in Table 4, i.e. the book and market measure of debt over assets and liabilities over assets.

The regressions record a significant degree of reversion back to previous levels of leverage after the shock. If we measure leverage as book debt over book assets, column 2 of Table 9 records that 39% of the leverage deviation has reversed three years after the cash flow shock. Column 3 reports regression results where we put interactive variables between leverage deviation and the dummies for large and prolonged shocks. Once we control for large and prolonged cash flow shocks, the leverage adjustment effect is even stronger. Column 3 records that 76% of the leverage deviation has reversed three years after the cash flow shock. The positive coefficients (although insignificant) before the two interactive variables imply that leverage adjustment is less obvious for firms that have experienced large and prolonged cash flow shocks. We conclude that these firms have encountered fundamental shifts in their earnings ability and thereafter have to rely on higher leverage. The other measures of leverage report similar results. Namely, a significant

proportion of leverage deviation has reversed three years after the shock, especially for firms whose cash flow shortage is mild and/or temporary.

The descriptive statistics in Table 3 shows that small firms experience larger shocks and Table 10 therefore records leverage adjustment regressions for small firms separately. Market leverage regressions are similar to the whole sample but book value leverage adjustments are smaller. We again observe strong leverage adjustment when we put the interactive variables into the regressions and, as in the whole sample, the two interactive variables usually have positive (although insignificant) coefficients. The results on leverage adjustment are not therefore dependent on firm size.

4.3 The Role of Equity in Leverage Adjustment

To examine the role of equity issuance in the adjustment process we examine how leverage would have moved if new equity had not been issued. To do this, we replace equity issues with debt issues in the definition of leverage. That is, we replace the t=3 leverage with:

$$leverage_{t=3} = \left(total\ debt_{t=3} + \sum_{j=1}^{3} equity^{F}_{t=j} \right) / total\ assets_{t=3},$$

where $equity^F$ is (the flow of) new equity issues. The idea is to measure the leverage adjustment after the shock without its equity component.

Table 11 records that when equity issues are excluded there is less adjustment in the regressions that measure leverage in book value terms. This suggests that without equity issues, leverage deviations would not be reversed. Market leverage adjustments are not as affected by equity issues as the book measures, possibly because equity issuance has a negative price impact on market valuations, thereby reducing the response of market valuations to new equity issues.

Once we put the two interactive variables into the regressions, the coefficients on the two interactive variables have large positive and significant coefficients. This means that without equity issuance, the leverage of firms with large and prolonged shocks would continue to grow after the shock. These firms appear to be particularly reliant on equity finance to adjust back after the shock, as observed in Table 7.

In summary, equity issuance plays an important role in the leverage adjustment process.

5 Interpretation of Results

The analysis has revealed the value of the approach taken in this paper of looking at substantial cash flow disturbances. The perturbation approach has been highly informative about responses during shocks as well as subsequent dynamics.

What emerges is quite distinct in many ways from previous results. While internal cash flow is important prior to the cash flow shock, once the shock occurs firms resort to a number of sources of external finance. Trade credit and running down of inventories and cash stocks are important during the initial shocks. After the shock, there is a tendency to retire rather than to issue debt, and equity is a much more important source of finance. Equity sources are supplemented post shock by cutting dividends.

The non-linear relation between equity finance and financing is particularly in evidence in the cross-sectional regressions. There is a pronounced convex relation between equity and the size and the duration of firms' cash flow shocks. After the shock, leverage adjusts back to its historical level, and equity finance plays an important role in this.

The results are therefore highly consistent with a pecking-order of finance during the shocks in revealing a strong non-linear relation between new equity issues and cash flow shocks. However, after the shock there is strong evidence of leverage adjustments (by equity issuance) in line with the trade-off theory. In summary, we find support for the pecking-order theory during shocks and the trade-off theory after the shocks.

The analysis has also revealed the importance of sources of finance that are not much discussed in the literature, namely the use of trade credit, inventories and cash stocks. It is these that are most closely associated with more modest financing requirements and they play a role that is not dissimilar to internal sources of finance. The pecking order theory should therefore be supplemented by trade credit and the running down of inventories and cash stocks as alternatives to the use of internal

sources as forms of finance that are at the lower end of the financing hierarchy. Firms then resort to debt and new equity, cutting dividends and reductions in investment as responses to cash flow requirements that cannot be met through these other forms of finance. When firms' earnings recover, they revert back to their historical leverage by retiring debt and issuing equity.

6. Conclusions

This paper takes a new approach to examining the financing decisions of firms by evaluating the financing response of firms to large perturbations in their cash flows.

