How Do Firms Finance Their Investments? The Relative Importance of Equity Issuance and Debt Contracting Costs*

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Abstract

This paper examines the financing decisions of firms in response to changes in investments and profits. We find that information and agency costs play important roles in firms' financing decisions. However, we find no strong evidence that asymmetric information about the value of a firm's assets causes equity to be used only as a last resort. Indeed equity is the predominant source of finance in situations, such as profit shortfalls, investment in intangible assets, and internally generated growth opportunities, where informational asymmetries and agency costs are likely to be high. We also find that firms respond asymmetrically to positive and negative profit shocks. In financing fixed assets, high asymmetric information firms use more short-term debt and less long-term debt, whereas firms with high potential agency problems use significantly more equity and less long-term debt and cash.

Corporate financial managers must decide how to finance their company's investments and profit shortfalls. Finance theory predicts that information and agency costs play an important role in this decision. Myers (1984) and Myers and Majluf (1984), for example, argue that asymmetric information about asset values imposes adverse selection costs on equity issuance. This leads to the prediction that firms whose asset values are opaque to outsiders will use debt to cover financing needs and issue equity only as a last resort.[1] DeMeza and Webb (1987) extend Stiglitz and Weiss (1981) to show that asymmetric information about asset risk leads to increased debt issuance costs. Their argument predicts that firms whose asset riskiness is not transparent to outsiders will issue equity to cover financing needs. Moral hazard problems may lead to underinvestment (Myers, 1977) or asset substitution (Barclay and Smith, 1995a and 1995b; Guedes and Opler, 1996; and Krishnaswami, Spindt, and Subramaniam, 1999) inducing increased agency costs of debt issuance.[2] These arguments predict that firms with greater scope for opportunistic behavior (e.g. whose investments are opaque to outsiders) will use equity to fund their investments. Agency effects, however, can cut both ways. Agency problems between managers and shareholders can lead to lower costs of debt issuance relative to equity issuance (e.g., Jensen and Meckling, 1976; Jensen, 1986; and Stulz, 1990).[3] Boot and Thakor (1993) argue that, when balancing information and agency costs, firms may find it optimal to simultaneously issue debt and equity. This leads to the prediction that firms will use strips of capital, combinations of debt and equity, to cover their financing needs.

We test these predictions empirically by examining how firms finance their investments and profit shortfalls. Specifically, we estimate a multi-equation system whose dependent variables are financing sources, whose independent variables are factors affecting the need for finance, and whose coefficients are constrained to conform to accounting identities. Our model provides a richer menu of financing

[1] Boot and Thakor (1993) and Fulghieri and Lukin (2001) show that this prediction is reversed when outside investors can produce information about the firm.
[2] While agency costs could also arise in markets with symmetric information due to costs of proving a case in the court of law, asymmetric information would likely also create and exacerbate agency problems; see, for example, Stiglitz (2000) and the references therein.
[3] A recent paper by Inderst and Mueller (2006) provides a different perspective on the importance of information transparency in the choice of debt and equity financing.

choices and a more detailed description of the financing deficit than has been studied in earlier papers. We disaggregate debt into short-term debt and long-term debt and allow firms to issue equity, repurchase shares, and draw down (or build up) their cash balances endogenously. As in Shyam-Sunder and Myers (1999) and Frank and Goyal (2003) we take the financing deficit as exogenous, and we disaggregate the financing deficit into its components: investments in net working assets, investments in net fixed assets, profits, and dividends. We require that the aggregate adjustments of all the left-hand side variables to a change in a right-hand side variable exactly offset the change so that the sources and uses of funds identity is satisfied.

Our principal empirical findings are as follows. First, we find that investment-induced deficits are financed with both short- and long-term debt and equity but that cash balances are not a significant source of financing. The simultaneous use of debt and equity is predicted by Boot and Thakor (1993). Deficits caused by profit shortfalls, on the other hand, are financed primarily with equity. Existing literature (e.g., Shyam-Sunder and Myers, 1999) assumes that investments and shortfalls in internally generated funds are financed in the same way, but our results show that this is not true. This finding also implies that market timing cannot completely explain equity issuance since profit shortfalls are more likely to be associated with low rather than high share prices.[4] Second, we find that firms issue equity to fund investments in intangible assets such as R&D and advertising campaigns and in funding internally developed investment opportunities (as compared to external acquisitions). We also find, consistent with Fama and French (2005), that small firms, high-growth firms, and less-profitable firms use more equity to cover their financing needs than large firms, low-growth firms, and more profitable firms. Third, we find that firms respond asymmetrically to positive and negative profit shocks. While they use equity to cover profit shortfalls, they respond to positive profits by increasing their financial flexibility, that is, by replenishing cash balances and reducing debt issuance. And fourth, using idiosyncratic risk to proxy for asymmetric information about the firm and R&D plus advertising expenses divided by tangible assets to proxy for

[4] This finding is also consistent with rebalancing where firms with higher operating losses become overlevered and issue equity when raising outside financing. We thank the referee for pointing this out to us..

potential agency problems, we find that, compared to low asymmetric information firms, high asymmetric information firms use less long-term debt and more short-term debt to finance investments in fixed assets and, compared to firms with low potential agency problems, firms with high potential agency problems use significantly less long-term debt and more equity to finance investments in net fixed assets.

Taken altogether, our results show that information and agency costs play important roles in firms' financing decisions. However, we find no strong evidence that asymmetric information about the value of a firm's assets causes equity to be used only as a last resort. Indeed equity is the predominant source of finance in situations, such as profit shortfalls, investment in intangible assets, and internally generated growth opportunities, where informational asymmetries and agency costs are likely to be high.[5] Consistent with Myers (1977), firms with high potential agency costs seek to preserve financial flexibility when financing fixed assets.

Two recent studies by Frank and Goyal (2003) and Fama and French (2005), who test the pecking order theory of financing, are related to our paper. Unlike these papers, however, our interest is not in narrowly testing a particular theory of financing, but rather in achieving a deeper understanding how investment and cash flow shocks affect a firm's financing decision. Frank and Goyal (2003) examine debt financing while we examine a broader set of financing decisions (cash, short-term debt issues, long-term debt issues, equity issues and repurchases). We also relax the Frank and Goyal (2003) assumption that financing decisions respond symmetrically to investments and disinvestments as well as to profits and losses and find that financing responses are asymmetric. Unlike Fama and French (2005), who examine equity issues and repurchases independent of investment decisions, in our model investments and financing choices are linked. Furthermore, Fama and French (2005) do not address questions about the magnitude and relative importance of debt versus equity issues, which we do.

[5] There are at least two reasons why profit shortfalls and investments in fixed assets may lead to different information and agency frictions. First, while investments in net fixed assets increase the collateral base of the firm, profit shortfalls do not. Second, financing of profit shortfalls can be viewed as financing of existing assets which have recently been unproductive while this is not necessarily true for investments in new fixed asset. See also Section 5.1.

Two other recent papers by Pulvino and Tarhan (2006) and Dasgupta, Noe, and Wang (2008), which study the cash flow sensitivity of investment, use an empirical model that, like ours, consists of multiple equations, lagged dependent variables, and cross-equation coefficient restrictions. Unlike these papers, however, we focus on how firms choose to finance their investment needs and profit shortfalls and how the firms' choices depend on who is doing the financing and what is being financed.

The remainder of the paper is organized as follows. Section 1 describes the data and the variables we use in the analysis. Section 2 outlines our model of financing decisions and discusses our overall findings. Section 3 examines the financing choices of firms conditional on their characteristics while section 4 analyzes the financing choices of firms when investing in acquisitions and in R&D and advertising campaigns. In section 5 we perform further tests to examine how agency and information costs affect the financing choices of firms. Section 6 concludes.

1. Data and variables

The sample is from Compustat and covers the years 1972 to 2005. We exclude regulated utilities (Standard Industrial Classification (SIC) codes 4900-4949) and financial firms (SIC codes 6000-6999). While we use all firms with available information, our test results are qualitatively similar if we exclude firms with total assets less than $500,000 and firms with stockholders' equity below $250,000.

The sample consists of 183,170 firm-years for an average of 5,387 firms per year. Using data from Compustat, we construct variables for changes in cash holdings, short-term debt issues, long-term debt issues, equity issues, share repurchases, investment in net working assets, investment in net fixed assets, income available to common and preferred shareholders, and dividends. The variables used in estimating our model are defined in the Appendix.

Table 1 presents summary statistics of the variables for the whole period of 1972-2005 and for several sub-periods. We find that the average firm in our sample invests $3.6 million per year in net working assets and $27.45 million per year in net fixed assets. Income of the average firm is $36.44 million while dividends and repurchases are $18.25 and $8.03 million. Internal financing for the sample (average

change in cash balances) is \$7.94 million. In terms of external financing, we find that average firm-year long-term debt issues are \$14.41 million while short-term borrowings are \$3.37 million. Gross (net) equity issues are relatively large, at \$25.70 (\$17.67) million per firm-year. The large amounts of equity financing extend the findings of Fama and French (2005) that firms issue equity frequently.

We also find a significant variation in debt and equity issues across the different sub-periods and a pronounced growth in share repurchases during 1981-2005. Long-term debt financing for the average firm peaks in the 1996-2000 period at \$25.31 million. Interestingly, during 2001-2005, net long-term debt issues decline significantly to \$10.22 million. Equity issues also reach a peak of \$47.34 million during 1996-2000. Share repurchases for the average firm increase from \$1.47 million in the 1972-1975 period to around \$19.10 million in the 2001-2005 period. Dividends, on the other hand appear quite stable over time at around \$18 to \$20 million per year for the average firm.

[Insert Table 1 about Here]

2. The financing decisions of firms

2.1. Econometric approach

In this section we examine how the average firm in our sample finances its investments. Specifically, we estimate the system of equations

$$y = \mathrm{B}x + \mathrm{C}z + e \tag{1}$$

where y is a $n \times 1$ vector of financing choices, x is a $m \times 1$ vector of components of the financing needs and z is a $k \times 1$ vector of other determinants of financing choices. We sign the elements of y as sources of finance (i.e., increases in liability or equity accounts or decreases in asset accounts) and the elements of x as uses of finance. When sources and uses are measured exhaustively, the sources and uses of funds identity

$$\mathrm{i}'y - \mathrm{i}'x \equiv 0 \tag{2}$$

is satisfied. This identity imposes cross-equation restrictions on the coefficients $\mathrm{i}'\mathrm{B} = \mathrm{i}_{\mathrm{l}\times\mathrm{m}}$ and $\mathrm{i}'\mathrm{C} = 0_{\mathrm{l}\times\mathrm{k}}$ and implies that the error terms are correlated, that is, $\mathrm{i}'\mathrm{e} = 0$. The unit sum restrictions on the columns of B reflect the fact that a change in any element of x, a need for finance, must be fully accommodated by the combined changes in elements of y, the sources of finance. A ceteris paribus change in any element of z, may cause elements of y to vary, but their aggregate variation must equal zero.[6] The restriction in (2) is necessary to obtain efficient coefficient estimates.

We estimate a system of five equations in which the dependent variables are change in cash holdings, short-term debt issues (net), long-term debt issues (net), equity issues (gross), and share repurchases. The regressions are asset-weighted to allow interpretations for the average firm (as opposed to the average dollar) and to control for size-related heteroskedasticity of the residuals. Our independent variables are investments in net working and fixed assets, income available to common and preferred shareholders, and dividends. Additionally, we control for firm characteristics by including leverage (long-term debt-to-assets), size (natural log of assets), growth opportunities (market-to-book assets), and profitability (earnings-to-assets) to the list of explanatory variables.

