Debt Capacity and Tests of Capital Structure Theories*

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Abstract

The impact of debt capacity on recent tests of competing theories of capital structure is examined. Controlling for debt capacity, the pecking order appears to be a good description of financing behavior for a large sample of firms. The main results are first, that internally generated funds appear to be the preferred source of financing for all firms. Second, if external funds are required, in the absence of debt capacity concerns, debt appears to be preferred to equity. Concerns over debt capacity largely explain the use of new external equity financing by publicly traded firms. Thirdly, when possible, debt capacity is "stockpiled." We provide evidence of the stockpiling of debt capacity by profitable, low leverage firms that expect to use little external finance in the future. This evidence is directly contrary to predictions of the tradeoff theory. Finally, we present evidence that reconciles the frequent equity issues by small, high-growth firms with the pecking order.

Introduction

Recently, an interesting discussion has been generated in studies designed to detect which of the predominant theories of capital structure, the tradeoff or the pecking order theory, best describes the financing choices of corporations. Shyam-Sunder and Myers (1999) provide evidence, using a simple model and a sample of 157 U.S. firms, suggesting the pecking order theory is a good first-order description of the financing behavior of these firms. Chirinko and Singha (2000) use three examples to illustrate potential problems with using the Shyam-Sunder and Myers test to evaluate the pecking order theory. Frank and Goyal (2003) argue that the predictions of the pecking order theory do not hold when a broad sample of firms and a longer time series is used. Fama and French (2002) find that short term variation in earnings and investment is mostly absorbed by debt, as predicted by the pecking order, but that the pecking order has other failings (namely significant equity issues by small, high-growth firms). This paper explores the role of debt capacity in tests of capital structure theories within the Shyam-Sunder and Myers framework in order to better understand the contrasting results of these studies and to provide new evidence concerning the competing theories of capital structure.

We present evidence that firms follow a pecking order in incremental financing choice and offer substantial support for a dynamic version of the pecking order theory articulated in Myers (1984) by explicitly recognizing the role of debt capacity in the theory. Our main finding is that, based on the Shyam-Sunder and Myers test, the pecking order theory provides a good description of financing behavior for a broad cross-section (and a long time horizon) of firms once concerns over debt capacity are controlled for. Internally generated funds appear to be the first choice of financing for all firms. Firms unconstrained by concerns over debt capacity

primarily use debt to fill their financing deficit while constrained firms exhibit a heavy reliance on external equity financing. We show that firms appear to "stockpile" debt capacity. When possible, internally generated funds are used to finance new investment and to reduce debt levels. Directly contrary to the tradeoff theory we see that firms with low leverage expecting high profits and having low external financing requirements exhibit this behavior.

Frank and Goyal (2003) argue that firms with the greatest potential for asymmetric information will have the greatest incentive to follow the pecking order. They conclude that finding large, mature firms (rather than small, high-growth firms) perform "best" in the Shyam-Sunder and Myers test is contrary to the pecking order theory (see also Fama and French (2002)). Our evidence shows that it is precisely the small, high-growth firms that face the more restrictive debt capacity constraints. We also provide evidence concerning differences in the costs associated with announcements of equity issues (which have been argued to be the result of asymmetric information) across groups of firms. The evidence from announcement effects for new equity issues shows that young, high-growth firms actually face lower costs than do large mature firms. We conclude that finding small, high-growth firms to be the predominant issuers of equity is not in fact contrary to the pecking order hypothesis.

The remainder of this paper is organized as follows. Section 1 describes prior tests of the pecking order and develops our hypotheses. Section 2 describes our data. Section 3 presents an empirical examination of the effect of controlling for debt capacity. Section 4 examines the tradeoff theory versus the pecking order. Section 5 examines the intuition that firms facing greater amounts of asymmetric information should follow the pecking order more closely, and Section 6 concludes.

1. Recent Tests of Capital Structure Theory

The tradeoff theory of capital structure predicts that firms will choose their mix of debt and equity financing to balance the costs and benefits of debt. Tax benefits of debt and control of free cash flow problems are argued to push firms to use more debt financing, while bankruptcy costs and other agency problems provide firms with incentives to use less. The theory describes a firm's optimal capital structure as the mix of financing that equates the marginal costs and benefits of debt financing. In static versions of the tradeoff model these forces determine an optimal capital structure. In dynamic versions of the model (*e.g.* Fisher, Heinkel, and Zechner (1989)) the optimum is characterized as an optimal interval, and violation of the endpoints of the interval lead to revisions in the firm's financing mix.

Myers (1984), based on the argument in Myers and Majluf (1984), presents a pecking order theory of capital structure. The major prediction of the model is that firms will not have a target or optimal capital structure, but will instead follow a pecking order of incremental financing choices that places internally generated funds at the top of the order, followed by debt issues, and finally, only when the firm reaches its "debt capacity," new equity financing. This theory is based upon costs derived from asymmetric information between managers and the market and the idea that tradeoff theory costs and benefits to debt financing are of second order importance when compared to the costs of issuing new securities in the presence of asymmetric information. The development of a pecking order based upon costs of adverse selection requires an *ad hoc* specification of the manager's incentive contract (see Dybvig and Zender (1991)) and a limitation on the types of financing strategies that may be pursued (see Brennan and Kraus

(1987)). Despite these theoretical criticisms, the pecking order theory remains one of the predominant theories of incremental financing choice.

Dynamic versions of the pecking order model result in firms saving debt capacity for future possible needs. (Myers (1984) describes this loosely while Vishwanath (1993) and Chang and Dasgupta (2003) present more complete developments.) The extent of this "savings" behavior will depend on how changes in the firm's investment opportunity set and changes in the asymmetry of information are modeled. Regardless of the specific modeling choices, the predictions of dynamic models concerning financing behavior will be dependent upon the "distance" the firm is from its current level of debt capacity and the "speed" with which it expects to approach this level. Firms requiring outside financing will use a mix of debt and equity in which the weights will depend on the probability of reaching capacity given their current leverage, debt capacity level, and current growth and expectations for these characteristics in the future. Those firms expecting little or no growth, whose debt capacity is far from their current debt level, will finance predominantly (or even entirely) with debt and those at or near their debt capacities will rely on equity finance. Intermediate firms will use a mix of the two securities with the weights being determined by the likelihood of reaching their debt capacity in future financing.

In a recent set of papers, tests designed to distinguish between these theories have been developed. Shyam-Sunder and Myers (1999) introduce a test of the pecking order theory of capital structure. Their test is based on the prediction of what type of financing will be used to fill the "financing deficit." The financing deficit is defined, using the cash flow identity, as the growth in assets less the growth in current liabilities (except the current portion of long term

debt) less the growth in retained earnings. According to the identity, this deficit must be "filled" by the (net) sale of new securities. Shyam-Sunder and Myers argue that, except for firms at or near their debt capacity, the pecking order predicts that the deficit will be filled entirely with new debt issues. The empirical specification of their test is given as:

$$\Delta D_{it} = \alpha + \beta_{PO} DEF_{it} + \varepsilon_{it} \quad (1)$$

where ΔD_{it} is the net debt issued by firm *i* in period *t*, and DEF_{it} is the corresponding financing deficit. This test embodies the pecking order predictions that existing financial slack and internally generated cash flows will be the first choice for financing new investment followed by new debt issues. Changes in the use of debt should be driven by the deficit alone and not by considerations of an optimal capital structure. However, the test itself formally ignores the issue of debt capacity raised in Myers (1984).