The results have provided new insights on the financing of firms. They have revealed the importance of new equity issues in the financing of substantial cash flow requirements and the non-linear relation of equity financing to firm performance. They have demonstrated the significance of trade credit and the running down of inventories and cash stocks as well as debt and equity issues. They have shown how firms' leverage adjusts back to previous levels after large perturbations. In other words, the perturbation analysis has been informative about the impact response of firms and longer-term dynamics.

It is worth considering why a perturbation analysis has been so insightful since after all, we would normally attribute a filtering technique with throwing away valuable observations. However, it allows the analysis to focus on that part of the functional relation between financing and earnings that is most informative – namely the region where non-linear relations are most likely to be observed. Most data sets swamp this region with a large number of observations of more routine forms of financing. Having identified regions of significant financing events it is then more straightforward to evaluate the determinants of financing both during and after these events. This allows potential non-linear relations between finance and firm performance during perturbations and adjustments around the perturbations to be identified more precisely than has been possible to date.

In a related paper, Mayer and Sussman (2005), examine the financing of firms in the context of investment spikes. They use a filtering technique to identify years of large capital expenditures in excess of two standards deviations of a base level of investment either side of the spike. In other words they identify equivalently large

financing requirements created by precisely opposite circumstances, i.e. large capital expenditures as against adverse cash flow shocks. Despite the very different circumstances surrounding these events, in many respects they report similar financing patterns – large amounts of new equity issues by certain types of firms and financing behaviour that is consistent with the pecking order in the short-run and the trade-off theory in the long-run. But in one respect the results are quite different. There is a large amount of debt finance by, in particular large, firms during investment spikes whereas we have found only modest levels of debt issuance to meet cash flow shortfalls. One possible explanation for this difference is that there is increased collateral to offer as security in investment spikes that is not available in cash flow shortfalls.

References

1. Auerbach, A.S., 1985. Real determinants of corporate leverage. In: Friedman, B.M. (Ed.), Corporate Capital Structures in the United States. University of Chicago Press, Chicago, IL.
2. Bradley, M., Jarrell, G.A., Kim, E.H., 1984. On the existence of an optimal capital structure: Theory and evidence. Journal of Finance 39, 857–878.
3. Fama, E. and French, K., 2002. Testing trade-off and pecking order predictions about dividends and debt. Review of Financial Studies 15, 1–34.
4. Flannery, M. J., Rangan, K. P., 2006. Partial adjustment toward target capital structures. Journal of Financial Economics, 79, 469–506.
5. Frank, M., Goyal, V., 2003. Testing the pecking order theory of capital structure. Journal of Financial Economics 67, 217–248.
6. Graham, J., 1996. Debt and the marginal tax rate. Journal of Financial Economics 41, 41–74.
7. Graham, J., Harvey, C., 2001. The theory and practice of corporate finance: evidence from the field. Journal of Financial Economics 60, 187–243.
8. Hovakimian, A., Hovakimian, G., Tehranian, H., 2004, Determinants of target capital structure: the case of dual debt and equity issues. Journal of Financial Economics, 71, 517-540.
9. Hovakimian, A., Opler, T., Titman, S., 2001. The debt–equity choice. Journal of Financial and Quantitative Analysis 36, 1–24.
10. Jalilvand, A., Harris, R.S., 1984. Corporate behavior in adjusting to capital structure and dividend targets: an econometric study. Journal of Finance 39, 127–145.
11. Kayman, A., Titman, S., 2007. Firms' histories and their capital structures. Journal of Financial Economics, 83, 1-32.
12. Leary, M. T., Roberts, M. R., 2005. Do firms rebalance their capital structures? Journal of Finance 60, 2575–2619.
13. Mayer, C., Sussman, O., 2005. Financing investment: a new test of capital structure. Working paper, University of Oxford.
14. Myers, S.C., 1984. The capital structure puzzle. Journal of Finance 39, 575–592.
15. Rajan, R., Zingales, L., 1995. What do we know about capital structure? Some evidence from international data. Journal of Finance 50, 1421–1460.

16. Shyam-Sunder, L., Myers, S., 1999. Testing static trade-off against pecking order models of capital structure. Journal of Financial Economics 51, 219–244.
17. Smith, C.W., Watts, R.L., 1992. The investment opportunity set and corporate financing, dividend, and compensation policies. Journal of Financial Economics 32, 263–292.
18. Titman, S., Wessels, R., 1988. The determinants of capital structure choice. Journal of Finance 43, 1–18.