Empirical models used in the financing literature usually assume that investments in net working and net fixed assets, firm profits, and dividends are exogenous to firms' financing decisions. However, some studies, such as Pulvino and Tarhan (2008) and Dasgupta, Noe, and Wang (2008) present models where investments, dividends, and changes in cash balances are dependent variables. For this reason, we also estimate an eight-equation model and examine the robustness of our overall conclusions pertaining to the profit shortfall related financing choices.

2.2. How firms finance investments

Table 2 shows how firms finance investments in current and fixed assets, as well as how the financing variables respond to changes in income and dividends. Panel A presents the coefficient estimates from an unrestricted estimation. Panel B presents the estimates with the restriction that sources of funds equal uses

[6] Pulvino and Tarhan (2006) use a similar modeling approach in examining the cash flow sensitivity of investments.

of funds (equation (2)). We focus our discussion on the restricted estimates and present the unrestricted estimates to examine how constraining the coefficients affects the estimates.

[Insert Table 2 about here]

Panel B shows that firms use long-term debt and equity differently when financing investments in net working assets and net fixed assets. When financing a dollar of investment in net working assets, the average firm borrows \$0.17 of short-term debt, borrows \$0.12 of long-term debt, and issues \$0.72 of equity. On the other hand, when financing a dollar of investment in net fixed assets the average firm relies on \$0.19 of short-term debt, \$0.51 of long term borrowings, and \$0.39 of equity. Cash holdings play a small role in financing both working assets and fixed assets. Finally, share repurchases are not materially affected by either type of investments, supporting the common assumption in the literature that investments and payouts (in the form of repurchases) are independent, at least on the margin.

2.3. How firms respond to changes in profits

When firms experience an increase in income available to common and preferred shareholders, they reduce their reliance on external markets and add to their cash holdings. Panel B of Table 2 shows that firms use \$1 increase in profits to reduce both their short- and long-term borrowings by about \$0.11, and to cut back their equity offerings by \$0.73. All three coefficients are significant at the 0.01 level.

The estimated coefficients on short- and long-term borrowings show that firms use incremental profits at least partially to increase financial flexibility by reducing their debt. This finding is consistent with the idea that firms increase their financial slack when they experience an increase in internal funds.

In our setup, consistent with the literature on the financing deficit, we assume that investments and dividends are exogenous. We now examine the robustness of our results if we assume that investments and dividends are endogenous and the only exogenous variable is income available to common and preferred. We present the results in Table A1. We find that again profits (and profit shortfalls) mostly affect firm equity issues. For \$1 of profit, the average firm reduces equity issues by \$0.56 (p-value of 0.0001), reduces short-term debt issues by \$0.06 (p-value of 0.0001), and increases cash balances by

$0.08 (p-value of 0.003). These coefficients are smaller in magnitude than the coefficients in our base model, but still show that equity is the financing choice most significantly affected by income. This model further allows us to examine how income affects the investment decisions of firms as well as dividends. The coefficient estimates show that for $1 in income, the average firm increases its investments in working assets by $0.20 (p-value of 0.0001), investments in fixed assets by $0.09 (p-value of 0.013), and dividends by $0.01 (p-value of 0.001). Similar to our findings regarding repurchases, we also find that dividends are not very sensitive to profits. However, dividends are sticky so that for every $1 of dividends in *t*-1 firms pay $0.58 of dividends in year *t*. A majority of that "stickiness" in dividends ($0.37/$0.58) is sustained by equity issues.

2.4. The effect of dividends on financing decisions

Our findings show that firms on average fund their dividends primarily by equity issues. In fact, to pay $1 of dividends, the average firm raises more than $1 of external funds and uses the extra amount to build-up its cash balances and to distribute additional funds to its shareholders by repurchasing shares. Given that our results reflect equilibrium financing choices, it is perhaps not surprising that dividends and reduction in equity issues seem to be almost perfect substitutes. In our setting this result means that, given the level of investments and profits, if a firm wants to pay more dividends to equity holders then the firm would have to issue more equity to finance its investments or profit shortfalls.

2.5. The importance of past financing decisions

Financing choices may be persistent. If ignored, persistence in financing choices could lead to biased estimates of the sensitivities of financing to investments and income. In addition, debt and equity issues may not be contemporaneous with investments. For example, firms may issue debt or equity one year prior to the planned investments. That decision in turn will affect the amount of debt or equity issued in the present year. We address these issues by including lagged dependent variables in the set of explanatory variables. While past financing choices may affect individual current financing choices,

equations (1) and (2) require the aggregate effect of past financing decisions to equal zero. So we restrict the coefficients on the lagged dependent variables to add up to zero.

In Table 3 we do not find much evidence for persistence in the dependent variables.[7] Cash holding changes and short- and long-term debt issues revert over time, consistent with the idea that firms have fixed costs of issuing debt and so when accessing the debt markets they issue more debt securities than they need for present investments. The \$0.19/\$1.00 reversion in short-term debt from year *t*-1 to year *t* is mostly achieved by an increase in long-term debt of \$0.07 and increases in equity offerings and cash balances of \$0.04 and \$0.02, respectively. The \$0.09/\$1.00 reversion in long-term debt is achieved by an increase in short-term debt by the same amount, while the addition to cash balances and the increase in equity issues offset each other. Equity issues show some degree of persistence so that one dollar of equity issued in year *t*-1 leads to \$0.05 equity issued in year *t*. The lack of reversal in equity issues suggests that fixed costs of equity issues may play a less significant role in firms' financing decisions than fixed costs of debt issues. If in year *t* firms do not reverse high equity issues of year *t*-1 then firms should use the issued equity for other purposes. Indeed, we find that year *t*-1 equity issues increase firms' cash holdings and reduce debt issues.

[Insert Table 3 about here]

2.6. Tracking the financing deficit

In the model by Frank and Goyal (2003) long-term debt is the dependent variable and the net financing deficit is the independent variable. They argue that the estimated coefficient needs to equal 1.0 (i.e. "track" the financing deficit) if the pecking-order hypothesis is to hold. Additionally, they argue that when the external financing deficit is disaggregated, each component should track the deficit.[8]

Results in Table 3 indicate that no single variable tracks the financing deficit. Cash holdings, for example, have a significant response only to profit shocks. Short-term debt, long-term debt, and equity

[7] When dividends are endogenous (Table A1) we find that dividends are persistent as discussed in Section 3.2.
[8] The prediction that the estimated coefficients should equal 1.0 comes from the fact that in their model cash holdings and short-term debt are folded into their definition of net working capital.

issues all adjust to the financing deficit but none of these financing components tracks the deficit. Furthermore, while short-term debt appears to symmetrically adjust to the different sources of the deficit, the adjustments of long-term debt and equity depend on the source of the deficit and in general are not symmetric. For example, if capital expenditures increase by a dollar, equity issues of the average firm increase by $0.32. We see a similar positive response but by a significantly higher amount ($0.68) when profits decline by a dollar. The corresponding amounts for short term borrowings are $0.20 and $0.12. In the case of long-term debt we find that a one dollar investment in fixed assets leads to $0.52 increase in long-term debt while a one dollar decline in income available to common and preferred shareholders leads only to $0.11 increase in long-term debt issues. These findings reveal patterns not predicted by the pecking order theory of finance.

Interestingly, our results also indicate that a shortfall in internally generated funds is mostly financed with equity. Arguably, firm profitability is the most firm-specific component of the financing deficit (as compared to investments), and as such is most likely to be affected by asymmetric information. Our findings, therefore, question the role of adverse selection costs in the security issuance decision.

3. Firm characteristics and financing choices

That firms collectively and on average rely heavily on external equity in financing their fixed assets contradicts the predictions of Myers (1984) and Myers and Majluf (1984). However, empirical findings for the average firm may conceal important differences across firms with different attributes. Differentiating firms' financing choices conditional on various firm attributes provides sharper tests of the role played by information asymmetries in determining the financing decisions of firms.

To examine how financing decisions vary with firm characteristics, we first estimate our main model for 16 portfolios formed on the basis of firm size (total assets), growth opportunities (market-to-book assets (M/B)), profitability (operating income relative to total assets), and leverage (long-term debt-to-assets). Then we calculate the eight differences between coefficients with high and low levels of one of the characteristics (e.g., size) while matching on the other three characteristics (e.g., market-to-book

assets, profitability, and leverage). Table 4 presents the average differences in coefficients for different firm portfolios.

Second, we use a more complex regression model of firms' financing decisions. This new model includes the four firm characteristics as determinants of financing choices and also includes interactions between these four firm characteristics and investments and profits. To preserve the "sources equal uses" constraint, we restrict the coefficient estimates for each interaction effect to add up to zero. For convenience of interpretation, we also standardize the variables related to firm size, growth opportunities, profitability, and leverage. Table 5 presents the regression results.

Pecking order predicts that firms with higher asymmetry in information between managers and investors (i.e., small firms, firms with high market-to-book assets ratios, and less profitable firms) will be more reluctant to issue equity. The debt level of firms may also affect their financing decisions but the role of leverage is more difficult to interpret because leverage is endogenous. Nevertheless, to ensure that differences in leverage are not responsible for our findings, we use leverage as a control variable in all of our tests.

3.1. Firm characteristics and financing of investments in fixed assets

Regarding firm size, Fama and French (2005) find that small firms are more frequent users of the external equity markets. Our findings provide evidence that firm size is inversely related to the proportion of fixed assets financed through equity. Table 4 (Panel A) shows that small firms, relative to large firms, use \$0.10 more equity, \$0.10 less long-term debt, \$0.05 more short-term debt, and \$0.05 less cash when financing a dollar of net fixed assets. The first three coefficients are significant at the 0.01 level while the cash coefficient has a p-value of 0.02. Because it is more likely that small firms are informationally less transparent than large firms, it is notable that small firms actually use more equity and less internal funds than large firms.

[Insert Table 4 about here]

The results in Table 5 show that the primary financing significantly related to firm size is short-term debt. When we examine the interaction between firm size and fixed asset investments, we find that small firms finance a larger proportion of their fixed asset investments with short-term debt. A one standard deviation decrease in the natural logarithm of total assets (our measure of firm size) leads to $0.19 increase of short-term debt. While smaller proportions of long-term debt and equity are used, these coefficients are not statistically significant.

[Insert Table 5 about here]

Growth prospects, as measured by market-to-book assets, also play an important role in how firms finance their capital expenditures. Table 4 (Panel B) shows that high market-to-book assets firms (firms with high growth opportunities) issue $0.17 more equity than low market-to-book assets firms (p-value of 0.0001). Low growth firms make up for the difference in equity issues by using $0.12 more cash (p-value of 0.003) and $0.04 more long-term and $0.01 more short-term debt (neither coefficient is statistically significant). To the extent that high growth firms are more likely to have higher information asymmetries than mature low growth firms, the finding that high market-to-book assets firms actually use more equity runs counter to predictions based on adverse selection considerations. The estimates reported in Table 5 provide similar conclusions. For example, the increase in equity offerings in response to a one standard deviation increase in market-to-book assets is not statistically significant, while the $0.04 decrease in both cash and short-term debt have p-values of 0.050.

Our findings cast further doubt on the dominance of adverse selection costs in firms' financing choices. In their concluding section Myers and Majluf (1984) acknowledge the possibility that high growth firms may issue equity for reasons of financial flexibility. In their support, Fama and French (2005) also argue that high market-to-book firms and firms with low earnings are rational opt-outs allowed by the pecking order model. Our findings, therefore, are consistent with the idea that as growth opportunities increase financial flexibility considerations increasingly dominate adverse selection.[9]

[9] While we use market-to-book assets as a measure of growth opportunities, our results are also consistent with Baker and Wurgler (2002) and Welch (2004) who show that firms tend to issue more equity when their market valuations are high.