Shyam-Sunder and Myers argue that the "simple" version of the pecking order predicts $\alpha = 0$ and $\beta_{PO} = 1$. This is intuitively appealing as the slope coefficient in this regression indicates the extent to which new debt issues are explained by a need for external capital. They acknowledge that β_{PO} may be less than 1 for firms near their debt capacity; however, they choose a sample of firms (large, mature firms) for which this is not predicted to be an issue. They find $\beta_{PO} = 0.75$ with an R^2 of 0.68 (see column 2 of their Table 2) when they estimate the model in equation (1). They interpret this as evidence that "the pecking order is an excellent first-order descriptor of corporate financing behavior" (Shyam-Sunder and Myers (1999) pg.242) for their sample of firms. They also find that a target adjustment model based on the tradeoff theory has little power to explain the changes in debt financing for their sample of firms.

Frank and Goyal (2003) question the conclusions drawn by Shyam-Sunder and Myers (1999) on several fronts. The most interesting challenges are the extent to which the Shyam-Sunder and Myers findings hold for a broader sample of firms, whether the results hold over a longer time horizon (in particular including the 1990's), the extent to which other "tradeoff theory information" affects their conclusions, and whether their findings hold for subsamples of firms for which (they argue) the pecking order is most likely to hold. For their larger sample, Frank and Goyal show the prediction $\beta_{PO} = 1$ in equation (1) does not hold and that it significantly weakens in the 1990's, even for the types of firms (large, mature) examined by Shyam-Sunder and Myers (1999).

Fama and French (2002) examine many of the predictions of the tradeoff and the pecking order theories with respect to capital structure and dividend policy. They argue that for the majority of the predictions the two theories agree and generally report findings consistent with these shared predictions. Consistent with Shyam-Sunder and Myers (1999), Fama and French (2002) find that (for their large sample) debt is used to address variations in investment and earnings in the short-term. They also find, as in Frank and Goyal (2003), that small, high-growth companies issue most of the equity. Fama and French join Frank and Goyal in arguing that this finding contradicts the pecking order theory.

Understanding more clearly what drives these contrasting findings and what sort of financing behavior drives the results presented in these studies is important for furthering our understanding of capital structure and financing choices by firms. We provide evidence in an attempt to reconcile some of these findings by focusing on the role of debt capacity. This is an idea considered in Myers (1984) and is an important element of the pecking order hypothesis that

is often ignored in empirical tests.

1.1. Debt capacity

Debt capacity was originally defined by Myers (1977) as the point at which an increase in the use of debt (fixed commitments) actually reduces the total market value of the firm's debt. More recently, Shyam-Sunder and Myers (1999) and Chirinko and Singha (2000) define it in terms of "sufficiently high debt ratios" implying that costs of financial distress curtail further debt issues. Adding debt capacity to the pecking order theory suggests that costs of adverse selection are dominant for moderate capital structures but that tradeoff-theory-like forces become primary motivators of financing decisions at extremely high leverage making it more difficult to distinguish the theories.

Dynamic versions of the pecking order as described above make it clear that two firm characteristics will be required to capture the impact of debt capacity concerns on the behavior of a firm following the pecking order: the distance a firm currently is from its debt capacity and the firm's requirements (current and future) for external financing, which determine how quickly a firm expects to approach its debt capacity. There appears to be no well accepted or even completely described measure of a firm's debt capacity, making it difficult to determine empirically how far a firm is from its debt capacity at a given point in time. Rather than offer a potentially controversial definition of debt capacity, we argue that firms with characteristics that limit their borrowing ability will, in general, be more likely to be constrained by debt capacity concerns for a given financing transaction. We then use the consideration of debt capacity constraints to refine the empirical analyses that have been pursued recently and to extend these tests in an effort to better understand the determinants of financing choices.

A firm's level of debt capacity may in general be driven by both demand and supply side considerations. On the demand side, firms with more uncertain cash flows and those whose value is derived primarily from growth opportunities (Myers (1977)) will face relatively lower demand for debt financing. On the supply side, a factor limiting the amount a firm can borrow stems from the possibility that lenders will ration some borrowers when there is asymmetric information between the firm and the market (Stiglitz and Weiss (1981)).[1]

Based on these arguments, our primary indicator of whether debt capacity concerns constrain a firm's choices is whether the firm has rated debt outstanding in a given year. Firms with rated debt outstanding have demonstrated they are able to use the bond market for their debt financing. Those without rated debt are (for the most part) borrowing via loans from banks or other financial intermediaries. It is the firms that borrow from these "relationship lenders" who may be subject to an externally imposed debt capacity in the form of rationing. In contrast, firms that are willing to comply with the strict disclosure requirements and are able to satisfy the requisite scrutiny for an investment bank to certify a public bond offering borrow in a market for which the interest rate equilibrates the supply and demand for borrowing. This is the implicit assumption concerning the debt market made by Myers and Majluf (1984) and so firms that are able to issue rated debt most clearly conform to the assumptions underlying the pecking order behavior. The predicted behavior must be modified if there is rationing in the debt market. In addition to their role in solving information problems, Cantillo and Wright (2000) argue that financial intermediaries are also more efficient at reorganizing firms compared to arm's length

[1]Hellman and Stiglitz (2003) model the impact of asymmetric information on the debt and equity markets.

investors. They predict that the firms able to obtain bond ratings and borrow in the public debt markets are those with lower expected costs associated with financial distress (*e.g.*, those with more tangible assets, fewer growth opportunities, and low cash flow volatility). Consistent with these notions of debt capacity, Whited (1992) uses the existence of a bond rating as an empirical measure of whether firms are effectively constrained from using the external financial markets. Faulkender and Petersen (2003) show that, all else equal, firms without a bond rating have lower leverage ratios than firms with rated debt, which they interpret as evidence of credit rationing.

2. Data

The data consist of all firms on both the CRSP and Compustat databases from the period 1971-2000. We begin in 1971 because we require flow of funds data to compute the financing deficit and this data is not available prior to 1971. Using the flow of funds data, we follow Frank and Goyal (2002) and compute the financing deficit as the sum of internal cash flow, the change in working capital, investments, and cash dividends.[2] By definition, the financing deficit is equal to the sum of net debt (data 111 - data 114) and equity issues (data 108 - data 115). In contrast, Shyam-Sunder and Myers (1999) also include the current portion of long-term debt as part of the financing deficit beyond its role in the change in working capital. Frank and Goyal find empirically that the current portion of long-term debt should not be included as part of the deficit, and we follow their definition here. We exclude regulated (SICs 4900-4999) and financial (SICs 6000-6999) firms and firms with minimum total assets less than $1 million or minimum sales

[2]The individual Compustat variables used to compute the components of the deficit vary by format code (as reported in Compustat). See Frank and Goyal (2002) for details on computing the individual components of the financing deficit.

less than zero. We further exclude individual firm-years with missing values for the financing deficit and net debt or equity issues. The financing deficit and net security issues are scaled by book assets (data 6) at the end of the previous year. In order to reduce the impact of outliers on the results, we eliminate firm-year observations for which the financing deficit or net issues of debt or equity are greater than 200% of the firm's total book assets at the end of the previous year.

For each firm year, we compute leverage as the ratio of long-term debt (data 9 + data 44) to total assets. We also compute the change in leverage over the year as well as the firm's growth in total assets over the year. As a useful way of summarizing how growth would impact the firm's leverage under the pecking order, we use the definition of the financing deficit and the balance sheet identity to compute a variable that measures the amount by which the firm's debt ratio would change if the firm issued all debt to fill its current financing deficit. We call this variable the *predicted* change in leverage.