Table 1: Descriptive Statistics and Selection

This table provides information on the unfiltered population of 4,327 firms, the filtered sample of 1,235 firms, the 1,139 firms excluding outliers and the working panel of 1,023 firms (omitting firms still subject to cash flow shocks in 2004 when the data end). Panel A reports mean financial characteristics (total assets, cash earnings over assets, market to book ratios and book leverage (total liabilities over book assets)). Standard deviations are reported in brackets. Panel B reports the distribution of stock-exchange listing of the firms. Panel C reports the results of probit regressions where the dependent variable receives a value of one if the firm is included in the respective sample (and zero otherwise). The "Duration" variable measure the number of consecutive years of data available for each firm.

Panel A: Financial Characteristics

	Population	Filtered Sample	Excluding Outliers	Working Panel
Total assets($m)	1099(5673)	1067(4084)	1141(4250)	1071(3935)
Cash earning /assets	0.004(0.67)	-0.02(1.07)	0.01(0.77)	0.01(0.78)
Market-to-book	2.32(4.32)	2.21(5.45)	1.95(3.40)	1.95(3.47)
Book leverage	0.58(1.03)	0.59(1.16)	0.57(0.99)	0.58(1.08)

Panel B: Stock Exchange Listing (%)

	Population	Filtered Sample	Excluding Outliers	Working Panel
NYSE	24.7	23.7	24.5	24.3
AMEX	6.4	8.3	8.2	8.3
NASDAQ	50.5	46.6	45.9	44.8
OTC	10.0	13.1	12.9	14.1
Other	8.4	8.3	8.5	8.5
Total	100	100	100	100

Panel C: Probit Regression

	Filtered Sample	Excluding Outliers	Working Panel
Log of assets	0.001	0.008	0.008
Market-to-book	-0.016	***-0.037	***-0.048
Book leverage	-0.019	-0.023	-0.003
Cash earning/assets	-0.117	-0.051	-0.091
Duration of data	***0.090	***0.090	***0.097
NYSE	**-0.400	-0.273	-0.297
AMEX	-0.053	0.064	0.032
NASDAQ	-0.267	-0.116	-0.130
OTC	0.092	0.222	0.266
Pseudo R-Square	0.05	0.05	0.06

Figure 1: Dynamic Structure of the Working Sample

This figure describes the dynamic structure of the working sample. The year of the cash flow shock is denoted as period zero. The shock is defined as a three standard deviation or more drop in cash earnings below the historical (previous four years) mean. A recovery is defined as a return to at most one standard deviation below the historical mean. We say that a firm "ends" when it reaches 2004, the year in which the data set terminates.

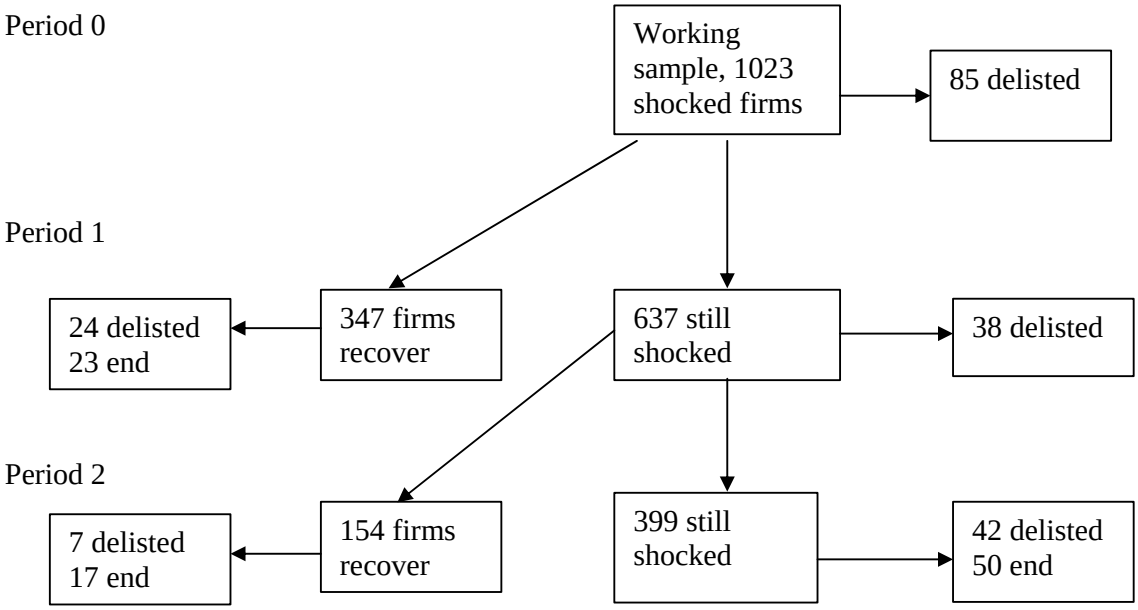

Table 2: Flow of Funds, Assets and Market to Book Ratios around the Cash Flow Shock

This table reports mean and median flow-of-funds around a cash-earning event at time, t=0. To account for size differences, each firm's cash flows are deflated by its own book value of total assets averaged over four years prior to the shock and then reported as percentages. The tables show cash flows, net debt, net equity, investment, net accumulation of inventories, trade credit, use of cash reserves, and payment of dividends. A positive number represents cash inflow and a negative number cash outflow. The last two columns report the average book value of assets (in million dollars) and the market to book ratios. The last two rows in each table average the entries before and after the shock.