Profitability also plays a significant role when firms finance fixed assets. As shown in Table 4 (Panel C), firms that make up the low earnings portfolios raise \$0.04 more equity (p-value is 0.050) to finance one dollar of fixed asset investments relative to firms that make up the high earnings portfolios. Firms with lower earnings also use \$0.04 more short-term and \$0.06 less cash than higher profitability firms (p-values of 0.009 and 0.090). Again, if adverse selection considerations were to play an important role in security issuance decisions, we would have expected low-profitability firms to issue significantly less equity.

In summary, the evidence in this section shows that small firms finance a larger proportion of their fixed asset investments with short-term debt as compared to large firms. When financing investments in fixed assets, firms with high growth opportunities use more equity and less cash and debt relative to firms with low growth opportunities. Finally, less profitable firms use less cash but more equity and short-term debt relative to their more profitable counterparts.

3.2. Firm characteristics and response to changes in profits

While earlier studies typically combine investments and profits into one quantity that represents the financing deficit of the firm, our methodology allows us to examine the influences of investments and of profits on firms' financing decisions separately.[10] In this section we examine how firm characteristics affect the relation between income and financing choices.

In Table 3 we have shown that the average firm responds to a dollar decline (increase) in income by increasing (reducing) equity issues by \$0.68 and by drawing down (building up) their cash balances by \$0.06. They also increase (reduce) their short- and long-term debt issues each by \$0.12 and \$0.11 respectively. In this section we discuss how firms with different characteristics respond to changes in profits. In Section 4 we examined how firms finance a deficit caused by a dollar increase in fixed assets.

[10] Frank and Goyal (2003) also decompose the external financing deficit but they only examine the effect on long-term debt issues and mainly focus on whether the slope coefficients of the components of the deficit equals one.

To compare the financing response to investment-induced versus loss-induced deficits, we focus on how firms respond to a dollar decline in income.

To cover profit shortfalls, small firms use \$0.14 less long-term debt and \$0.20 more equity (p-values of 0.0001 and 0.008 respectively) while high growth firms use \$0.07 less short-term debt (p-value of 0.007) relative to their counterparts. Low profitability firms react to a dollar shortfall in profits by issuing \$0.10 less long-term debt (p-value of 0.001), \$0.03 more short-term debt (not statistically significant), and \$0.20 more equity (p-value of 0.024) than high profitability firms. Overall, similar to the case with investment-induced deficit, in funding deficits induced by profit shortfalls, firms that are likely to face difficulties in credit markets (small firms, high growth firms, and firms with lower profitability) appear to resort to equity at the expense of other sources of financing and are less aggressive in using their cash balances.

When examining the different portfolios in Table 4, we find that profitability is an important factor affecting the marginal share repurchase of firms. To fund fixed asset investments low profitability firms repurchase \$0.01 less (p-value of 0.047) than high profitability firms. This finding is consistent with the idea that firms with lower ability to pay shareholders (low profits) repurchase less.

4. Investment characteristics and financing choices

In this section we extend our analysis by first comparing the financing of "organic" (i.e., internal) investments to acquisitions. We then compare investments in research and development and advertising to investments in fixed assets.

4.1. Internal investments versus acquisitions

To examine whether firms finance their internal investments and their acquisitions differently, we modify our base model. In estimating the system, we are constrained by the fact that when a firm executes an acquisition, Compustat data for this transaction do not show the working/fixed composition of the target's assets. The data on the acquirer's fixed and net working assets incorporate the working and fixed

assets of the target. We want to be able to compare how organic fixed assets (or organic net working assets) are financed relative to acquisitions-related fixed assets (or net working assets acquired in the deal). To do this, ideally one would have data on four variables representing exogenous investment opportunities, namely internal working and fixed asset investments and acquisitions-related current and fixed asset investments. Since the asset decomposition data on the target's assets are not available, an alternative method is to estimate the system using the bidders' investments in fixed and net working assets (both organic and acquisitions) as exogenous variables (the coefficients of which must sum to one after the appropriate sign adjustments) and include a separate variable for acquisitions (of both working and fixed assets), where the acquisitions variable terms are constrained to sum to zero. This specification allows us to estimate the incremental coefficient for acquisitions relative to organic investments for both acquisitions in working and fixed asset under the assumption that the incremental coefficient is the same for the two types of acquisitions.[11]

Acquisitions in our model can be thought of as a censored variable that takes on the value of zero when the firm is not engaged in an acquisition activity, and assumes the value of the funds spent on acquisitions when bidder firms acquire target firms. When the acquisitions are in fact zero, the estimated coefficients on net working and on net fixed assets serve as predictions for how the organic investments are financed. For example, in the case of fixed assets the estimate for the acquisitions variable represents how firms finance internal fixed asset investments minus acquisitions-related fixed asset investments. Therefore, the estimated coefficients for the acquisitions variable in Table 6 represent the incremental financing used in funding acquisitions-related assets (both for fixed assets and for net working capital) compared to internal investments (again, both fixed and working assets).

The results displayed in Table 6 show that firms in our sample use \$0.77 of long-term debt (\$0.48 + \$0.29), \$0.33 of short-term debt, while reducing equity by \$0.09 in financing acquisitions-related fixed

[11] This does not mean that acquisitions of working capital are financed the same way as acquisitions of fixed assets. In order to obtain the actual coefficients for financing of working capital one needs to add the incremental coefficients to the coefficients for investments in working capital. To the extent that firms finance organic investments in working capital differently form investments in fixed assets, the respective acquisitions would also be financed differently.

assets. When bidders acquire $1 of targets' fixed assets, their cash holdings and share repurchases remain largely unaffected. Relative to internally generated fixed asset investments firms fund acquisitions of fixed assets with $0.29 more long-term debt (p-value is 0.031) and $0.47 less equity (p-value of 0.085). While firms also use more short-term debt (perhaps reflecting the role played by bridge-loans in these transactions), the coefficient in question is not statistically significant. The same observations hold for financing of organic net working assets investments relative to acquisitions related net working assets investments.

[Insert Table 6 about here]

How does the extent of asymmetric information problems inherent in acquisitions compare with organic investment-related asymmetries? Our view is that information asymmetry problems are likely to be more severe in organic (internally generated) investment projects than in acquisitions. In valuing acquisitions of public companies, investors have access to publicly available data on targets. Betton, Eckbo, and Thorburn (2008) find that in their sample of takeover contests between 1980 and 2005 around one third of all targets are public. Even when target companies are not publically traded, typically advisor investment banks provide due diligence and bidder managers disclose the changes they intend to make in the operations of the target and the capital structure of the combined entity. Based on this information, investors form an opinion on the net present value (NPV) of acquisitions. In the case of organic investments (especially fixed-asset investments), on the other hand, investors are not typically privy to the private assumptions managers use in valuing projects. For example, if an oil company decides to build a refinery, investors would typically not have data on the assumptions managers make to construct project-related cash flows, and the discount rate they use in determining the NPV of a project. On the other hand, when the oil company is considering buying a refinery firm, investors will be better able to determine the value of the target by using publicly available data and the managers' disclosures regarding the operational and financial changes they would make in running the target and the nature and magnitude of

the benefits they would generate from the combined firm if they succeed in acquiring the target.[12] Therefore, our finding that in financing informationally more transparent (acquisitions) investments compared to less transparent (organic) investments, firms use more debt and less equity, suggests that equity issuance costs may not be as sensitive to asymmetric information characteristics of investments as debt contracting costs may be. In fact, our results are consistent with the idea that external acquisitions allow firms, that otherwise would resort to equity, to issue more long-term debt.

4.2. R&D and advertising investments versus fixed asset investments

While R&D expenditures and advertising campaigns are investment projects that need to be financed, the accounting rules do not allow these investments to be capitalized and to appear as balance sheet items. Nevertheless, R&D expenditures represent investments as important as, and for some firms even more important than, fixed asset projects. For example, it can be argued that for a pharmaceutical firm its R&D program potentially plays a more important role in the determination of its share price than a project such as building a new plant for the manufacturing of its drugs. Similarly, for a firm like Nike, the success of its advertising campaign arguably would affect its stock price more than its decision about building plants to manufacture its sneakers. Given that R&D and advertising projects probably have a higher degree of information asymmetry than fixed asset investments, examining how firms finance these intangible projects relative to fixed asset investments would be an informative exercise.

We include another independent variable that represents the sum of R&D and advertising expenditures when estimating our model. Since these expenditures are already subtracted to arrive at the "income available to shareholders" variable, we redefine income by adding back R&D and advertising expenses to it.[13] The results displayed in Table 6 show that firms rely on more external equity and less debt by substantial amounts in undertaking these intangible projects than they do in funding fixed asset

[12] Fama and French (2005) argue that asymmetric information problems may be minor in stock-financed mergers because mergers are negotiated between informed parties. If adverse selection costs of equity are of main concern to managers, then firms should use even more equity in financing mergers and acquisitions.
[13] This definition ignores the tax shields provided by such expenditures.

investments. In particular, to finance $1 of R&D and advertising projects firms issue $0.80 of external equity (versus $0.38 in organic fixed asset investments), while short- plus long-term debt represent $0.26 of the financing package (versus $0.66 for organic fixed assets). Overall, even though R&D and advertising ventures represent investments that are informationally less transparent relative to fixed asset projects, firms seem to use substantially more equity and significantly less debt in financing these intangible projects.

5. Debt contracting and equity issuance costs and financing choices

The evidence so far indicates that less informationally transparent investments (intangible versus tangible projects, organic investments versus acquisitions) are financed with more equity and less long-term debt. Furthermore, when financing investments in fixed assets and profit shortfalls, firms that are less likely to be informationally transparent -- such as small firms, firms with low earnings, and high growth firms -- typically use more equity and less long-term debt than their more informationally transparent counterparts. One explanation consistent with the above findings is that, as firms and investments become less informationally transparent, the contracting costs of debt issues increase relative to the adverse selection costs of equity issues. At any rate, the behavior we find is the opposite of what one would predict if, as in Myers and Majluf (1984), adverse selection considerations play the dominant role in security issuance decisions.

5.1. The financing implications of investments versus disinvestments and profits versus shortfalls

Existing literature (e.g., Shyam-Sunder and Myers, 1999; Frank and Goyal, 2003) assumes that debt and equity financing have a symmetric response to investments and disinvestments as well as to profits and shortfalls. But such symmetry does not have an obvious justification. For example, the information implications when firms finance profit shortfalls would likely be different from the ones arising when firms have positive profits. Furthermore, separate analysis of investments versus disinvestments and

profits versus shortfalls allows us to more precisely examine how firms finance positive investments (one of the sources of the deficit) and profit shortfalls (the other source of the deficit). While in both cases firms would likely issue external debt and/or equity, in the first case firms will be financing new assets and in the second case they will be financing shortfalls generated by existing assets. Table 7 shows the results when we separately examine the effects of investments/disinvestments and profits/shortfalls on financing.