We also use a number of variables that have been identified as affecting leverage in the previous literature on capital structure (*e.g.*, Rajan and Zingales (1995), Frank and Goyal (2003), and Fama and French (2002)). Asset tangibility is measured as the ratio of property plant and equipment (data 8) to total assets. Firms with more tangible assets are expected to have lower costs associated with financial distress. The market-to-book ratio ((data 6-data 60+data 24*data 25)/data 6) is used as a proxy for growth opportunities. Myers (1977) argues that firms with more growth opportunities have greater potential for underinvestment problems arising from the use of debt. Profitability is measured as the ratio of operating profits (data 13) to total assets. Prior research has found an inverse correlation between profitability and leverage, which has

often been interpreted as evidence in favor of the pecking order (*e.g.*, Fama and French (2002)). As a proxy for the volatility of a firm's cash flow in a given year we use the volatility of that firm's daily stock returns during the year. Theoretically, cash flow volatility and stock price volatility will be tied by pricing in the equity market. Empirically, for a subset of firms with sufficient data to accurately measure cash flow volatility, we find that the rank correlation between these two volatility measures is 0.53.[3] All else equal, a firm with more volatile cash flows can borrow less either because the debt overhang problem (Myers (1977)) is more severe or because it is more likely to be unable to meet the payments on its debt obligations, thus triggering costly financial distress.

Finally, firm age is measured as the age of the firm relative to the first year the firm appears on Compustat. We also create a variable indicating whether a firm has rated debt outstanding in a particular year as recorded by Compustat. The debt rating variable (data 280) is only available beginning in 1986. Our final sample is comprised of 67,200 firm-year observations.

2.1 The importance of controlling for debt capacity

To provide some initial evidence about how debt capacity concerns affect financing behavior, Figures 1 and 2 plot, for each calendar year from 1986 to 2001, the average financing deficit, the average net debt issued, and the average net equity issued for subsamples of firms with and without rated debt outstanding in that year. If firms follow a pecking order in financing

[3]Measuring cash flow volatility directly is problematic because in a given year many firms will have relatively few past observations of the generated cash flow with which to estimate volatility. Using quarterly Compustat data we compute the volatility of a firm's return on assets for a subsample of our firms using at least 8 and as many as 12 quarters of data.

choice and if firms that are able to issue rated debt face less restrictive debt capacity constraints, we should see their behavior conform much more closely to the static pecking order predictions than do firms that are unable to issue rated debt.

For the firms that should be less constrained by debt capacity considerations (those with rated debt), Figure 1 shows that net issues of debt are very highly correlated with the financing deficit. Figure 2 provides the same information for the firms that do not have rated debt outstanding. The contrast is striking: for those firms that should face tighter debt capacity constraints, net issues of equity are highly correlated with the financial deficit.

Table 1 presents summary statistics for the subsamples of firms based upon whether they have rated debt outstanding. This data is also consistent with the idea that concerns over debt capacity drive financing behavior. The most notable differences between the subsamples are that, in contrast to firms without bond ratings, firms with rated debt have low average financing deficits, finance their deficits almost entirely with debt financing, and on average grow somewhat more slowly than firms without rated debt outstanding. The lower growth rates and smaller financing deficits for firms with rated debt means that these firms can finance a larger proportion of their financing deficits with debt without significantly increasing their leverage ratios (so approach their debt capacities much more slowly), while those firms without bond ratings would experience a significant change in their leverage ratios by issuing debt to fund their financing deficits. To illustrate this concretely, we calculate a variable labeled predicted leverage change that measures the change in leverage that would occur if firms financed their entire deficit with debt. Table 1shows that, on average, firms with rated debt outstanding would see their leverage ratios increase by 2.8% if they followed the pecking order, while those without rated debt would

see an increase in their leverage ratios of 5.2%.

Firms with rated debt outstanding are also on average older, larger, have a greater proportion of tangible assets, have less valuable growth opportunities as measured by the market-to-book ratio, and have less volatile stock returns compared to firms without rated debt. Further, compared to firms without bond ratings, firms with rated debt outstanding are on average more highly levered. All of these findings are consistent with the idea that firms with rated debt have higher levels of borrowing capacity.

As a final illustration of the usefulness of bond ratings as a proxy for the extent to which the firm is constrained by concerns over debt capacity, Table 2 presents the results of the simple Shyam-Sunder and Myers test of the pecking order specified in equation (1). The first column of the table presents the results of this simple test for our entire sample (which includes observations for the period 1971-1985, years for which bond ratings are not reported in Compustat). Similar to the results reported by Frank and Goyal (2000), we find no support for the prediction that the slope coefficient in this regression, β_{PO}, is equal to 1.0. The estimate of β_{PO} is 0.446 and the R-squared of the regression is 0.45. In the next two columns, we divide the sample into two periods and replicate the Frank and Goyal (2003) finding that the pecking order appears to perform "worse" during the latter half of the sample period.

The fourth and fifth columns of Table 1 examine only the latter half of the sample period (the period for which bond ratings are available in Compustat), but further segment the data according to whether or not the firm has rated debt outstanding in a given year. For firms without rated debt the estimate of β_{PO} equals 0.361 and the R-squared of the regression is 0.34. The financing behavior of this set of firms is far from that predicted by the static pecking order.

For the firms with rated debt outstanding the results are quite different and support the predictions of the static pecking order. The estimate of β_{PO} in this regression is 0.784 and the R-squared is 0.80.[4]

The final column of Table 2 examines the behavior of those firms within our sample that move from using unrated debt to using rated debt (or vice-versa). The regression that we estimate is similar to the simple Shyam-Sunder Myers regression, but also includes an indicator for firm years with bond ratings and an interaction term of the rating indicator and the financing deficit. If the ability to obtain a bond rating is an indication that the firm faces a more relaxed debt capacity constraint then we expect the slope on the interaction term to be positive. The results of the regression show that in the years prior to issuing rated debt the firms rely to a large extent on equity financing. The slope coefficient on the financing deficit is 0.583. This coefficient is slightly larger than that for the subsample of unrated firms as a whole, but is well below the value of 1.0 predicted by the pecking order. As predicted by our arguments concerning debt capacity, the financing behavior of the firms changes significantly in the years after they obtain a bond rating. The coefficient on the interaction term is 0.199, which implies that after obtaining a rating the firms fill a much larger part of their financing deficit with debt (the implied slope coefficient is 0.782 = 0.583 + 0.199). Prior to obtaining a bond rating this set of firms behaves consistently with facing a restrictive debt capacity constraint. After obtaining a bond rating, however, this same set of firms behaves very much in accordance with the static pecking order theory.

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[4]Note that these results are more strongly in support of the pecking order than the original Shyam-Sunder and Myers (1999) results and are based solely on the later portion of the sample period, the period for which Frank and Goyal (2003) report that the relation weakens.

3. Controlling for Debt Capacity

The results presented above are supportive of the pecking order hypothesis modified to account for concerns about debt capacity. However, using the actual presence or absence of rated debt to proxy for debt capacity concerns is potentially problematic. We are particularly worried about firms without bond ratings that have chosen to rely on equity financing (perhaps for reasons outside of the pecking order) despite their having the capacity, based on firm characteristics, to issue rated debt. To identify such firms as being constrained by concerns over debt capacity is a mistake, and would bias our results in favor of the pecking order.

To minimize these concerns in our analysis we use a predictive model of whether or not a firm has rated debt outstanding rather than using the presence or absence of a bond rating. We estimate a logit model in which the dependent variable is one if a firm has rated debt outstanding in a particular year and zero otherwise. The estimation uses data from 1986-2001, which is the period that bond ratings are available in Compustat. The firm characteristics used in the logit regression are firm size (the log of total assets), profitability (ROA), the fraction of total assets that are tangible, the market to book ratio, leverage, firm age (the natural log of the number of years since the firm first appeared on the compustat data file), the standard deviation of stock returns, and, in one version, industry dummies for each 2-digit SIC code in the sample.[5] All of the independent variables are lagged one period to reduce problems associated with endogeneity. Smaller and younger firms are likely to have a shorter track record and be more opaque from the standpoint of lenders, suggesting that these firms will be less likely to have bond ratings.