Panel A: Means (%)

Time	Cash Earning	Debt	Equity	Investment	Inventory	Cash	Credit	Dividends	Other	Assets	M/B
-4	6.92	1.26	5.06	-7.76	-1.12	-2.23	-0.94	-1.34	0.09	966.27	2.11
-3	7.55	2.31	5.36	-9.4	-1.42	-2.45	-1.03	-1.31	0.31	1009.51	2.15
-2	7.74	2.2	9.13	-10.8	-1.74	-4.98	-1.09	-0.99	0.44	1082.96	2.19
-1	6.57	3.09	5.6	-10.44	-1.96	-1.62	-1.15	-0.96	0.75	1123.65	1.9
0	-10.15	3.27	5.65	-6.56	1.56	2.83	3.51	-1.06	1.03	1053.95	1.77
1	1.17	0.08	4.37	-6.02	0.15	0.14	0.01	-0.76	0.87	1100.44	1.65
2	3.68	0.95	5.55	-7.01	-0.61	-1.92	-0.56	-0.84	0.72	1191.39	2.05
3	5.11	0.42	4.14	-8.23	-0.73	-0.93	0.27	-0.92	0.83	1251.58	1.94
-4 to -1	7.20	2.22	6.29	-9.60	-1.56	-2.82	-1.05	-1.15	0.40	1045	2.09
0 to 3	-0.05	1.18	4.93	-6.96	0.09	0.03	0.81	-0.90	0.86	1149	1.85

Panel B: Medians (%)

Time	Cash Earning	Debt	Equity	Investment	Inventory	Cash	Credit	Dividends	Other	Assets	M/B
-4	8.37	0	0.03	-5.49	-0.27	-0.18	-0.5	0	0	62.74	1.52
-3	9.19	0	0.03	-6.6	-0.2	-0.16	-0.55	0	0	74.51	1.45
-2	9.02	0	0.01	-7.05	-0.15	-0.13	-0.4	0	0	98.15	1.4
-1	8.72	0	0	-7.23	-0.26	0	-0.39	0	0	108.65	1.27
0	-3.16	0	0	-4.99	0.11	0.43	1.46	0	0	91.77	1.14
1	4.85	-0.3	0	-3.53	0.04	-0.02	0	0	0	92.88	1.19
2	5.61	-0.31	0.04	-3.17	0	-0.08	-0.05	0	0	108.39	1.26
3	6.02	-0.1	0.09	-3.64	0	-0.1	0	0	0	107.36	1.28
-4 to -1	8.83	0	0.02	-6.59	-0.22	-0.12	-0.46	0	0	86	1.41
0 to 3	3.33	-0.18	0.03	-3.83	0.04	0.06	0.35	0	0	100	1.22

Table 3: Flow of Funds, Assets and Market to Book Ratios around the Cash Flow Shock: Small Firms

This table reports mean and median flow-of-funds around a cash-earning event at time=0 for the small firms, defined as smaller than half the average assets of the entire sample. To account for size differences, each firm's cash flows are deflated by its own book value of total assets averaged over four years prior to the shock and then reported as percentages. The tables show cash flows, net debt, net equity, investment, net accumulation of inventories, trade credit, use of cash reserves, and payment of dividends. A positive number represents cash inflow and a negative number cash outflow. The last two columns report the average book value of assets (in million dollars) and the market to book ratios. The last two rows in each table average the entries before and after the shock.