[Insert Table 7 about here]

In Table 7, as expected, in financing both fixed asset investments and profit shortfall-induced deficits, firms issue short- and long-term debt as well as equity. In response to declines in net fixed assets and increases in profits, on the other hand, firms cut back on their debt and equity issues. More notably, however, long-term borrowings differ depending on whether firms finance fixed asset investments versus disinvestments ($0.54 versus $0.26). The same is true for equity issues ($0.29 for investments versus $1.19 for disinvestments). Interestingly, when we combine short- and long-term debt issues, we find that disinvestments in net fixed assets are exclusively allocated to equity issues while a major part ($0.74 for every $1) of investments in net fixed assets are financed with short-and long-term debt. Similarly, debt and equity issues differ depending on whether firms finance profit shortfalls versus positive profits. Profit shortfalls are mostly financed with equity issues ($0.80 for every $1) while $1 of positive profits leads to around $0.20 increase in cash holdings, $0.26 decrease in total debt issues, and to $0.54 decrease in equity issues.

Overall, if the deficit is generated by investments in net fixed assets, firms rely mainly on debt issues while if the deficit is generated by profit shortfalls firms rely mainly on equity issues. What could explain this difference? The answer may be provided by examining how contracting costs of debt and adverse selection costs of equity are affected when informational transparency of the firm and its investments decreases. Investors possibly face informational imperfections accompanied by debt contracting as well as equity adverse selection costs whether the firm needs funds for new fixed assets or to counter profit shortfalls. However, seeking funds for fixed asset investments may mitigate debt contracting costs. First,

due to its tangibility, the fixed asset to be acquired would have some collateral value. Second, even if the fixed asset being financed is not pledged to the bondholders, it still may play a mitigating role in debt contracting costs due to the senior position of bondholders over shareholders and the increased asset base of the firm after the investment. In contrast, when a firm is seeking financing to cover its profit shortfalls, the firm would not be using the funds to acquire new assets. In fact, in such a situation instead of investing in new assets, the firm would be seeking funds to invest in its existing assets (which may already be pledged as collateral to existing debt). Furthermore, the fact that the firm has a profit shortfall indicates that the existing assets have not been productive (at least during the recent past). And finally, the asset base of the firm will not increase -- only long-term debt would increase. These three factors would increase the contracting costs of debt significantly when firms finance profit shortfalls, likely increasing the cost of debt issues relative to the cost of equity issues and leading firms to increase their reliance on equity financing.[14]

We test this argument by examining how financing choices respond to changes in the financing deficit associated with greater quality uncertainty (i.e., a decline in income available to common and preferred shareholders) versus changes in the deficit caused by (presumably) positive NPV investment opportunities. The average firm finances a dollar of fixed asset investments with \$0.54 of long-term debt, \$0.19 of short-term debt, and \$0.29 of equity. The extra funds are used to increase cash by an insignificant \$0.01. What is striking is that when firms need to access external markets to finance a dollar of profit shortfall, the long-term debt markets appear to dry up. Even though long and short-term lenders are willing to finance 73% of the investments-driven deficits, they provide only 23% of the financing when the same one dollar deficit is caused by a \$1 decline in profits. On average, when financing a dollar of a shortfall-induced deficit compared to a dollar of investment-induced deficit, firms use \$0.52 more

[14] In this argument, we do not need to make assumptions about whether the cost of debt is higher than the cost of equity or not. What we explore are the relative costs of debt versus equity as informational transparency decreases. While under adverse selection the costs of debt issues are always lower than the costs of equity issues, other factors may lead to costs of debt that are higher than costs of equity. Both access constraints and liquidity concerns, for example, are more severe in debt relative to equity markets. Petersen and Rajan (1995) observe that, in the presence of informational imperfections, as competition among lenders increases borrowers with greater quality variation may be rationed out of the debt market. Firms, even if not completely rationed out of, may have limited access to credit markets. See, for example, Faulkender and Petersen (2006) and Zarutskie (2006).

equity and $0.51 less debt. The overall evidence is consistent with the argument that relatively high debt contracting costs in informationally less transparent environments (e.g., operating losses) cause firms to issue equity, rather than debt, when funding their financing deficits.

5.2. Evidence from regressions with proxies for adverse selection and debt contracting costs

In this section we further test whether (and how) debt contracting costs and equity issuance costs affect firms' financing choices. Since a decrease in transparency of information is likely to increase the costs of debt as well as equity issues, our results allow us to examine the relative importance of debt and equity costs. As a proxy for asymmetric information (i.e., adverse selection costs) we use the idiosyncratic risk of the firm's stock (see, for example, Krishnaswami, Spindt, and Subramaniam, 1999) while as a proxy for contracting costs of debt (i.e., moral hazard costs) we use the ratio of R&D and advertising expenses-to-tangible assets.[15]

For each firm, we use all available daily returns from CRSP for a given year to estimate the market model (also including one lag of the excess market return) and use the standard error of the regression to measure firm idiosyncratic risk for that year. As predicted by the pecking order theory, we expect that an increase in asymmetric information would lead to higher adverse selection costs of equity relative to debt issues, thus causing firms to reduce their use of equity and increase their use of debt.

Low (high) intangibility, as measured by low (high) R&D and advertising expenses relative to existing tangible assets, would lead to low (high) moral hazard problems associated with debt; e.g., asset substitution and underinvestment. On the one hand, Myers (1977) shows how intangibility increases debt contracting costs. On the other hand, existing tangible assets can be used as debt collateral and therefore reduce such costs. One may argue that an increase in intangible relative to tangible projects will decrease the transparency of the firm as a whole and therefore raise debt as well as equity issue costs. The point we want to make, however, is that higher intangible relative to tangible projects will increase debt contracting

[15] We do not use Compustat's definition of intangible assets because it includes accounting items such as goodwill. For the same reason, we use tangible assets rather than total assets as the denominator of our ratio.

costs by more than it would increase equity issue costs. As a consequence, when firms finance investments and profit shortfalls, we expect the intangibility ratio to be positively related to the use of equity and negatively related to the use of debt.

In Table 8 as explanatory variables we now include interactions of the aforementioned two proxies with fixed asset investments and income available to shareholders.

[Insert Table 8 about here]

The average firm uses all external financing sources to finance a dollar of fixed assets. Table 8 shows that $0.69 of the financing comes from short- and long-term debt, $0.43 comes from equity, with the excess financing mostly used to build up cash balances. When idiosyncratic risk (our proxy for information asymmetry) increases by one standard deviation, equity issues essentially remain unchanged. Total debt issues, on the other hand, increase by less than $0.01 with a $0.05 decline in long-term debt issues and a $0.05 increase in short-term debt issues. Asymmetric information has a similar effect on how firms finance deficits caused by profit shortfalls. On average, firms counter a one dollar decline in profits by drawing down on their cash balances ($0.15), by increasing their short- and long-term borrowings ($0.11 and $0.16), and by issuing $0.58 of equity. A one standard deviation increase in idiosyncratic risk does not affect equity issues but reduces long-term debt issues by around $0.02 while increasing short-term debt issues by a similar amount (both significant at 0.01 level). The overall results pertaining to idiosyncratic risk do not support the view that higher equity issue costs relative to debt issue costs prevent firms from issuing equity when firms finance deficits. Increases in asymmetric information appear to shift firms' reliance from long- to short-term debt while leaving equity issues largely unaffected.

Table 8 also shows that a one standard deviation increase in R&D and advertising expenses-to-tangible assets (our proxy for debt contracting costs), leads to $0.24 more equity issues (p-value of 0.0001) and to $0.06 less long-term debt issues (p-value of 0.005). As the intangibility ratio increases by a one standard deviation, firms financing net fixed asset investments also build up their cash balances -- or negative debt -- by an additional $0.17 (p-value of 0.001). When firms finance profit shortfalls, the last row of Table 8 shows that a one standard deviation increase in the intangibility ratio leads to a $0.01

increase in equity issues and a $0.01 decrease in short- plus long-term debt issues. However, the equity coefficient is insignificant.

Overall, the results in this section support the hypothesis that as investments/firms become less informationally transparent, long-term debt issue costs increase relative to the costs of short-term debt issues and equity issues so that firms change their preference from long-term debt to short-term debt and equity.

6. Conclusion

Investments and profit shortfalls need to be financed. But how do firms do it? Roughly 50 years ago, Modigliani and Miller (1958) observed that in perfect capital markets populated by rational investors, financing choices would not affect firm value, and therefore would be irrelevant. Subsequent research has studied the question in settings in which markets are assumed to be imperfect or investor rationality is bounded. Much of this research focuses on imperfections in the allocation of information -- imperfections that may lead to adverse selection costs of equity issues and to contracting costs of debt issues. This paper examines empirically how these costs affect the financing decisions of firms.

The financing decision has traditionally been examined using a single-equation (typically debt) model with an aggregated financing deficit. In this paper we explore a more general model, in which (i) firms have several available financing choices and (ii) the financing deficit is disaggregated. The model requires firms to abide by the constraint that sources of funds should equal uses of funds while traditional models ignore this constraint.

We further extend the role of information asymmetries by incorporating information asymmetries that may be associated with the components of the financing deficit and the types of firms engaged in financing. For this reason, we differentiate between investments and profit shortfalls and, in the case of investments, between projects based on their tangibility and also based on whether they represent organic investments or acquisitions. Additionally, we differentiate between firms by forming 16 portfolios based on their interest coverage, size, growth, and profitability attributes. Our model allows us to examine the

links between firm and asset characteristics and firms' financing choices. The extension of information asymmetries in this manner enables us to conduct sharper tests of the role played by information asymmetries in financing decisions.

Our empirical findings show that firms meet their financing needs mainly by raising funds in the external capital markets. Firms issue debt and equity when the need to finance capital expenditure arises but they finance profit shortfalls primarily with equity. Furthermore, the use of equity is more pronounced in the case of small firms, high growth firms, and low profit firms. Additionally, firms in general use more equity in funding their intangible projects, such as R&D and advertising ventures and for financing internal investments (compared to acquisitions).

The evidence from our empirical tests demonstrates an economically significant relation between informational and agency costs (both at the asset level and at the firm level) and the financing choices of firms. We do not find strong evidence that asymmetric information about the value of a firm's assets causes equity to be used only as a last resort. In fact, we find that firms use predominantly equity in situations where informational asymmetries and agency costs are likely to be high, such as in financing profit shortfalls, investment in intangible assets, and internally generated growth opportunities. Our results suggest that in financing investments and profit shortfalls firms are guided more by potential agency and contracting costs of debt than by the potential adverse selection concerns associated with equity issues.

Appendix: Derived variables

Dividends = Preferred Dividends (19) + Common Dividends (21);

Income Available to Common and Preferred = Retained Earnings in year *t* (36) – Retained Earnings in year *t*-1 (36) + Dividends;

Share Repurchases = Purchase of Common and Preferred Stock (115);

Equity Issues (Net) = the change from year *t*-1 to *t* of Stockholder's Equity (216) – Retained Earnings (36);

Equity Issues = Equity Issues (Net) + Share Repurchases;

Short-term Debt Issues (Net) = the change from year *t*-1 to *t* of Debt in Current Liabilities (34);

Long-term Debt Issues (Net) = the change from year *t*-1 to *t* of Long-term Debt (9);

Change in Cash Holdings = the change from year *t*-1 to *t* of Cash and Short-term Investments (1);

Investment in Net Working Assets = the change from *t*-1 to *t* of [Current Assets (4) – Cash and Short-term Investments (1)] – [Current Liabilities (5) – Debt in Current Liabilities (34)];

Investment in Net Fixed Assets = the change from *t*-1 to *t* of Net Property, Plant and Equipment (8).

We also create portfolios based on leverage, earnings, market-to-book assets (M/B), and firm size.