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[5]The independent variables are similar to those used in a recent paper by Peterson and Faulkender (2003).

Smaller firms will also face proportionally higher fixed costs of issuing bonds in the public debt markets (*e.g.*, Altinkilic and Hansen (2000)). To the extent that "relationship" lenders are also more efficient at *ex post* monitoring and restructuring in the event of distress (*e.g.*, Cantillo and Wright (2000)), we expect that firms likely to face higher potential costs of debt finance arising from financial distress and distortions to their investment policy, such as those with high volatility, fewer tangible assets, and high market-to-book ratios, will be less likely to have a bond rating. Finally, all else equal, more profitable firms are better able to make required payments to debtholders and so can support more debt, and firms with more debt outstanding have proven their ability to borrow.

Table 3 presents the results of the logit regressions. Robust t-statistics that are corrected for non-independence of observations within a firm are reported in parentheses below the regression coefficients. Model (1) shows that firm size, firm age, the standard deviation of stock returns, the market-to-book ratio, and leverage have the expected signs and all are significant predictors of the likelihood that a firm has a bond rating. Interestingly, the financial constraints literature also identifies firm size and firm age as proxies for the general level of financial constraints facing a firm, lending further support to the use of the prediction of rated debt as a measure of whether a firm is constrained or unconstrained by concerns over debt capacity. The model fit as measured by the pseudo R-squared is 0.52. Model (2) shows that inclusion of industry effects improves the fit of the model only slightly.

The estimated coefficients (based on data from 1986-2001) from Model (1) are used to obtain an estimated probability that a given firm has rated debt for each year in the period 1971-2001. Beyond minimizing the potential bias associated with using the actual presence of rated

debt, this approach also allows us to begin our sample period in 1971 (when the statement of cash flow data becomes available) rather than in 1986 (when bond ratings are first reported in Compustat). In each year we form three quantiles based on the predicted probability of having a bond rating. The low quantile contains firms with the lowest predicted probabilities of having a bond rating based on their characteristics, and the high quantile contains firms with the highest likelihood of having a bond rating.

3.1 A more complete analysis of the effects of debt capacity on financing behavior

We now turn to a more complete analysis of how debt capacity affects financing behavior based on the predictions of the dynamic pecking order theories (Vishwanath (1993) and Chang and Dasgupta (2003)). As discussed above, the dynamic pecking order theory predicts that financing behavior will be dependent upon both a firm's distance its current debt capacity and the speed at which the firm expects to approach its debt capacity given its current and future financing needs. Under the pecking order, holding the size of the financing deficit constant, firms with less restrictive debt capacity constraints will use more debt to fill their external financing needs. Holding debt capacity constant, firms should use more debt to fund small deficits, but will increasingly turn to equity when external financing needs are large (see also Chirinko and Singha (2000)). In this section we examine both of these predictions within the Shyam-Sunder and Myers (1999) framework using subsample analysis based on our predicted debt ratings groups.[6] Panel A of Table 4 presents the results of these tests.

The first column in this table presents the results of the basic Shyam-Sunder and Myers

[6]Empirically, firms with large current deficits are also more likely to have large future deficits, so the size of the current financing deficit contains information about a firm's future external financing needs.

test of the pecking order on those firms most likely to be constrained by debt capacity considerations (those in the low predicted bond ratings group). As expected, the Shyam-Sunder and Myers test performs particularly poorly on this set of firms. The estimate of β_{PO} is only 0.30 and the R-squared indicates that the financing deficit explains only 29% of the variation in net debt issues.

The second column in this table considers this same set of firms but extends the Shyam-Sunder and Myers test by including the squared deficit as an independent variable in order to consider differences in the behavior of firms facing "small" and "large" financing deficits. The results are consistent with the predictions of the dynamic versions of the pecking order theory. The slope coefficient on the level of the financing deficit increases significantly to 0.53, indicating that "small" deficits are financed by about half debt and half equity. The coefficient estimate on the squared financing deficit is -0.24, indicating that these firms rely much more heavily on equity financing when deficits are "large." The R-squared of the regression increases but remains relatively low at 0.34.

An interesting contrast to these results is presented in the final two columns of panel A of Table 4 which examines the subsample of firms with the highest likelihood of having a bond rating. These columns show that for a very large cross-section (and a long time series) of firms that are predicted not to face binding debt capacity constraints, the financing deficit explains debt issues very well. In the basic Shyam-Sunder and Myers test the slope coefficient is 0.750 and the R-squared is 75%.[7] When the squared deficit is included the slope coefficient on the deficit

[7]In contrast to the conclusions in Frank and Goyal (2002), we find little evidence that, for firms unconstrained by debt capacity, the pecking order performs worse in the latter half of the sample period. Specifically, for firms in the high predicted rating group, the slope coefficient in the regression is 0.793

increases to 0.793. The coefficient on the squared financing deficit is significantly negative but is small in magnitude (-0.076), indicating that, for those firms least likely to be constrained by debt capacity considerations, debt is the primary security used to fill the financing deficit, even when the deficit is "large".

The medium predicted rating group exhibits behavior that lies between that of the low and high predicted rating groups. Overall, the results presented in panel A of Table 4 indicate that the use of debt and equity across groups conforms well with the predictions of the dynamic pecking order theory. The more restrictive the debt capacity constraint is, and the more rapidly a firm expects to approach this constraint,[8] the greater the firm's observed dependence on external equity financing will be.

To examine the robustness of our conclusions, panel B of Table 4 considers these same regressions dividing the sample into three groups based upon the firm's stock return volatility. At the beginning of each calendar year we form three groups based on the prior year's stock return volatility. The low volatility group contains firms in the lowest quartile of volatility in each year, and the high volatility group contains firms in the highest quartile. The medium volatility group contains the remaining firms.[9] The firms with the tightest debt capacity constraint are expected to be those with the highest levels of stock return volatility, our proxy for

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in the pre 1986 period and falls only slightly, to 0.746 in the post-1986 period.

[8]Although not reported, consistent with the results in Table 1, we find that those firms with the lowest probabilities of having a bond rating have the highest average financing deficits as a fraction of beginning of period total assets.

[9]We also examined using asset volatility computed by multiplying equity volatility by ratio of equity to total assets. The results were similar. The results are also robust to different cutoffs for dividing the firm-years into subsamples.

cash flow volatility (a measure of the firm's demand for debt financing). The results are very similar to those reported based on the predicted bond rating groups. In the highest volatility group, the slope coefficient in the basic Shyam-Sunder and Myers regression is 0.40. As in the panel A regressions, for the most constrained firms, including the squared deficit term improves the fit of the regression and increases the slope coefficient on the financing deficit substantially. The estimated slope coefficient on the deficit term is 0.61 when the deficit squared term is included, again indicating that, even for the most constrained firms, when the level of the deficit is low the predominant form of external financing is debt. The estimated coefficient on the squared deficit term is -0.23, indicating that when the deficit is "large" for these highly constrained firms, much more emphasis is placed on the use of external equity financing.

For the least constrained firms, the lowest volatility group, the basic Shyam-Sunder and Myers regression fits very well. The estimated slope coefficient is 0.74, indicating a heavy reliance on the use of debt financing. In this group the inclusion of the deficit squared term does not have a significant impact on the regression, indicating that for firms with the least volatile cash flows, even large deficits are filled predominantly with debt financing. Finally, note that the same pattern across the groups appears, with the use of equity financing increasing as the firms are more constrained by debt capacity or face greater requirements for the use of outside financing.[10]

4. Distinguishing the Pecking Order From the Tradeoff Theory

[10]As a final robustness check we also allowed for differing coefficients for positive and negative deficits. The inferences were unchanged from those reported.