Panel A: Means (%)

Time	Cash Earning	Debt	Equity	Investment	Inventory	Cash	Credit	Dividends	Other	Assets	M/B
-4	4.13	0.22	9.44	-6.89	-1.29	-3.34	-1.14	-1.03	-0.42	23.75	2.39
-3	4.66	1.89	9.97	-9.24	-1.74	-3.77	-1.21	-0.91	0.01	27.79	2.36
-2	4.99	1.02	15.21	-10.19	-2.49	-7.41	-1.48	-0.46	0.13	34.38	2.4
-1	2.94	3.19	10.75	-10.76	-2.58	-2.77	-1.23	-0.46	0.4	38.06	2.17
0	-19.84	3.5	11.08	-7.61	1.87	5.04	5.2	-0.46	0.63	34.09	1.79
1	-4.78	0.44	8.01	-6.13	-0.02	1.66	-0.12	-0.37	0.76	32.86	1.87
2	-0.92	1.1	10.89	-6.71	-0.93	-3.27	-0.76	-0.45	0.6	34.78	2.57
3	1.72	0.59	7.28	-9.32	-0.86	-0.79	0.46	-0.59	0.71	37.39	2.33
-4 to -1	4.18	1.58	11.34	-9.27	-2.03	-4.32	-1.27	-0.72	0.03	31.00	2.33
0 to 3	-1.81	2.40	11.75	-9.45	-1.24	-2.23	0.32	-0.57	0.29	33.58	2.18

Panel B: Medians (%)

Time	Cash Earning	Debt	Equity	Investment	Inventory	Cash	Credit	Dividends	Other	Assets	M/B
-4	7.13	-0.06	0.29	-4.08	-0.31	-0.46	-0.72	0	0	16.99	1.66
-3	7.91	-0.01	0.32	-5.54	-0.29	-0.57	-0.61	0	0	21.93	1.48
-2	8.38	0	0.2	-5.98	-0.37	-0.16	-0.59	0	0	27.79	1.46
-1	7.43	0	0.27	-7.18	-0.22	-0.12	-0.31	0	0	29.86	1.3
0	-9.87	0	0.1	-5.05	0	2.08	2.81	0	0	26.07	1.13
1	1.49	-0.14	0.1	-3	0	0.21	-0.01	0	0	23.78	1.18
2	3.37	-0.25	0.18	-2.23	0	-0.14	-0.16	0	0	22.03	1.27
3	3.15	-0.05	0.21	-3.26	0	-0.01	0	0	0	20.98	1.29
-4 to -1	7.71	-0.02	0.27	-5.70	-0.30	-0.33	-0.56	0	0	24.14	1.48
0 to 3	3.46	0	0.22	-5.94	-0.22	0.31	0.33	0	0	26.41	1.34

Table 4: Leverage Around Cash Flow Shocks

This table reports various measures of book and market leverage around the cash flow shocks (t=0). Book leverage is book value of debt/liabilities over book value of assets. Market leverage is book value of debt/liabilities over market value of assets where the market value of assets is defined as the book value of liabilities plus the market value of equity. Panel A refers to means and Panel B to medians.

Panel A: Means

	Book Leverage		Market Leverage	
Time	Total Debt/ Total Assets	Total Liabilities/ Total Assets	Total Debt/ Total Assets	Total Liabilities/ Total Assets
-4	0.25	0.54	0.16	0.34
-3	0.24	0.52	0.17	0.35
-2	0.24	0.50	0.18	0.36
-1	0.25	0.54	0.19	0.40
0	0.29	0.67	0.23	0.47
1	0.29	0.62	0.23	0.48
2	0.27	0.69	0.20	0.45
3	0.27	0.60	0.19	0.44

Panel B: Medians

	Book Leverage		Market Leverage	
Time	Total Debt/ Total Assets	Total Liabilities/ Total Assets	Total Debt/ Total Assets	Total Liabilities/ Total Assets
-4	0.21	0.52	0.11	0.29
-3	0.2	0.5	0.11	0.31
-2	0.21	0.5	0.12	0.32
-1	0.21	0.52	0.14	0.38
0	0.25	0.57	0.18	0.46
1	0.23	0.58	0.17	0.46
2	0.23	0.58	0.15	0.43
3	0.22	0.58	0.14	0.42

Table 5: Delisted Firms

This table reports flow-of-funds for the 85 firms that were delisted in period 0 (Panel A), 62 firms delisted in period 1 (Panel B) and 49 firms delisted in period 2 (Panel C). The left-hand side of the tables refers to means and the right-hand side to medians. Cash flows, debt issues, equity issues and investment expenditures are reported.