Long-term Debt-to-Assets = Long-term Debt (9) divided by Total Assets (6);

Market-to-book assets (M/B) = (Assets (6) – Book Value of Equity + Market Value of Equity) divided by Assets (6), where Book Value of Equity = Stockholder's Equity (216, or 60 + 130, or 6 – 181) – Preferred Stock (10, or 56, or 130) + Deferred Tax and Investment Tax Credit (35) – Postretirement Benefits (330); and Market Value of Equity = Shares Outstanding (25) times Share Price (199);

Earnings-to-Assets = Operating Income Before Depreciation (13) divided by Assets (6);

Firm size is measured by the assets (6) of the firm;

R&D and advertising expenses = R&D Expense (46) + Advertising Expense (45) when available;

Tangible assets = Receivables (2) + Inventories (3) + Property, Plant, and Equipment (8);

External acquisitions are measured by Acquisitions (129).

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Table 1
Summary statistics

We collect the data from the Compustat annual files between 1972 and 2005. We excluding utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). Dollar amounts are in constant 2003 U.S. Dollars. We trim all variables at their annual 0.5th and 99.5th percentiles. Variables are in millions of dollars. The table presents the mean, median and standard deviation of the variables for the whole sample period and for several sub-periods.

	Change in Cash Holdings	Short-term Debt Issues (Net)	Long-term Debt Issues (Net)	Equity Issues	Dividends	Share Repurchases	Investment in Net Working Assets	Investment in Net Fixed Assets	Income Available to Comm. and Pref.
Whole Sample: 183,170 firm-years									
Mean	7.94	3.37	14.41	25.70	18.25	8.03	3.60	27.45	36.44
Median	0.05	0.00	0.00	0.79	0.00	0.00	0.30	0.46	1.33
Std. Dev.	85.82	79.96	145.39	124.96	83.19	58.63	79.15	156.08	221.44
1972-1975: 14,239 firm-years									
Mean	5.94	2.96	15.54	6.79	17.54	1.47	14.88	30.82	45.03
Median	0.24	0.00	0.00	0.07	0.75	0.00	1.72	1.95	6.14
Std. Dev.	49.80	57.58	76.82	26.95	63.46	7.86	84.61	119.92	145.38
1976-1980: 23,392 firm-years									
Mean	4.39	4.13	13.49	8.26	17.00	1.20	10.46	39.84	46.36
Median	0.08	0.03	0.00	0.08	0.41	0.00	0.85	1.25	3.60
Std. Dev.	46.64	40.37	75.18	36.51	63.10	6.65	62.28	159.30	157.20
1981-1985: 23,647 firm-years									
Mean	5.06	2.48	9.29	12.78	18.95	3.56	0.95	27.09	33.68
Median	0.06	0.01	0.00	0.30	0.00	0.00	0.27	0.63	1.58
Std. Dev.	52.20	49.09	90.71	53.84	78.30	25.88	64.79	144.98	143.51
1986-1990: 26,514 firm-years									
Mean	4.60	7.46	17.46	16.50	19.80	7.47	5.36	26.23	38.92
Median	0.00	0.00	0.00	0.42	0.00	0.00	0.24	0.26	0.66
Std. Dev.	71.75	79.17	146.21	71.10	89.98	45.49	75.43	140.39	186.17
1991-1995: 29,287 firm-years									
Mean	5.55	1.21	7.00	20.76	17.80	3.85	3.00	17.44	26.81
Median	0.03	0.00	0.00	1.06	0.00	0.00	0.29	0.33	0.83
Std. Dev.	59.26	62.60	105.53	72.32	82.74	24.01	61.73	113.74	158.75
1996-2000: 35,789 firm-years									
Mean	10.34	6.64	25.31	47.34	16.11	12.54	2.54	31.21	30.39
Median	0.07	0.00	0.00	2.60	0.00	0.00	0.27	0.76	0.36
Std. Dev.	97.84	92.03	185.51	204.29	78.93	67.81	83.89	176.69	219.63
2001-2005: 30,302 firm-years									
Mean	16.29	– 1.68	10.22	45.40	20.63	19.10	– 4.62	22.90	41.18
Median	0.06	0.00	0.00	3.02	0.00	0.00	– 0.04	0.00	-0.10
Std. Dev.	142.27	120.91	209.44	174.41	104.96	110.24	105.30	194.00	373.38

Table 2
Financing decisions of firms

We collect the data from the Compustat annual files between 1972 and 2005. We exclude utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). Dollar amounts are in constant 2003 U.S. Dollars. We trim all variables at the annual 0.5^{th} and 99.5^{th} percentiles. As explanatory variables we also include four firm characteristics for year *t*-1: the natural logarithm of firm assets as a measure of firm size, the ratio of firm market value to book value of assets, the ratio of earning to assets, and the ratio of long-term debt to total assets. For ease of interpretation, we standardize these variables by subtracting their annual means and dividing by their annual standard deviation. In the case of long-term debt-to-assets, we standardize using the industry specific mean and standard deviation. The table presents the average of the 34 coefficient estimates from annual regressions. The p-values from a two-tailed t-test are presented in parenthesis. The model estimated is Seemingly Unrelated Regressions (SUR). To control for heteroscedasticity due to differences in firm size, we weight by assets. Panel A reports the unrestricted coefficient estimates. Panel B reports the coefficient estimates with restrictions:

$$
\begin{aligned}
-\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 - \alpha_5 &= 0 \\
-\beta_{11} + \beta_{21} + \beta_{31} + \beta_{41} - \beta_{51} &= 1 \\
-\beta_{12} + \beta_{22} + \beta_{32} + \beta_{42} - \beta_{52} &= 1 \\
-\beta_{13} + \beta_{23} + \beta_{33} + \beta_{43} - \beta_{53} &= -1 \\
-\beta_{14} + \beta_{24} + \beta_{34} + \beta_{44} - \beta_{54} &= 1 \\
-\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 - \gamma_5 &= 0
\end{aligned}
$$

The α coefficients are the intercepts. The first subscript of the β coefficients indicates the column (the dependent variable) while the second subscript indicates the row (the explanatory variable). The γ coefficients are the coefficients of the remaining control variables: leverage, size, market-to-book assets, and profitability.

Panel A. Unrestricted coefficient estimates

	Dependent variable				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	– 0.0896	– 0.3530 [b]	0.0898	0.5422	0.1418 [a]
	(0.8628)	(0.0437)	(0.5997)	(0.3882)	(0.0001)
Investment in Net Working Assets	– 0.0234	0.0941	0.0890	0.5773 [a]	0.0013
	(0.5056)	(0.2197)	(0.3884)	(0.0001)	(0.2552)
Investment in Net Fixed Assets	0.1049 [c]	0.2245 [a]	0.6024 [a]	0.5287 [a]	0.0051 [a]
	(0.0604)	(0.0001)	(0.0001)	(0.0001)	(0.0064)
Income Available to Common and Preferred	0.0569	– 0.1068 [a]	– 0.0847 [a]	– 0.6820 [a]	– 0.0016
	(0.1046)	(0.0001)	(0.0013)	(0.0001)	(0.2354)
Dividends	0.3348 [b]	0.2601	0.1920	1.3241 [a]	0.0899 [a]
	(0.0165)	(0.1306)	(0.3129)	(0.0001)	(0.0001)
Natural Log of Assets	– 0.0717	– 0.2097 [a]	0.0378	0.2172	0.0822 [a]
	(0.7745)	(0.0034)	(0.6095)	(0.4628)	(0.0001)
Market-to-Book Assets	0.0568 [c]	– 0.0339 [a]	– 0.0163 [b]	0.1376 [a]	0.0025 [b]
	(0.0615)	(0.0001)	(0.0369)	(0.0014)	(0.0484)
Earnings-to-Assets	0.0188	0.0331 [b]	– 0.0198 [c]	0.0258	0.0006
	(0.3786)	(0.0111)	(0.0741)	(0.3542)	(0.6789)
Long-term Debt-to-Assets	0.0063	0.0521 [a]	– 0.1104 [a]	0.0882 [c]	– 0.0034 [c]
	(0.7240)	(0.0007)	(0.0001)	(0.0575)	(0.0762)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test

Panel B. Restricted coefficient estimates

	Dependent variable				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	– 0.1144	– 0.2650 [c]	– 0.0747	0.3662	0.1409 [a]
	(0.8269)	(0.0843)	(0.4778)	(0.5505)	(0.0001)
Investment in Net Working Assets	0.0093	0.1655 [a]	0.1208 [b]	0.7240 [a]	0.0011
	(0.7925)	(0.0017)	(0.0129)	(0.0001)	(0.3237)
Investment in Net Fixed Assets	0.0825 [c]	0.1889 [a]	0.5144 [a]	0.3845 [a]	0.0053 [a]
	(0.0777)	(0.0001)	(0.0001)	(0.0001)	(0.0064)
Income Available to Common and Preferred	0.0583	– 0.1125 [a]	– 0.1059 [a]	– 0.7252 [a]	– 0.0020
	(0.1133)	(0.0001)	(0.0001)	(0.0001)	(0.1621)
Dividends	0.2879 [b]	0.2422	0.0017	1.1352 [a]	0.0912 [a]
	(0.0408)	(0.1483)	(0.9921)	(0.0001)	(0.0001)
Natural Log of Assets	– 0.0745	– 0.1720 [b]	– 0.0109	0.1902	0.0818 [a]
	(0.7669)	(0.0104)	(0.8257)	(0.5148)	(0.0001)
Market-to-Book Assets	0.0569 [c]	– 0.0339 [a]	– 0.0263 [a]	0.1195 [a]	0.0025 [c]
	(0.0595)	(0.0002)	(0.0019)	(0.0023)	(0.0537)
Earnings-to-Assets	0.0188	0.0286 [b]	– 0.0216 [b]	0.0123	0.0005
	(0.3788)	(0.0248)	(0.0162)	(0.6348)	(0.7263)
Long-term Debt-to-Assets	0.0038	0.0504 [a]	– 0.1007 [a]	0.0506	– 0.0035 [c]
	(0.8338)	(0.0010)	(0.0002)	(0.1109)	(0.0682)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test

Table 3
How financing decisions of firms depend on past financing decisions

We collect the data from the Compustat annual files between 1972 and 2005. We exclude utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). Dollar amounts are in constant 2003 U.S. Dollars. We trim all variables at the annual 0.5^{th} and 99.5^{th} percentiles. As explanatory variables we add four firm characteristics for year *t*-1: the natural logarithm of firm assets as a measure of firm size, the ratio of firm market value to book value of assets, the ratio of earning to assets, and the ratio of long-term debt to total assets. For ease of interpretation, we standardize these variables by subtracting their annual means and dividing by their annual standard deviation. In the case of long-term debt-to-assets, we standardize using the industry specific mean and standard deviation. As explanatory variables we further add lagged dependent variables. The table presents the average of the 34 coefficient estimates from annual regressions. The p-value from a two-tailed t-test is presented in parenthesis under each coefficient. The model estimated is asset-weighted Seemingly Unrelated Regressions (SUR). The table reports the coefficient estimates with restrictions:

$$
\begin{aligned}
-\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 - \alpha_5 &= 0 \\
-\beta_{11} + \beta_{21} + \beta_{31} + \beta_{41} - \beta_{51} &= 1 \\
-\beta_{12} + \beta_{22} + \beta_{32} + \beta_{42} - \beta_{52} &= 1 \\
-\beta_{13} + \beta_{23} + \beta_{33} + \beta_{43} - \beta_{53} &= -1 \\
-\beta_{14} + \beta_{24} + \beta_{34} + \beta_{44} - \beta_{54} &= 1 \\
-\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 - \gamma_5 &= 0
\end{aligned}
$$

The α coefficients are the intercepts. The first subscript of the β coefficients indicates the column (i.e., the dependent variable) while the second subscript indicates the row (i.e., the independent variable). The γ coefficients are coefficients of leverage, size, market-to-book assets, profitability, and the lagged dependent variables.