Once consideration of debt capacity is taken into account in the pecking order it becomes more difficult to distinguish it from a dynamic version of the tradeoff theory with issuance costs (*e.g.*, Fischer, Heinkel, and Zechner (1989)). For firms with high levels of leverage (firms at or near their debt capacity or near the upper level of their capital structure bounds) the behavior predicted by both theories is that firms will seek to reduce the relative amount of debt in the firm's capital structure.

The two theories provide contrasting hypotheses, however, for highly profitable firms that are far below their debt capacities. The pecking order theory, both static and dynamic, predicts that profitable firms with low leverage have no incentive to increase their leverage. Such firms will prefer instead to "stockpile" debt capacity for the future as long as internal funds are sufficient to fund the firm's investment needs. Conversely, the dynamic tradeoff theory predicts that in such situations new debt financing would be preferred to an increased use of (internal) equity. Specifically, highly profitable firms with low leverage will seek to actively re-balance their capital structures; increasing their leverage to take advantage of the valuable tax deductions associated with debt financing. This contrast in the predictions of the two models is an important way in which we can empirically distinguish between the competing theories.

To directly test the tradeoff theory against the pecking order we attempt here to capture the dynamic nature of this decision. Our approach is to consider the financing behavior of firms over a significant time period as opposed to examining their behavior annually. To do so, we form six non-overlapping five-year panels beginning in 1971.[11] We allow firms to enter and exit

[11]Note that the last panel contains six years. The choice of five years as the time frame is somewhat arbitrary. We have checked the robustness of this choice and the qualitative results do not change with an increase or decrease in the length of the panels by one year.

each panel, but require a firm to have three years of data within a panel for its inclusion our final analysis. Leary and Roberts (2004) report that firms actively adjust their capital structures on average about once a year, suggesting that a five-year horizon should be more than sufficient to allow for the slow adjustment in capital structures implied by the dynamic tradeoff theory. For each firm in the panel we compute its debt ratio the year it enters the panel and the last year it appears in the panel. Over the years the firm is in the panel, firm specific averages of asset growth, size, profitability, market-to-book, asset tangibility, financing deficit, and net debt and equity issues are computed. For each firm we also create a measure of the firm's actual leverage relative to the leverage of similar firms at the time the firm enters the panel.[12] This model is used to generate an indicator variable that indicates whether a firm has high (relative leverage greater than zero) or low relative leverage (relative leverage less than or equal to zero) at the beginning of the panel. Finally, firms in the panel are sorted into three groups using independent sorts based on their average asset growth and average profitability. By ranking on asset growth and profitability, rather than the financing deficit, we isolate the firm's decision to retain earnings.

Panel A of Table 5 reports univariate averages of the change in the debt ratio and other variables as a function of average profitability. This panel focuses on firms with moderate asset growth to avoid confounding effects related to very high-growth (behavior affected by debt capacity constraints) or negative growth (financial distress). Results are averaged across the six

[12]Specifically, the firm's relative leverage is the residual from a cross-sectional regression of the debt-to-assets ratio on lagged firm size, market-to-book, asset tangibility, profitability, and the probability that the firm has a bond rating from our predicted model of ratings in Table 3. The regression also includes indicators for each two-digit SIC code. The results are unchanged if we instead use the firm's leverage relative to the industry median.

panels. The pattern is striking: holding average asset growth constant, the change in the firm's debt ratio is inversely related to average profitability and the difference in the change in leverage across the profitability groups is statistically significant at the one percent level. More importantly, firms with the highest profitability actually decrease their leverage by 1.4% on average over the five-year panels. Additionally, examining the magnitude of the average financing deficits across profitability groups indicates that this reduction in the leverage ratio arises from the funding of asset growth using retained earnings (internal equity). For the high profitability group, the average financing deficit equals zero over the five-year period indicating that, on average, the most profitable firms fund all of their asset growth using internal funds rather than paying out a portion of these cash flows and actively seeking to use more external debt. These results are consistent with the pecking order theory, but are difficult to reconcile with the tradeoff theory without large transaction costs.

A possible explanation for these results is that we have failed to adequately control for other factors that affect firms' use of leverage. To account for this possibility, panel B of Table 5 presents a regression analysis of the five-year change in leverage on average profitability and several control variables. As controls we include firm size, market-to-book, and asset tangibility, all measured as firm specific averages over a given panel. We also include the firm's leverage ratio at the beginning of the panel to account for the idea that firms near their debt capacity have the greatest incentive to reduce debt, all else equal. Finally, to directly test the tradeoff theory prediction that firms with high expected profits and sufficient debt capacity seek to add debt we include an interaction of profitability with the low relative leverage indicator, which is equal to one if the firm enters the panel with a debt ratio lower than its predicted value. The coefficient

on the profitability variable alone measures the effect of expected future profitability on the change in debt ratio for firms that enter the panel with debt ratios above their predicted levels. Both the tradeoff and pecking order theories predict that this coefficient will be negative. In contrast, the tradeoff theory predicts that the coefficient on the interaction term will be positive, and that the sum of the two profitability coefficients will be positive as well. The pecking order theory predicts a negative value for the sum of the two coefficients.

For the moderate growth subsample (the middle column in the panel), the results reported in panel B are consistent with the predictions of the pecking order. The coefficient on average profitability is reliably negative, which supports the notion that firms with high initial leverage use excess profits to reduce their leverage over time. For this subsample, the coefficient on the interaction term is small in magnitude and is not significantly different from zero. This latter finding supports the pecking order and indicates highly profitable firms with low initial leverage that expect moderate asset growth also reduce their debt ratios, and do so at *the same rate* as firms with high initial leverage. These results are generally consistent across all three asset growth categories.[13]

The results presented in Table 5 provide evidence that internally generated funds are the preferred source of financing, regardless of existing leverage and expected profitability. Firms stockpile debt capacity by using internal equity when profits are sufficient to fund asset growth. Moreover, even firms with low initial leverage use excess profits to reduce their leverage ratios

[13]As a robustness check, we repeat the analysis using the values of the explanatory variables at the beginning of each panel. So long as the levels of the variables are persistent, the beginning of period values should be a reasonable proxy of expectations for the future. The results are qualitatively the same as those reported. All else equal, for low leverage firms, there is a negative correlation between profitability and the change in the leverage ratio.

over time. This finding is directly contrary to the tradeoff theory. Because we rank firms based on their profitability over a five-year period our analysis identifies those firms that have high and relatively stable cash flows over the period. Under the tradeoff theory such firms, all else equal, have the greatest incentive to increase their debt. Our results are also consistent with Leary and Roberts (2004), who find, using a duration model, that the likelihood of a firm issuing debt is negatively related to profitability. Finally, note that these results are not a restatement of the well known negative cross-sectional correlation between profitability and leverage, but rather, consider the impact of profitability on incremental financing decisions over a significant period of time.

5. Asymmetric Information, Debt Capacity, and Financing Choice

The pecking order is derived based on the underlying assumption that costs of asymmetric information drive firms' financing choices. Based on this, Frank and Goyal (2003) and Fama and French (2002) argue that firms with more asymmetric information should follow the pecking order more diligently. These studies cite the finding that small, high-growth firms are the predominant issuers of equity and the evidence that the Shyam-Sunder and Myers test performs poorly on a sample of small, high-growth firms and well on a sample of large, mature firms as inconsistent with the pecking order. Their conclusions are based on the observation that the former group of firms should face larger problems of asymmetric information than the latter.