Panel A: Delisted in Period 0

	Mean(%)				Median(%)			
Time	Cash flow	Debt	Equity	Investment	Cash flow	Debt	Equity	Investment
-4	5.33	3.1	6.26	-12.31	7.74	0	0	-7.14
-3	6.44	4.91	6.23	-11.73	9.81	0	0.03	-7.42
-2	4.78	2.03	12.94	-11.36	6.91	0	0.02	-8.07
-1	2.56	1.83	6.55	-9.99	6.24	0	0.02	-7.84
0	-15.23	3.74	5	-3.78	-9.29	0	0	-4.32

Panel B: Delisted in Period 1

	Mean(%)				Median(%)			
Time	Cash flow	Debt	Equity	Investment	Cash flow	Debt	Equity	Investment
-4	5.36	0.32	13.48	-8.41	6.68	-0.03	0.61	-5.75
-3	7.04	2.73	3	-9.19	8.64	0	0.26	-7.24
-2	6.31	3.93	14.64	-11.76	9.66	0	0.15	-8.4
1	5.41	1.52	8.92	-10.89	8.5	-0.03	0.18	-7.17
0	-17.45	3.16	8.84	-6.19	-8.19	0	0.1	-3.98
1	-3.32	0.59	3.82	-5.28	0.76	-0.07	0.02	-1.63

Panel C: Delisted in Period 2

	Mean(%)				Median(%)			
Time	Cash flow	Debt	Equity	Investment	Cash flow	Debt	Equity	Investment
-4	7.4	3.45	2.28	-6.29	7.31	0.57	0	-5.32
-3	7.78	6.03	2.63	-12.08	8.41	0.19	0.01	-7.15
-2	6.66	-0.68	12.52	-10.93	8.35	0	0	-7.32
1	5.88	4.03	2.44	-11.13	7.87	0.46	0	-7.31
0	-10.85	5.11	4.71	-6.29	-3.35	0	0.01	-4.9
1	-1.47	-0.42	3.45	-3.69	2.74	-0.82	0	-2.44
2	1.77	-0.66	4.69	-3.22	2	-1.04	0	-1.66

Table 6: Financing Responses to Cash Flow Shocks

This table reports regression results of period-zero financing response on the cash flow shock, the past level of that source of finance and various firm characteristics. The dependent variables are flows of debt, equity, trade credit, inventory, the use of cash stocks, dividend payments, and fixed investment. The cash flow shock is defined as the (absolute value) fall in cash earning relative to the mean-historical level of cash earnings in the previous 4 years. Average finance is the mean source of finance (i.e. the dependent variable) in the past 4 years. All flow of funds variables are scaled by the average assets in the past 4 years. Firm characteristics are: beginning-of-period Q, firm size (log of beginning-of-period book assets), beginning-of-period leverage (total debt over total book assets), and beginning-of-period collateral (fixed assets over total assets). ***, **, and * denote significance at 1%, 5%, and 10% based on White-corrected standard errors.

	Debt	Equity	Credit	Inventory	Cash Stock	Dividend	Investment
Shock	***0.23	***0.34	***0.20	***0.08	0.01	**0.01	-0.03
Average finance	-0.01	***0.43	***-0.69	***-0.65	***-1.06	***0.41	**0.24
Q	-0.00	***0.03	0.00	***-0.01	*-0.01	*-0.00	***-0.01
Firm size	0.00	***-0.01	-0.00	**0.00	0.00	***-0.00	0.00
Leverage	0.01	**0.09	*0.03	0.01	*-0.05	**0.01	**0.07
Collateral	***0.10	**0.06	-0.01	0.00	0.01	-0.01	***-0.09
Constant	***-0.06	**-0.05	-0.01	-0.01	0.02	0.00	-0.02
Adj. R square	0.08	0.37	0.28	0.12	0.18	0.18	0.08

Table 7: Financing Responses to Cash Flow Shocks: Different Shocks

This table reports results for period-0 financing regressions with slope dummies for large and prolonged shocks. The dependent variables are flows of debt, equity, trade credit, inventory, the use of cash stocks, dividend payments, and fixed investment. The cash flow shock is defined as the (absolute value) fall in cash earning relative to the mean-historical level of cash earnings in the previous 4 years. Average finance is the mean source of finance (i.e. the dependent variable) in the past 4 years. All flow of funds variables are scaled by the average assets in the past 4 years. Firm characteristics are: beginning-of-period Q, firm size (log of beginning-of-period book assets), beginning-of-period leverage (total debt over total book assets), and beginning-of-period collateral (fixed assets over total assets). D1 equals one if the shock-variable is larger than 20% and zero otherwise. D2 equals one if cash flow does not recover right after the shock (i.e. in period one) and zero otherwise. ***, **, and * denote significance at 1%, 5%, and 10% based on White-corrected standard errors.