Lagged dependent variables estimates

	Dependent variable				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	0.4379 [a]	– 0.2285 [c]	– 0.1823 [a]	0.9756 [a]	0.1269 [a]
	(0.0011)	(0.0929)	(0.0079)	(0.0001)	(0.0002)
Investment in Net Working Assets	– 0.0271	0.1792 [a]	0.1454 [a]	0.6474 [a]	– 0.0010
	(0.3785)	(0.0006)	(0.0096)	(0.0001)	(0.1941)
Investment in Net Fixed Assets	0.0284	0.1954 [a]	0.5170 [a]	0.3215 [a]	0.0055 [b]
	(0.3264)	(0.0001)	(0.0001)	(0.0001)	(0.0187)
Income Available to Common and Preferred	0.0925 [a]	– 0.1180 [a]	– 0.1117 [a]	– 0.6803 [a]	– 0.0026 [c]
	(0.0045)	(0.0001)	(0.0001)	(0.0001)	(0.0723)
Dividends	0.1906	0.2918 [c]	0.1001	0.8853 [a]	0.0866 [a]
	(0.1174)	(0.0962)	(0.4787)	(0.0001)	(0.0001)
Natural Log of Assets	0.2049 [a]	– 0.1539 [b]	– 0.0530	0.4853 [a]	0.0735 [a]
	(0.0078)	(0.0146)	(0.1522)	(0.0001)	(0.0004)
Market-to-Book Assets	0.0689 [a]	– 0.0324 [a]	– 0.0217 [a]	0.1264 [a]	0.0034 [c]
	(0.0006)	(0.0007)	(0.0023)	(0.0001)	(0.0618)
Earnings-to-Assets	0.0214	0.0280 [b]	– 0.0167	0.0109	0.0008
	(0.2088)	(0.0169)	(0.1923)	(0.5773)	(0.4811)
Long-term Debt-to-Assets	– 0.0037	0.0388 [a]	– 0.0928 [a]	0.0472	– 0.0031
	(0.8507)	(0.0034)	(0.0008)	(0.1031)	(0.2113)
Change in Cash Holdings in Year *t*-1	– 0.1412 [a]	0.0101	– 0.0707 [a]	– 0.0729	0.0077 [a]
	(0.0001)	(0.7072)	(0.0066)	(0.1186)	(0.0012)
Short-term Debt Issues in Year *t*-1	0.0252 [b]	– 0.0868 [a]	0.0703 [a]	0.0420	0.0003
	(0.0155)	(0.0004)	(0.0002)	(0.1706)	(0.8460)
Long-term Debt Issues in Year *t*-1	0.0363 [a]	0.0909 [a]	– 0.0901 [b]	0.0326	– 0.0029 [a]
	(0.0048)	(0.0001)	(0.0233)	(0.3286)	(0.0081)
Equity Issues in Year *t*-1	0.0366 [a]	– 0.0087	– 0.0057	0.0533 [a]	0.0023
	(0.0100)	(0.2209)	(0.7528)	(0.0053)	(0.4264)
Share Repurchases in Year *t*-1	– 0.1148 [a]	0.0298	– 0.0434	0.0231	0.1242 [a]
	(0.0014)	(0.4686)	(0.2513)	(0.6526)	(0.0001)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test

Table 4
Differences in financing decisions between size, market-to-book assets, profitability, and leverage portfolios

We collect the data from the Compustat annual files between 1972 and 2005. We exclude utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). Dollar amounts are in constant 2003 U.S. Dollars. We trim all variables at the annual 0.5th and 99.5th percentiles. We create 16 portfolios based on the median assets, median earnings-to-assets, median market-to-book assets, and the industry mean long-term debt-to-assets. Then we estimate the restricted model from Table 3 (excluding the measures of leverage, size, market-to-book assets, and profitability) for each of the 16 portfolios for every year. The model estimated is asset-weighted Seemingly Unrelated Regressions (SUR). The table reports the average differences in parameter estimates between portfolios with small firms and portfolios with large firms (Panel A), portfolios with low market-to-book assets and portfolios with high market-to-book assets (Panel B), portfolios with low profitability and high profitability (Panel C), and portfolios with low long-term debt-to-assets and high long-term debt-to-assets (Panel D). We do not display the coefficients for the lagged dependent variables for brevity. P-values testing whether the differences in coefficients are significantly different from zero are presented in parenthesis.

Differences in coefficients between portfolios

	Panel A. Small minus large portfolio estimates					Panel B. Low market-to-book minus high market-to-book portfolio estimates				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	– 2.2635 [a]	– 0.0508	1.0855	– 4.0674 [a]	– 0.7692 [a]	– 1.5415 [b]	0.2862	0.3912	– 2.3196 [b]	– 0.1007
	(0.0078)	(0.9135)	(0.2474)	(0.0055)	(0.0013)	(0.0450)	(0.1601)	(0.1799)	(0.0478)	(0.4629)
Investment in Net Working Assets	0.1188 [b]	0.0124	– 0.0611 [b]	0.1765 [a]	0.0090 [c]	– 0.0615 [c]	0.0924 [a]	0.0592 [b]	– 0.2118 [a]	0.0013
	(0.0127)	(0.5086)	(0.0420)	(0.0031)	(0.0543)	(0.0902)	(0.0010)	(0.0403)	(0.0010)	(0.7038)
Investment in Net Fixed Assets	0.0538 [b]	0.0514 [a]	– 0.0976 [a]	0.1010 [a]	0.0010	– 0.1192 [a]	0.0140	0.0386	– 0.1722 [a]	– 0.0004
	(0.0185)	(0.0010)	(0.0044)	(0.0041)	(0.6372)	(0.0029)	(0.1571)	(0.2332)	(0.0001)	(0.8151)
Income to Comm. and Preferred	– 0.0759 [b]	– 0.0026	0.1376 [a]	– 0.2048 [a]	0.0061	0.0220	– 0.0694 [a]	0.0001	0.0848	– 0.0065
	(0.0419)	(0.8771)	(0.0001)	(0.0079)	(0.4586)	(0.5480)	(0.0072)	(0.9966)	(0.1618)	(0.2168)
Dividends	0.2128 [c]	– 0.0001	– 0.2713 [c]	0.5086 [a]	0.0244	– 0.0452	0.1611 [b]	– 0.0905	– 0.0891	0.0267
	(0.0679)	(0.9992)	(0.0513)	(0.0036)	(0.5181)	(0.5857)	(0.0263)	(0.4820)	(0.5708)	(0.2741)
	Panel C. Low profitability minus high profitability portfolio estimates					Panel D. Low leverage minus high leverage portfolio estimates				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	0.1063	– 0.4401	– 0.3919	0.6250	– 0.3133 [c]	0.0634	– 1.0851 [b]	2.3408 [b]	– 1.0986	0.0937
	(0.7884)	(0.2202)	(0.4066)	(0.3561)	(0.0660)	(0.8324)	(0.0439)	(0.0333)	(0.1110)	(0.3352)
Investment in Net Working Assets	0.0422 [c]	0.0028	– 0.0400 [b]	0.0800 [c]	0.0007	– 0.1045 [a]	0.0656 [a]	– 0.1579 [a]	– 0.0119	0.0002
	(0.0544)	(0.9118)	(0.0315)	(0.0663)	(0.3691)	(0.0001)	(0.0098)	(0.0001)	(0.6513)	(0.9463)
Investment in Net Fixed Assets	0.0582 [c]	0.0442 [a]	– 0.0280	0.0374 [b]	– 0.0045 [b]	– 0.0540 [b]	0.0367 [b]	– 0.1223 [a]	0.0328	0.0012
	(0.0884)	(0.0094)	(0.3579)	(0.0491)	(0.0469)	(0.0169)	(0.0183)	(0.0005)	(0.1319)	(0.4460)
Income to Comm. and Preferred	– 0.1345 [b]	– 0.0315	0.1043 [a]	– 0.1969 [b]	0.0105	0.1172 [a]	0.0719 [a]	0.0931 [b]	– 0.0612 [a]	– 0.0134 [b]
	(0.0170)	(0.1269)	(0.0013)	(0.0237)	(0.1784)	(0.0019)	(0.0029)	(0.0149)	(0.0044)	(0.0221)
Dividends	0.2956 [b]	– 0.0885 [b]	– 0.1562 [c]	0.5046 [b]	– 0.0358	– 0.3151 [b]	– 0.0863	0.2939 [c]	– 0.5754 [a]	– 0.0527 [c]
	(0.0265)	(0.0348)	(0.0563)	(0.0111)	(0.2569)	(0.0147)	(0.1206)	(0.0600)	(0.0067)	(0.0615)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test

Table 5
How firm characteristics affect financing decisions

We collect the data from the Compustat annual files between 1972 and 2005. We exclude utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). Dollar amounts are in constant 2003 U.S. Dollars. We trim all variables at the annual 0.5^{th} and 99.5^{th} percentiles. As explanatory variables we add four firm characteristics for year *t*-1: the natural logarithm of firm assets as a measure of firm size, the ratio of firm market value to book value of assets, the ratio of earning to assets, and the ratio of long-term debt to total assets. For ease of interpretation, we standardize these variables by subtracting their annual means and dividing by their annual standard deviation. In the case of long-term debt-to-assets, we standardize using the industry specific mean and standard deviation. As explanatory variables we further add lagged dependent variables (estimates not displayed for brevity) and we create interactions between the four firm characteristics and the explanatory variables (investments, dividends, and profits). The table presents the average of the 34 coefficient estimates from annual regressions. The p-value from a two-tailed t-test is presented in parenthesis under each coefficient. The model estimated is asset-weighted Seemingly Unrelated Regressions (SUR). The table reports the coefficient estimates with restrictions:

$$
\begin{aligned}
-\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 - \alpha_5 &= 0 \\
-\beta_{11} + \beta_{21} + \beta_{31} + \beta_{41} - \beta_{51} &= 1 \\
-\beta_{12} + \beta_{22} + \beta_{32} + \beta_{42} - \beta_{52} &= 1 \\
-\beta_{13} + \beta_{23} + \beta_{33} + \beta_{43} - \beta_{53} &= -1 \\
-\beta_{14} + \beta_{24} + \beta_{34} + \beta_{44} - \beta_{54} &= 1 \\
-\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 - \gamma_5 &= 0
\end{aligned}
$$

The α coefficients are the intercepts. The first subscript of the β coefficients indicates the column (i.e., the dependent variable) while the second subscript indicates the row (i.e., the independent variable). The γ coefficients are coefficients of leverage, size, market-to-book assets, profitability, the lagged dependent variables, and the interaction variables.