While this intuition is appealing, note that the model predicting whether a firm can issue rated debt finds firm size, age, and volatility to be major predictors of whether a firm will have rated debt outstanding. Thus small and/or young firms are much more likely to be constrained by

debt capacity concerns. Additionally, high-growth firms with significant external financing needs, all else equal, are moving towards their debt capacities more quickly. The recognition that small, high-growth firms may have greater concerns over debt capacity implies that finding frequent equity issues by such firms is not necessarily contradictory to the pecking order.

It is also true that the theoretical basis of the Myers and Majluf (1984) argument, the foundation of the pecking order theory, is the wealth loss to existing shareholders from new equity issues. This cost is derived from a comparison of the cost due to asymmetric information concerning the assets in place versus the expected value of the firm's growth options. Small, high-growth firms can reasonably be expected to have greater amounts of asymmetric information with respect to their assets in place than do large, mature firms. However, if they also have growth options that are significantly more valuable (relative to the assets in place) than the growth options of large firms, then small firms, according to the Myers and Majluf (1984) model, may face lower adverse selection costs associated with an equity issue.

To explore how debt capacity concerns and costs of adverse selection might affect financing behavior, we begin by presenting a characterization of firms that issue significant amounts of new equity. Table 6 presents summary statistics for firms sorted into three groups based upon their estimated probability of having a debt rating. These groups are further sorted into those firms that issue significant amounts of equity in a given year and those that do not. Using the Compustat data, we define a significant issue of equity as an issue that equals or exceeds five percent of the value of the firm's total assets at the end of the previous period.[14] We

[14]The five percent cutoff for identifying issuers with Compustat data has also been used by Hovakimian et al. (2001), Korajczyk and Levy (2003), and Leary and Roberts (2004).

refer to these firms as "issuers" for simplicity.[15]

For the subsample of firms most likely to face debt capacity constraints (the low predicted rating group) we find significant differences in the characteristics of issuers and non-issuers. Most dramatically we see that the issuers of significant amounts of equity are, on average, growing very fast (average growth in assets is 49.8% annually as compared to 10.6% for the non-issuers). Further, the growth is largely dependent upon external financing (the average deficit for issuers is 42.9% and their average return on assets is -2.4%).

Issuers also have relatively low leverage measured both by the 13.4% book leverage and an excess leverage (relative to the predicted value from the cross-sectional regression) of -6.0%. Although they have low leverage prior to the issue, the predicted leverage change (the change in the firm's book leverage ratio that would occur if their deficits completely financed with debt) of 29% is quite large, indicating that if these firms used only debt financing their debt ratios would on average increase from about 13% to over 42%. Given their growth and profitability, such an increase in leverage would likely violate any reasonable expected level of debt capacity. In contrast, the financing choices made by these firms result in the actual change in leverage for being essentially zero. The non-issuers, on the other hand, have a predicted leverage change of only 2.7% and an actual leverage change of 1.7%. Finally, compared to non-issuers, the issuers are smaller ($16.7 Million in assets vs. $17.4 Million), younger (6.3 vs. 9.2 years), have higher market-to-book ratios (3.4 vs. 1.6), and higher volatility of stock returns (0.84 vs. 0.71). Given

[15]All of the differences in means between issuers and nonissuers of the variables reported in Table 6 are significant at the five percent level with the exception of lagged total assets and lagged property plant equipment for the low predicted rating group and lagged property plant equipment for the medium predicted rating group.

their characteristics, it is not surprising that these firms use equity rather than debt financing.

The firms with medium and high estimated probabilities of having a bond rating should be less likely to be rationed by lenders, but may be reluctant to pursue further borrowing because they are unable to support additional debt. Consistent with this view, the issuing firms in these groups are growing much more rapidly and have significantly higher leverage prior to the issue than the non-issuers. As a specific example, consider the firms in the high predicted rating group. Within this subsample, the firms issuing significant amounts of equity have leverage of 37.8% and excess leverage of 10.4%. The predicted change in leverage (based on no new equity) is 7.4%, which would push these firms, on average, to a book leverage of 45%. Instead, the actual financing choices made by these firms result in an average *reduction* in their book leverage of 5.1%. The firms not issuing significant amounts of equity have average leverage of 29% (2.2% excess leverage) and a predicted leverage change of 0.5%. This predicted leverage change is very close to their actual change in leverage of 0.4%.

Finally, note that across all three groups of firms, there is a clear pattern comparing the issuers versus the non-issuers. The issuers are younger firms that are growing much more rapidly. Firms issuing significant amounts of equity also have more volatile stock returns (indicating more volatile cash flows) and lower profitability. In the highest and lowest groups, the issuers are also smaller firms, on average, with the issuers and non-issuers being of about equivalent size in the medium group. These results suggest that those firms who issue the majority of external equity can be classified as constrained by concerns over debt capacity, and provide a reconciliation of the results in Fama and French (2002) and Frank and Goyal (2003) with the pecking order.

Lastly, we examine whether small, high-growth firms, which we argue are those most likely to be constrained by considerations of debt capacity, face higher or lower adverse selection costs associated with equity issues as measured by the market reaction to the announcement of an issue. To the extent that small, high-growth firms have significant growth opportunities and are constrained from issuing debt, we expect the market to react less negatively to the announcement of an equity issue for these firms. In order to measure the cost of an equity issue we examine announcement effects for all issues of seasoned equity for firms in our sample with announcements of equity issues reported in the SDC database between 1980 and 2001.[16] We measure the three-day cumulative abnormal return (CARs) around equity issue announcements relative to a market model estimated over the 200-day period ending 21 days prior to the announcement of the equity issue. The final sample consists of 2,275 equity issue announcements, and the average three-day announcement CAR in the sample is -0.026.

The first two columns of Table 7 present the results of cross-sectional regressions explaining the announcement CARs using firm size, the market-to-book ratio, leverage, the fraction of secondary shares in the issue, and indicators for each sample year as control variables. We create an indicator variable equal to one for firms in the low estimated probability of having a bond rating group. In addition to identifying the firms most likely to be concerned about debt capacity, the summary statistics presented in Table 6 clearly indicate that firms with the lowest estimated probability of having a bond rating are also the smallest, youngest, and fastest growing

[16]Note that the SDC sample contains fewer equity issues than in Table 6. This is because Table 6 defines equity issues based on the statement of cash flows, and includes equity transactions, such as private equity issues and debt conversions, beyond those reported in SDC. Hovakimian, *et al.* (2001) discuss this issue in more detail.

firms. An examination of their costs of issuing equity relative to other firms will indicate the validity of the intuition that firms in this group have the greatest exposure to problems of asymmetric information and therefore, should follow the predictions of the static pecking order more closely.

The first column in Table 7 examines the full sample of equity issuers, while the second estimates the regression on a sample restricted to include only those firms that make significant issues of equity (based on the 5% cutoff used previously). In both cases we see that, on average, the constrained firms have less negative market reactions to announcements of equity issues compared to other firms. All else equal, the firms in the low predicted rating group see their stock prices fall by about 1% less relative to other firms at the announcement of an equity issue. Columns three and four repeat the analysis, but use a different dependent variable to measure the market reaction to an equity issue. The result in Myers and Majluf (1984) is driven by the wealth loss to existing shareholders rather than simply the CAR. We follow Stein (1992) and compute the dollar loss to existing shareholders (equal to the market value of equity prior to the issue multiplied by the CAR) scaled by the proceeds of the issue.[17] Based on this measure of the cost of an equity issue we again see that firms in the low predicted ratings group face lower costs compared to other firms at the announcement of an equity issue. On average, the existing shareholders of firms in the low predicted rating group face a cost associated with a new equity issue that is $0.085 (per dollar raised) lower compared to the shareholders of other firms issuing equity.