	Debt	Equity	Credit	Inventory	Cash Stock	Dividend	Investment
Shock	***0.44	-0.19	***0.16	0.08	**0.35	0.02	0.05
Shock*D1	-0.11	***0.34	0.06	0.03	*-0.19	-0.00	-0.10
Shock*D2	-0.11	**0.20	-0.03	-0.04	**-0.19	0.00	0.05
Average finance	-0.02	***0.43	***-0.70	***-0.64	***-1.09	***0.41	***0.25
Q	-0.00	***0.03	0.00	***-0.01	-0.01	*-0.01	***-0.01
Firm size	0.00	***-0.02	-0.00	*0.00	0.00	***-0.00	0.00
Leverage	0.01	**0.10	*0.03	0.01	*-0.05	**0.01	**0.07
Collateral	***0.10	**0.06	-0.01	0.00	0.01	-0.01	***-0.09
Constant	**-0.05	0.01	-0.01	-0.01	-0.01	0.00	-0.03
Adj. R square	0.09	0.39	0.28	0.13	0.20	0.18	0.08

Table 8: Financing Responses to Cash Flow Shocks: Small Firms

This table reports regression results of period-zero financing response on the cash flow shock of small firms (with less than half the average assets of the entire sample). The dependent variables are flows of debt, equity, trade credit, inventory, the use of cash stocks, dividend payments, and fixed investment. The cash flow shock is defined as the (absolute value) fall in cash earning relative to the mean-historical level of cash earnings in the previous 4 years. Average finance is the mean source of finance (i.e. the dependent variable) in the past 4 years. All flow of funds variables are scaled by the average assets in the past 4 years. Firm characteristics are: beginning-of-period Q, firm size (log of beginning-of-period book assets), beginning-of-period leverage (total debt over total book assets), and beginning-of-period collateral (fixed assets over total assets). D1 equals one if the shock-variable is larger than 20% and zero otherwise. D2 equals one if cash flow does not recover right after the shock (i.e. in period one) and zero otherwise. ***, **, and * denote significance at 1%, 5%, and 10% based on White-corrected standard errors.

	Debt	Equity	Credit	Inventory	Cash Stock	Dividend	Investment
Shock	***0.60	-0.30	0.07	0.08	**0.59	*0.03	-0.03
Shock*D1	***-0.25	**0.41	*0.13	0.04	**-0.39	-0.02	-0.01
Shock*D2	-0.12	**0.25	-0.04	-0.03	*-0.18	0.00	0.02
Average finance	-0.08	***0.45	***-0.67	***-0.66	***-1.03	**0.34	0.15
Q	-0.00	***0.03	0.00	***-0.01	-0.01	-0.00	***-0.01
Firm size	-0.00	***-0.07	-0.00	0.01	0.02	-0.00	*-0.01
Leverage	0.07	0.08	0.04	0.00	-0.07	***0.01	0.05
Collateral	**0.10	0.04	-0.00	0.02	-0.01	-0.00	***-0.13
Constant	**-0.07	**0.17	0.01	-0.03	-0.07	-0.00	0.03
Adj. R square	0.15	0.41	0.25	0.12	0.19	0.24	0.10

Table 9: Leverage Adjustment

This table reports leverage adjustment regressions over the period t=0 to t=3. The dependent variable is cumulative leverage adjustment after the cash flow shock: $leverage_{t=3} - leverage_{t=0}$. The main explanatory variable is the leverage shock, which is defined as $leverage_{t=0} - \overline{leverage}_{t=-4,...t=0}$, namely the deviation in leverage at the end of t=0 from its average historical level during t=-4,...,-1. The dynamics of all-four definitions of leverage as in Table 4 are analysed. All other variables are as defined in Table 7: D1 equals one if the shock-variable is larger than 20% and zero otherwise. D2 equals one if cash flow does not recover right after the shock (i.e. in period one) and zero otherwise. We also control for Q, firm size (log of book assets), leverage, and collateral, which are measured at the beginning of t=0. ***, **, and * denote significance at 1%, 5%, and 10% based on White-corrected standard errors.

	Book Leverage				Market Leverage			
	Total Debt/ Total Assets		Total Liabilities/ Total Assets		Total Debt/ Total Assets		Total Liabilities/ Total Asset	
Leverage shock	***-0.39	***-0.76	-0.17	**-0.45	***-0.55	***-0.66	***-0.48	***-0.52
Leverage shock*D1		0.38		0.33		0.13		-0.02
Leverage shock*D2		0.34		0.28		0.11		0.07
Q	0.00	0.00	0.00	-0.00	***-0.01	***-0.01	***-0.01	***-0.01
Size	-0.01	-0.01	-0.01	-0.01	-0.00	-0.00	-0.00	-0.00
Leverage	***-0.22	***-0.20	-0.04	-0.05	***-0.25	***-0.25	***-0.16	***-0.16
Collateral	0.03	0.04	-0.04	-0.03	0.04	0.04	-0.01	-0.01
Constant	**0.07	***0.08	***0.15	***0.15	***0.05	***0.05	***0.11	***0.11
Adj. R square	0.12	0.15	0.02	0.05	0.29	0.29	0.20	0.20