	Dependent variable				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	0.2707 [b]	– 0.1326	– 0.0639	0.5999 [a]	0.1328 [a]
	(0.0273)	(0.1959)	(0.3276)	(0.0008)	(0.0002)
Investment in Net Working Assets	– 0.0458	0.2261 [a]	0.1676 [a]	0.5596 [a]	– 0.0009
	(0.1325)	(0.0001)	(0.0001)	(0.0001)	(0.2273)
Investment in Net Fixed Assets	0.1245 [b]	– 0.1726	0.5556 [a]	0.7467 [c]	0.0052 [a]
	(0.0123)	(0.4342)	(0.0050)	(0.0884)	(0.0002)
Income Available to Common and Preferred	0.1580 [a]	– 0.1484 [a]	– 0.1688 [a]	– 0.5270 [a]	– 0.0022
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.3321)
Dividends	0.0501	0.3419 [c]	0.2026 [c]	0.5933 [a]	0.0877 [a]
	(0.5981)	(0.0594)	(0.0957)	(0.0001)	(0.0001)
Natural Log of Assets	0.1150	– 0.1051 [c]	0.0209	0.2752 [a]	0.0760 [a]
	(0.1012)	(0.0552)	(0.5697)	(0.0037)	(0.0004)
Market-to-Book Assets	0.0424 [b]	– 0.0403 [b]	– 0.0189 [a]	0.1058 [a]	0.0043 [b]
	(0.0167)	(0.0136)	(0.0014)	(0.0001)	(0.0307)
Earnings-to-Assets	0.0360 [b]	0.0204 [b]	– 0.0254 [b]	0.0440 [b]	0.0030
	(0.0129)	(0.0374)	(0.0217)	(0.0239)	(0.1158)
Leverage	– 0.0114	0.0339 [b]	– 0.0856 [a]	0.0363	– 0.0040
	(0.5727)	(0.0197)	(0.0052)	(0.2060)	(0.1568)
Investment in Net Fixed Assets × Natural Log of Assets	0.0070	– 0.1849 [b]	0.1632	0.0326	0.0038 [b]
	(0.8056)	(0.0476)	(0.1468)	(0.8637)	(0.0217)
Investment in Net Fixed Assets × Market-to-Book Assets	0.0358 [b]	– 0.0342 [b]	0.0452	0.0232	– 0.0016
	(0.0467)	(0.0452)	(0.3245)	(0.6514)	(0.3475)
Investment in Net Fixed Assets × Earnings-to-Assets	– 0.0417 [c]	– 0.0398 [b]	– 0.0358	0.0327	– 0.0012
	(0.0847)	(0.0348)	(0.1827)	(0.3843)	(0.2980)
Investment in Net Fixed Assets × Leverage	– 0.0145	– 0.0161	0.0399 [b]	– 0.0381	0.0002
	(0.5091)	(0.5467)	(0.0330)	(0.3634)	(0.8392)
Income to Comm. and Pref. × Natural Log of Assets	0.0249	0.0089	– 0.0461 [a]	0.0624 [b]	0.0003
	(0.1135)	(0.4907)	(0.0046)	(0.0307)	(0.8817)
Income to Comm. and Pref. × Market-to-Book Assets	– 0.0044	0.0042	– 0.0007	– 0.0082	– 0.0003
	(0.3587)	(0.2837)	(0.8678)	(0.2406)	(0.5594)
Income to Comm. and Pref. × Earnings-to-Assets	0.0202 [a]	0.0006	– 0.0084	0.0281 [a]	0.0001
	(0.0001)	(0.9133)	(0.1767)	(0.0001)	(0.9552)
Income to Comm. and Pref. × Leverage	– 0.0013	– 0.0140 [b]	– 0.0076	0.0222	0.0019 [c]
	(0.9025)	(0.0201)	(0.5152)	(0.1093)	(0.0571)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test

Table 6
Financing of acquisitions and R&D and advertising expenses

We collect the data from the Compustat annual files between 1972 and 2005. We exclude utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). Dollar amounts are in constant 2003 U.S. Dollars. We trim all variables at the annual 0.5^{th} and 99.5^{th} percentiles. The table presents the average of the 34 coefficient estimates from annual regressions. The p-value from a two-tailed t-test is presented in parenthesis under each coefficient. The model estimated is asset-weighted Seemingly Unrelated Regressions (SUR). The model estimated is similar to the model in Table 3. However, now we add acquisitions as another explanatory variable. Finally, we add R&D and Advertising Expenses to the set of explanatory variables. We also use Income plus R&D and Advertising Expense to measure internally generated funds. Measures of size, market-to-book assets, profitability, leverage, and the lagged dependent variables are also included in the set of explanatory variables but we do not display their coefficients for brevity. The restrictions are:

$$
\begin{aligned}
-\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 - \alpha_5 &= 0 \\
-\beta_{11} + \beta_{21} + \beta_{31} + \beta_{41} - \beta_{51} &= 1 \\
-\beta_{12} + \beta_{22} + \beta_{32} + \beta_{42} - \beta_{52} &= 1 \\
-\beta_{13} + \beta_{23} + \beta_{33} + \beta_{43} - \beta_{53} &= -1 \\
-\beta_{14} + \beta_{24} + \beta_{34} + \beta_{44} - \beta_{54} &= 1 \\
-\beta_{15} + \beta_{25} + \beta_{35} + \beta_{45} - \beta_{55} &= 0 \\
-\beta_{16} + \beta_{26} + \beta_{36} + \beta_{46} - \beta_{56} &= 1 \\
-\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 - \gamma_5 &= 0
\end{aligned}
$$

The α coefficients are the intercepts. The first subscript of the β coefficients indicates the column (i.e., the dependent variable) while the second subscript indicates the row (i.e., the independent variable). The γ coefficients are coefficients of leverage, size, market-to-book assets, profitability, and the lagged dependent variables. For brevity, the γ coefficients are not reported.

	Dependent variable				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	0.3753 [a]	– 0.2342 [c]	– 0.1286 [c]	0.8614 [a]	0.1233 [a]
	(0.0044)	(0.0695)	(0.0647)	(0.0001)	(0.0002)
Investment in Net Working Assets	– 0.0311	0.1708 [a]	0.1522 [a]	0.6446 [a]	– 0.0013 [b]
	(0.3382)	(0.0006)	(0.0001)	(0.0001)	(0.0263)
Investment in Net Fixed Assets	0.0437	0.1853 [a]	0.4788 [a]	0.3845 [a]	0.0049 [b]
	(0.2018)	(0.0001)	(0.0001)	(0.0001)	(0.0354)
Income to Comm. and Pref. plus R&D and Adv. Expenses	0.0989 [a]	– 0.1191 [a]	– 0.1083 [a]	– 0.6762 [a]	– 0.0026 [c]
	(0.0029)	(0.0001)	(0.0001)	(0.0001)	(0.0950)
Dividends	0.1511	0.3961	0.1668 [b]	0.6747 [a]	0.0864 [a]
	(0.1907)	(0.1531)	(0.0178)	(0.0016)	(0.0001)
Acquisitions	– 0.0426	0.1415	0.2914 [b]	– 0.4725 [c]	0.0030 [b]
	(0.3866)	(0.3055)	(0.0310)	(0.0849)	(0.0882)
R&D and Adv. Expenses	0.0599	0.2496 [a]	0.0179	0.8044 [a]	0.0120 [a]
	(0.2937)	(0.0069)	(0.8798)	(0.0001)	(0.0004)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test

Table 7
Are financing decisions symmetric for investments versus disinvestments and for profits versus operating losses?

We collect the data from the Compustat annual files between 1972 and 2005. We exclude utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). We estimate separate coefficients for increases and for decreases in Net Fixed Assets and estimate separate coefficients for positive and for negative Income Available to Common and Preferred shareholders. As explanatory variables we also add four firm characteristics for year *t*-1: the natural logarithm of firm assets as a measure of firm size, the ratio of firm market value to book value of assets, the ratio of earning to assets, and the ratio of long-term debt to total assets. For ease of interpretation, we standardize these variables by subtracting their annual means and dividing by their annual standard deviation. In the case of long-term debt-to-assets, we standardize using the yearly industry-specific mean and standard deviation. As explanatory variables we further add lagged dependent variables. The table presents the average of the 34 coefficient estimates from annual regressions. The p-value from a two-tailed t-test is presented in parentheses under each coefficient. The model estimated is asset-weighted Seemingly Unrelated Regressions (SUR). We impose the following restrictions:

$$
\begin{aligned}
-\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 - \alpha_5 &= 0 \\
-\beta_{11} + \beta_{21} + \beta_{31} + \beta_{41} - \beta_{51} &= 1 \\
-\beta_{12} + \beta_{22} + \beta_{32} + \beta_{42} - \beta_{52} &= 1 \\
-\beta_{13} + \beta_{23} + \beta_{33} + \beta_{43} - \beta_{53} &= 1 \\
-\beta_{14} + \beta_{24} + \beta_{34} + \beta_{44} - \beta_{54} &= -1 \\
-\beta_{15} + \beta_{25} + \beta_{35} + \beta_{45} - \beta_{55} &= -1 \\
-\beta_{16} + \beta_{26} + \beta_{36} + \beta_{46} - \beta_{56} &= 1 \\
-\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 - \gamma_5 &= 0
\end{aligned}
$$

The α coefficients are the intercepts. The first subscript of the β coefficients indicates the column (i.e., the dependent variable) while the second subscript indicates the row (i.e., the independent variable). The γ coefficients are coefficients of size, market-to-book assets, profitability, leverage, and the lagged dependent variables. For brevity, the γ coefficients are not reported.

	Dependent variable				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	0.0945	– 0.2658 [c]	– 0.2270 [a]	0.6812 [a]	0.0939 [a]
	(0.4590)	(0.0846)	(0.0039)	(0.0034)	(0.0006)
Investment in Net Working Assets	– 0.0393	0.1879 [a]	0.1411 [a]	0.6304 [a]	– 0.0013
	(0.1692)	(0.0002)	(0.0082)	(0.0001)	(0.1782)
Increases in Net Fixed Assets	0.0144	0.1929 [a]	0.5417 [a]	0.2856 [a]	0.0058 [b]
	(0.6662)	(0.0001)	(0.0001)	(0.0001)	(0.0170)
Decreases in Net Fixed Assets	0.2142	– 0.2434	0.2569 [a]	1.1937 [a]	– 0.0070 [c]
	(0.1282)	(0.3341)	(0.0028)	(0.0060)	(0.0962)
Positive Income Available to Common and Preferred	0.1954 [a]	– 0.1201 [a]	– 0.1413 [a]	– 0.5386 [a]	0.0045 [a]
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0013)
Negative Income Available to Common and Preferred	– 0.0192	– 0.1389 [a]	– 0.0913 [a]	– 0.8034 [a]	– 0.0145 [a]
	(0.4848)	(0.0001)	(0.0004)	(0.0001)	(0.0052)
Dividends	0.0914	0.3008 [c]	0.1101	0.7576 [a]	0.0771 [a]
	(0.5106)	(0.0916)	(0.4374)	(0.0001)	(0.0001)
Difference between Increases and Decreases in NFA	– 0.1998	0.4363	0.2848 [a]	– 0.9081 [b]	0.0128 [b]
	(0.1515)	(0.1198)	(0.0003)	(0.0340)	(0.0203)
Difference between Positive and Negative Income	0.2146 [a]	0.0187	– 0.0500 [c]	0.2648 [a]	0.0190 [a]
	(0.0001)	(0.4696)	(0.0989)	(0.0001)	(0.0008)
Difference between Increases in NFA and Negative Income	– 0.0048	0.0540	0.4504 [a]	– 0.5178 [a]	– 0.0087
	(0.9053)	(0.2524)	(0.0001)	(0.0001)	(0.1408)
Difference between Decreases in NFA and Positive Income	0.4096 [a]	– 0.3636	0.1156	0.6551 [c]	– 0.0025
	(0.0040)	(0.1412)	(0.1418)	(0.0951)	(0.5589)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test