The results are consistent with three interpretations. The first is that although the small,

[17]If we do not scale by the proceeds of the issue the same qualitative results are obtained.

high-growth firms in the low predicted rating group may face more asymmetric information concerning the value of their assets in place, they also face relatively more valuable investment opportunity sets. The second is that the market realizes that, due to the constraint imposed by debt capacity, the firm has little or no flexibility in its choice of financing instruments and so the announcement of an equity issue is less of a bad signal than it would be for a similar firm that could also choose to issue low risk debt. Last, if small, high-growth firms are better at "timing" their equity issues we would expect to see this pattern.[18] It is difficult to control for timing ability, however, given the differences in growth rates (which is correlated with the demand for external financing) between these firms and the rest of the sample, the small, high-growth firms may also have less flexibility in choosing when to issue than more mature firms.

As a final point, some caution should be used in interpreting these results as we only observe the market reactions of those firms that have chosen to issue equity. This selection bias makes it less likely for us to find any significant differences across the groups of firms. Nonetheless, our results provide a rationale within the pecking order framework for the frequent equity issues by small, high-growth firms, which others have posed as a challenge to the theory.

6. Conclusion

We demonstrate the importance of controlling for debt capacity and the rate at which the firm expects to use external financing when testing the pecking order theory. When this is done,

[18]See, for example, Korajczyk, Lucas, and McDonald (1991). These authors also question whether the price drop at the announcement of an equity issue should be considered a "loss" to existing shareholders if the announcement conveys information about the value of assets that would have become public anyway.

we find that the pecking order theory is a good descriptor of the observed financing behavior of a broad cross-section of firms. The finding that, on average, highly profitable, low leverage firms use internally generated funds to finance their growth and allow their leverage ratios to drop over an extended period is inconsistent with the tradeoff theory but consistent with the pecking order theory. By closely examining the small, high-growth firms that issue equity we show that equity may be their only option. We also present evidence from market reactions to equity issues that are consistent with the observed patterns of equity issuance across large, mature and small, high-growth firms.

An issue left to future research is the interaction between the growth in assets, profitability, and financing. We have implicitly assumed that asset growth and profitability are exogenous to the financing decision in this analysis. Theoretically, with perfect markets, this would be correct. Once one assumes a role for capital structure, however, we are necessarily removed from the Modigliani and Miller world, and it would be interesting and important to consider the link between a firm's financing and capital budgeting decisions.

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Table 1

Summary statistics for subsamples of firms with and without bond ratings reported in Compustat. The initial sample consists of 67,200 firm-year observations for 1971-2001. The sample reported in the table contains only data from 1986-2001, the time period for which bond ratings are available in Compustat. The financing deficit and net debt and equity issues are defined using the flow of funds data on Compustat. Firm age is measured relative to the first year the firm appears on Compustat. Excess leverage is the difference between the firm's leverage ratio and the predicted value of leverage from a cross-sectional regression (based on all firms in the sample in that year) of leverage on log total assets, the ratio of property plant and equipment to total assets, market-to-book, return on assets, the predicted probability that a firm has bond rating from model (1) in Table 3, and indicator variables for each two-digit SIC code in the sample. The predicted change in leverage is the change in the firm's leverage ratio over the year if the firm financed its entire financing deficit with debt.

Variable	No Bond Rating (N=30,144)				Bond Rating (N=7,198)			
	Mean	Std. Dev.	25th Pctile	75th Pctile	Mean	Std. Dev.	25th Pctile	75th Pctile
Financing Deficit/Total Assets	0.061	0.219	-0.024	0.062	0.049	0.191	-0.029	0.063
Net Debt Issued/Total Assets	0.019	0.136	-0.021	0.021	0.044	0.168	-0.019	0.059
Net Equity Issued/Total Assets	0.042	0.178	0.000	0.011	0.005	0.086	-0.008	0.004
Three Year Average Future Financing Deficit	0.159	0.415	-0.051	0.233	0.088	0.307	-0.062	0.154
Growth in Total Assets	0.128	0.395	-0.045	0.211	0.128	0.312	-0.017	0.172
Three Year Average Future Asset Growth	0.398	0.714	0.001	0.654	0.315	0.533	0.025	0.489
Firm Age (Years)	13.466	10.404	5.000	20.000	25.093	15.034	10.000	39.000
Total Assets	362.577	2290.073	21.386	196.749	4732.639	11037.880	627.629	4193.700
Net Prop. Plant & Equip./Total Assets	0.298	0.218	0.128	0.414	0.409	0.225	0.227	0.584
Market-to-Book Ratio	1.813	1.790	1.003	1.967	1.602	0.944	1.094	1.776
Return on Assets	0.078	0.222	0.040	0.176	0.134	0.088	0.095	0.177
Long-Term Debt/Total Assets	0.183	0.236	0.014	0.288	0.332	0.217	0.194	0.427
Excess Leverage	-0.015	0.166	-0.123	0.068	0.003	0.194	-0.129	0.102
Change in Leverage	0.007	0.166	-0.025	0.026	0.013	0.120	-0.029	0.041
Predicted Change in Leverage	0.052	0.426	-0.020	0.080	0.028	0.133	-0.028	0.058
Annual Standard Deviation of Stock Returns	0.712	0.462	0.416	0.869	0.435	0.246	0.281	0.517

Table 2

Pooled time-series cross-section regressions of net debt issued on the current financing deficit and interactions of the current financing deficit with an indicator equal to one if the firm has a bond rating in that year. Net debt issues and the financing deficit are computed using flow of funds data from Compustat. All variables are scaled by total assets at the end of the previous year. The full sample consists of 67,200 firm-year observations from the period 1971-2001. The subsample using bond ratings is from 1986-2001, the time period that bond ratings are available on Compustat. t-statistics based on robust standard errors adjusted for nonindependence within firms are reported in parentheses.

	Dependent Variable is Net Debt Issued					
Variable	Full Sample	1971-1985	1986-2001	No Bond Rating	Bond Rating	Bond Rating Changes
Intercept	-0.008	0.001	-0.001	-0.003	0.006	-0.006
	(-11.67)	(2.57)	(-2.18)	(-5.67)	(6.39)	(-3.57)
Financing Deficit	0.446	0.560	0.426	0.361	0.784	0.583
	(25.76)	(36.46)	(35.63)	(29.42)	(42.23)	(16.68)
Bond Rating						0.010
						(4.09)
Financing Deficit*Bond Rating						0.199
						(4.70)
N	67,200	29,802	37,398	30,144	7,198	6,655
R-Squared	0.455	0.574	0.406	0.339	0.800	0.692

Table 3

Logit regressions predicting bond ratings. The dependent variable is an indicator equal to one if the firm has a bond rating from Compustat in that year. The independent variables include the natural log of total book assets, return on assets, the fraction of total assets in property plant and equipment, the market-to-book ratio and leverage,. All explanatory variables are lagged one period. Model (2) includes indicator variables for each two-digit SIC code. The initial sample consists of 67,200 firm-year observations from the period 1971-2001. The subsample of firms used in the regressions is from 1986-2001, the time period that bond ratings are available on Compustat. z-statistics based on robust standard errors adjusted for nonindependence of observations within firms are reported in parentheses.