Table 10: Leverage Adjustment: Small Firms

This table reports leverage adjustment regressions over the period t=0 to t=3 for small firms with less than half the average size of assets of firms in the sample. The dependent variable is cumulative leverage adjustment after the cash flow shock: $leverage_{t=3} - leverage_{t=0}$. The main explanatory variable is the leverage shock, which is defined as $leverage_{t=0} - \overline{leverage_{t=-4,...t=0}}$, namely the deviation in leverage at the end of t=0 from its average historical level during t=-4,...,-1. The dynamics of all-four definitions of leverage as in Table 4 are analysed. All other variables are as defined in Table 7: D1 equals one if the shock-variable is larger than 20% and zero otherwise. D2 equals one if cash flow does not recover right after the shock (i.e. in period one) and zero otherwise. We also control for Q, firm size (log of book assets), leverage, and collateral, which are measured at the beginning of t=0. ***, **, and * denote significance at 1%, 5%, and 10% based on White-corrected standard errors.

	Book Leverage				Market Leverage			
	Total Debt/ Total Assets		Total Liabilities/ Total Assets		Total Debt/ Total Assets		Total Liabilities/ Total Asset	
Leverage shock	-0.33	***-0.95	0.01	*-0.71	***-0.43	***-0.50	***-0.42	***-0.40
Leverage shock*D1		0.55		0.45		0.17		-0.02
Leverage shock*D2		0.59		0.68		0.01		-0.03
Q	0.00	0.00	0.00	-0.01	**-0.01	**-0.01	***-0.01	***-0.01
Size	-0.03	-0.03	-0.08	-0.08	-0.01	-0.01	0.00	0.00
Leverage	-0.21	-0.14	-0.20	-0.08	***-0.24	-0.24	***-0.18	***-0.18
Collateral	-0.04	-0.03	-0.12	-0.14	-0.01	0.00	-0.08	-0.08
Constant	**0.18	0.17	***0.43	***0.42	*0.09	*0.09	***0.16	***0.16
Adj. R square	0.10	0.16	0.05	0.10	0.22	0.22	0.21	0.17

Table 11: Leverage Adjustment: The Role of Equity Issues

This table reports results of regressions similar in structure to Table 10, except that the t=3 leverage is replaced with: $leverage_{t=3} = \left(total\ debt_{t=3} + \sum_{j=1}^{3} equity^{F}_{t=j} \right) / total\ assets_{t=3}$, where $equity^{F}$ is (the flow of) equity issues. The idea is to measure the leverage adjustment after the shock without its equity component. All other variables are as in Table 9. The dependent variable is cumulative leverage adjustment after the cash flow shock: $leverage_{t=3} - leverage_{t=0}$. The main explanatory variable is the leverage shock, which is defined as $leverage_{t=0} - \overline{leverage_{t=-4,...t=-1}}$, namely the deviation in leverage at the end of t=0 from its average historical level during t=-4,...,-1. The dynamics of all-four definitions of leverage as in Table 4 are analysed. All other variables are as defined in Table 7: D1 equals one if the shock-variable is larger than 20% and zero otherwise. D2 equals one if cash flow does not recover right after the shock (i.e. in period one) and zero otherwise. We also control for Q, firm size (log of book assets), leverage, and collateral, which are measured at the beginning of t=0. ***, **, and * denote significance at 1%, 5%, and 10% based on White-corrected standard errors.

	Book Leverage				Market Leverage			
	Total Debt/ Total Assets		Total Liabilities/ Total Assets		Total Debt/ Total Assets		Total Liabilities/ Total Asset	
Leverage shock	-0.12	***-0.86	0.05	*-0.44	***-0.53	***-0.69	***-0.46	***-0.50
Leverage shock*D1		**0.91		**1.03		0.16		0.02
Leverage shock*D2		0.51		0.09		0.16		0.06
Q	*0.05	*0.05	0.06	0.05	0.01	0.01	0.00	0.00
Size	***-0.07	***-0.07	***-0.08	***-0.07	***-0.02	***-0.02	***-0.02	***-0.02
Leverage	***-0.34	***-0.30	-0.05	**-0.15	***-0.25	***-0.24	***-0.20	***-0.20
Collateral	0.02	0.05	-0.08	0.00	0.02	0.02	-0.02	-0.02
Constant	***0.43	***0.43	***0.47	***0.49	***0.16	***0.16	***0.22	***0.22
Adj. R square	0.13	0.15	0.10	0.13	0.19	0.19	0.16	0.16