Table 8
Asymmetric information, moral hazard and financing decisions

We collect the data from the Compustat annual files between 1972 and 2004. We exclude utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). Dollar amounts are in constant 2003 U.S. Dollars. We trim all variables based on the annual 0.5^{th} and 99.5^{th} percentiles. As explanatory variables we use four firm characteristics for year *t*-1: the natural logarithm of firm assets as a measure of firm size, the ratio of firm market value to book value of assets, the ratio of earning to assets, and the ratio of long-term debt to total assets. For ease of interpretation, we standardize these variables by subtracting their annual means and dividing by their annual standard deviation. In the case of long-term debt-to-assets, we standardize using the yearly industry-specific mean and standard deviation. As explanatory variables we also include the idiosyncratic risk of the firm and the ratio of R&D and advertising expenses to firm tangible assets as well as lagged dependent variables. For each firm in our sample we use year *t*-1 daily returns to estimate the market model, including lagged market return. We use the estimated standard error of the residual from that regression to measure firm idiosyncratic risk. Firm tangible asset are total receivables plus total inventory plus net property, plant, and equipment. For ease of interpretation, we also standardize these two variables. We finally create interactions between the two variables discussed above and the explanatory variables (investments and profits). The table presents the average of the 34 coefficient estimates from annual regressions. The p-value from a two-tailed t-test is presented in parentheses under each coefficient. The model estimated is asset-weighted Seemingly Unrelated Regressions (SUR). The table reports the coefficient estimates with restrictions:

$$
\begin{aligned}
-\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 - \alpha_5 &= 0 \\
-\beta_{11} + \beta_{21} + \beta_{31} + \beta_{41} - \beta_{51} &= 1 \\
-\beta_{12} + \beta_{22} + \beta_{32} + \beta_{42} - \beta_{52} &= 1 \\
-\beta_{13} + \beta_{23} + \beta_{33} + \beta_{43} - \beta_{53} &= -1 \\
-\beta_{14} + \beta_{24} + \beta_{34} + \beta_{44} - \beta_{54} &= 1 \\
-\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 - \gamma_5 &= 0
\end{aligned}
$$

The α coefficients are the intercepts. The first subscript of the β coefficients indicates the column (i.e., the dependent variable) while the second subscript indicates the row (i.e., the independent variable). The γ coefficients are the coefficients of size, market-to-book assets, profitability, leverage, the lagged dependent variables, the idiosyncratic risk, the ratio of R&D and advertising expenses to tangible assets, and the interaction variables. For brevity we do not report the coefficients of size, market-to-book assets, profitability, leverage, and the lagged dependent variables.

	Dependent variable				
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases
Intercept	1.0575 [a]	– 0.1444	– 0.3479 [a]	1.7850 [a]	0.2352 [a]
	(0.0009)	(0.1170)	(0.0017)	(0.0001)	(0.0001)
Investment in Net Working Assets	– 0.1109 [a]	0.2444 [a]	0.2107 [a]	0.4323 [a]	– 0.0018
	(0.0023)	(0.0001)	(0.0001)	(0.0001)	(0.1705)
Investment in Net Fixed Assets	0.1035 [a]	0.0960 [a]	0.5816 [a]	0.4318 [a]	0.0059 [a]
	(0.0003)	(0.0001)	(0.0001)	(0.0001)	(0.0003)
Income Available to Common and Preferred	0.1503 [a]	– 0.1095 [a]	– 0.1609 [a]	– 0.5828 [a]	– 0.0035
	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.2991)
Dividends	0.0417	0.0759 [b]	0.2001 [a]	0.8678 [a]	0.1020 [a]
	(0.6321)	(0.0356)	(0.0001)	(0.0001)	(0.0001)
Idiosyncratic Risk	– 0.0453	– 0.0288	0.0492 [a]	– 0.0666	– 0.0008
	(0.2435)	(0.1233)	(0.0058)	(0.1830)	(0.8054)
R&D and Adv. Exp.-to-Tangible Assets	– 0.0262	– 0.0126	– 0.0030	– 0.0130	– 0.0024
	(0.2523)	(0.3642)	(0.7930)	(0.6633)	(0.1523)
Investment in NFA × Idiosyncratic Risk	0.0233	0.0516 [a]	– 0.0467 [a]	0.0168	– 0.0017 [c]
	(0.1005)	(0.0001)	(0.0021)	(0.3901)	(0.0842)
Income × Idiosyncratic Risk	– 0.0131	– 0.0216 [a]	0.0253 [a]	– 0.0163	0.0005
	(0.2621)	(0.0062)	(0.0008)	(0.2637)	(0.6089)
Investment in NFA × R&D and Adv. Exp.-to-Tangible Assets	0.1658 [a]	– 0.0185	– 0.0570 [a]	0.2436 [a]	0.0022
	(0.0002)	(0.2019)	(0.0048)	(0.0001)	(0.4644)
Income × R&D and Adv. Exp.-to-Tangible Assets	0.0005	0.0053 [c]	0.0030	– 0.0073	0.0004
	(0.9359)	(0.0838)	(0.4316)	(0.2583)	(0.4916)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test

Table A1
Endogenous investments and dividends

We collect the data from the Compustat annual files between 1972 and 2004. We exclude utilities (SIC codes 4900-4949) and financial firms (SIC codes 6000-6999). Dollar amounts are in constant 2003 U.S. Dollars. We trim all variables based on the annual 0.5^{th} and 99.5^{th} percentiles. As explanatory variables we use four firm characteristics for year *t*-1: the natural logarithm of firm assets as a measure of firm size, the ratio of firm market value to book value of assets, the ratio of earning to assets, and the ratio of long-term debt to total assets. For ease of interpretation, we standardize these variables by subtracting their annual means and dividing by their annual standard deviation. In the case of long-term debt-to-assets, we standardize using the yearly industry-specific mean and standard deviation. As explanatory variables we also include lagged dependent variables. The table presents the average of the 34 coefficient estimates from annual regressions. The p-value from a two-tailed t-test is presented in parentheses under each coefficient. The model estimated is asset-weighted Seemingly Unrelated Regressions (SUR). The table reports the coefficient estimates with restrictions:

$$\begin{aligned} -\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 - \alpha_5 - \alpha_6 - \alpha_7 - \alpha_8 &= 0 \\ -\beta_{11} + \beta_{21} + \beta_{31} + \beta_{41} - \beta_{51} - \beta_{61} - \beta_{71} - \beta_{81} &= -1 \\ -\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 - \gamma_5 - \gamma_6 - \gamma_7 - \gamma_8 &= 0 \end{aligned}$$

The α coefficients are the intercepts. The first subscript of the β coefficients indicates the column (i.e., the dependent variable) while the second subscript indicates the row (i.e., the independent variable). The γ coefficients are the coefficients of size, market-to-book assets, profitability, leverage, and the lagged dependent variables.

	Dependent variable							
	Change in Cash Holdings	Short-term Debt Issues	Long-term Debt Issues	Equity Issues	Share Repurchases	Investment in Net Working Assets	Investment in Net Fixed Assets	Dividends
Intercept	0.4493 [a]	0.2293 [c]	0.4327 [a]	1.2863 [a]	0.1266 [a]	0.7460 [b]	0.5709 [b]	0.0554 [a]
	(0.0049)	(0.0648)	(0.0030)	(0.0002)	(0.0001)	(0.0167)	(0.0149)	(0.0002)
Income Available to Common and Preferred	0.0795 [a]	– 0.0591 [a]	0.0024	– 0.5643 [a]	– 0.0037 [b]	0.2015 [a]	0.0918 [b]	0.0099 [a]
	(0.0031)	(0.0001)	(0.9120)	(0.0001)	(0.0413)	(0.0001)	(0.0132)	(0.0006)
Natural Log of Assets	0.2148 [b]	0.0414	0.2732 [a]	0.7036 [a]	0.0721 [a]	0.3997 [b]	0.3058 [b]	0.0257 [a]
	(0.0160)	(0.6126)	(0.0017)	(0.0011)	(0.0002)	(0.0379)	(0.0145)	(0.0001)
Market-to-Book Assets	0.0617 [a]	– 0.0121	0.0159	0.1591 [a]	0.0032 [c]	0.0593 [a]	0.0362 [b]	0.0027
	(0.0019)	(0.3071)	(0.1073)	(0.0001)	(0.0736)	(0.0040)	(0.0162)	(0.1005)
Earnings-to-Assets	0.0235	0.0079	– 0.0298 [c]	– 0.0045	– 0.0008	– 0.0289	– 0.0177	– 0.0025
	(0.1680)	(0.4167)	(0.0898)	(0.8566)	(0.4862)	(0.1800)	(0.2208)	(0.1410)
Long-term Debt-to-Assets	– 0.0096	0.0379 [a]	– 0.0994 [a]	0.0247	– 0.0027	0.0107	– 0.0338 [b]	– 0.0013
	(0.6400)	(0.0079)	(0.0002)	(0.4061)	(0.2675)	(0.5549)	(0.0202)	(0.3981)
Change in Cash Holdings in Year *t*-1	– 0.1560 [a]	0.0543	– 0.0552	– 0.0046	0.0108 [a]	0.0615	0.0736 [b]	0.0046 [b]
	(0.0001)	(0.1397)	(0.1239)	(0.9178)	(0.0002)	(0.1931)	(0.0225)	(0.0199)
Short-term Debt Issues in Year *t*-1	0.0243	– 0.1626 [b]	0.0626 [c]	– 0.0002	– 0.0033	– 0.0738 [b]	– 0.0478	0.0005
	(0.2234)	(0.0125)	(0.0631)	(0.9966)	(0.1303)	(0.0215)	(0.3668)	(0.8482)
Long-term Debt Issues in Year *t*-1	0.0449 [b]	0.0610 [b]	– 0.0589	0.0470	– 0.0070 [a]	0.0001	0.0093	0.0019
	(0.0121)	(0.0412)	(0.1811)	(0.4298)	(0.0002)	(0.9991)	(0.7833)	(0.6269)
Equity Issues in Year *t*-1	0.0234 [b]	– 0.0016	0.0462	0.0945 [a]	– 0.0006	0.0766 [b]	0.0397 [c]	– 0.0001
	(0.0290)	(0.8421)	(0.1495)	(0.0006)	(0.8342)	(0.0146)	(0.0812)	(0.9253)
Share Repurchases in Year *t*-1	– 0.0865 [b]	0.1231 [c]	0.0456	0.2304	0.1294 [a]	0.0752	0.2548	0.0261
	(0.0182)	(0.0899)	(0.4391)	(0.2844)	(0.0001)	(0.3880)	(0.1227)	(0.1583)
Investment in Net Working Assets in Year *t*-1	– 0.0027	0.0602 [a]	– 0.0326	– 0.0298	0.0040 [a]	– 0.0131	0.0066	0.0029
	(0.8225)	(0.0024)	(0.1949)	(0.4989)	(0.0031)	(0.7285)	(0.8053)	(0.4316)
Investment in Net Fixed Assets in Year *t*-1	0.0291	0.0788	0.1105 [a]	0.0968	0.0067 [a]	0.0472	0.2019 [a]	0.0011
	(0.3279)	(0.1023)	(0.0086)	(0.1144)	(0.0001)	(0.2037)	(0.0073)	(0.5940)
Dividends in Year *t*-1	– 0.0444	0.1283 [b]	0.0284	0.3738 [a]	0.0690 [a]	– 0.1845 [b]	0.1102	0.5802 [a]
	(0.3053)	(0.0140)	(0.6927)	(0.0010)	(0.0001)	(0.0397)	(0.2013)	(0.0001)

[a, b, c] indicate significance at the 0.01, 0.05, and 0.10 levels from a two-tailed t-test