	Dependent Variable is one if the firm has a bond rating in that year	
Variable	Model (1)	Model (2)
Intercept	-10.048	-10.234
	(-30.91)	(-19.29)
Log (Assets)	1.212	1.238
	(25.49)	(24.75)
Return on Assets	0.028	0.237
	(0.07)	(0.57)
Property Plant & Equipment	-0.136	-0.702
	(-0.63))	(-2.44)
Market-to-Book	-0.077	-0.054
	(-2.17)	(-1.57)
Leverage	3.917	4.052
	(13.66)	(14.96)
Log(Firm Age)	0.363	0.391
	(6.36)	(6.64)
Standard Deviation of	-4.944	-5.619
Stock Returns	(-2.43)	(-2.72)
Industry Indicators	No	Yes
N	37,342	37,342
Pseudo R-Squared	0.519	0.532

Table 4.

Pooled time-series cross-section regressions of net debt issued on the current financing deficit and the squared value of the current financing deficit. Net debt issues and the financing deficit are computed using flow of funds data from Compustat. All variables are scaled by total assets at the end of the previous year. The sample consists of 67,200 firm-year observations from the period 1971-2001. In Panel A, firms are sorted into subsamples based on the predicted probability that the firm has a bond rating computed from model (1) from the logit regressions in Table 3. In Panel B, firms are sorted into subsamples based on the volatility of stock returns. t-statistics based on robust standard errors adjusted for nonindependence within firms are reported in parentheses.

Panel A. Subsamples Based On Predicted Bond Ratings

	Dependent Variable is Net Debt Issued					
Variable	Low		Medium		High	
Intercept	0.002	-0.002	-0.002	-0.002	0.000	0.001
	(2.95)	(-3.74)	(-3.69)	(-3.46)	(0.88)	(1.58))
Financing Deficit	0.299	0.529	0.611	0.676	0.750	0.793
	(25.42)	(34.81)	(37.01)	(40.45)	(55.38)	(70.93)
Squared Financing Deficit	---	-0.235		-0.090	---	-0.076
		(-12.49)		(-2.55)		(-2.83)
N	22,343	22,343	22,420	22,420	22,437	22,437
R-Squared	0.286	0.340	0.597	0.601	0.751	0.753

Panel B. Subsamples Based On The Standard Deviation Of Stock Returns

	Dependent Variable is Net Debt Issued					
Variable	Low		Medium		High	
Intercept	0.007	0.006	-0.003	-0.003	0.000	-0.003
	(14.31)	(12.77)	(-6.75)	(-7.96)	(0.42)	(-5.34)
Financing Deficit	0.737	0.722	0.471	0.663	0.395	0.614
	(40.19)	(36.63)	(37.64)	(49.87)	(24.58)	(31.40)
Squared Financing Deficit	---	0.028		-0.238	---	-0.233
		(0.53)		(-10.46)		(-8.22)
N	17,055	17,055	33,483	33,483	16,662	16,662
R-Squared	0.720	0.720	0.465	0.507	0.377	0.420

Table 5

Means of firm characteristics and regression analysis for subsamples of firms sorted into three groups based on five year average growth in assets and into three groups based on five year average profitability. The data are computed using six non-overlapping five year panels beginning in 1971 and ending in 2001. Firms are allowed to enter and exit each panel, but must have three-years of data to be included in a given panel. The five year change in the debt ratio is the difference between the ratio of long-term debt to assets at the end of each panel and the leverage ratio at the beginning of the panel. The independent variables in the regression include the natural log of total assets, the ratio of property plant and equipment to total assets, market-to-book, return on assets, and an interaction term between the return on assets and a low debt indicator variable, and the firm's leverage ratio at the beginning of the panel. All of the independent variables with the exception of the low debt indicator and the beginning of period leverage are measured as averages ovr the years the firm is in the panel. The low debt indicator variable is the difference between the firm's leverage at the beginning of the panel and the predicted value of leverage from a cross-sectional regression (based on all firms in the sample in that year) of leverage on log total assets, the ratio of property plant and equipment to total assets, market-to-book, return on assets, the predicted probability that a firm has bond rating from model (1) in Table 3, and indicator variables for each two-digit SIC code in the sample. The initial sample consists of 67,200 firm-year observations from the period 1971-2001. In panel A, the data are averaged across panels. t-statistics based on robust standard errors are reported in parentheses in panel B.

Panel A. Univariate Statistics for Moderate Growth Firms

	Five Year Change in Debt Ratio	Five Year Average Asset Growth	Five Year Average Profitability	Five Year Average Financing Deficit	Five Year Average Net Debt Issued
Low Profitability	0.036	0.097	0.033	0.061	0.022
Moderate Profitability	0.010	0.099	0.131	0.022	0.018
High Profitability	-0.014	0.104	0.212	0.000	0.007

Panel B. Regression Analysis

	Dependent Variable is the Five Year Change in Debt Ratio		
Variable	Low Growth	Moderate Growth	High Growth
Intercept	0.034	0.072	0.138
	(5.55)	(10.66)	(16.78)
Size	0.006	0.005	0.004
	(4.74)	(5.37)	(3.61)
Prop. Plant & Equip	0.082	0.104	0.138
	(6.39)	(8.54)	(11.32)
Market-to-Book	-0.009	-0.017	-0.019
	(-3.26)	(-6.06)	(-10.54)
Return on Assets	-0.149	-0.299	-0.257
	(-3.47)	(-9.06)	(-8.17)
Return on Assets*Low	-0.007	0.016	-0.043
Debt Indicator	(-0.16)	(0.54)	(-1.66)
Debt Ratio at Beginning	-0.318	-0.336	-0.439
of Panel	(-16.27)	(-16.45)	(-23.12)
N	4,467	4,471	4,470
R-Squared	0.142	0.192	0.200

Table 6

Summary statistics for subsamples of firms issuing and not issuing significant amounts of equity sorted by predicted bond rating groups. The predicted rating groups are formed based on the predicted probability of the firm having a bond rating from model (1) in Table 3. The financing deficit and net debt and equity issues computed using flow of funds data from Compustat. The financing variables are scaled by total assets at the end of the previous year. Issuers are defined as those firm-years where net equity issues exceed 5% of the firm's total assets at the end of the previous period. The initial sample consists of 67,200 firm-year observations from the period 1971-2001.

Predicted Rating Group	Low		Medium		High	
Variable	Non-issuers	Issuers	Non-issuers	Issuers	Non-issuers	Issuers
Financing Deficit/Total Assets	0.022	0.429	0.020	0.295	0.014	0.204
Net Debt Issued/Total Assets	0.025	0.031	0.024	0.031	0.020	0.036
Net Equity Issued/Total Assets	-0.003	0.397	-0.004	0.265	-0.006	0.168
Lagged Leverage	0.112	0.134	0.202	0.246	0.290	0.378
Excess Leverage	-0.080	-0.060	0.025	0.077	0.022	0.104
Change in Leverage	0.017	-0.003	0.008	-0.035	0.004	-0.051
Predicted Change in Leverage	0.027	0.290	0.015	0.166	0.005	0.074
Growth in Assets	0.106	0.498	0.100	0.443	0.083	0.332
Lagged Total Assets	17.405	16.765	82.948	85.338	2190.405	1270.262
Lagged Return on Assets	0.107	-0.024	0.138	0.101	0.143	0.114
Lagged Market to Book	1.580	3.372	1.404	2.285	1.448	1.729
Lagged Property Plant & Equipment	0.261	0.262	0.320	0.325	0.404	0.434
Age	9.168	6.260	13.864	9.809	22.042	16.570
Annual Standard Deviation of Stock Returns	0.712	0.840	0.544	0.631	0.427	0.497

Table 7

Regression analysis of market reaction to equity issue announcements. The dependent variable in the regressiosn is either the three-day cumulative abnormal returns around equity issue announcements or the dollar loss to existing shareholders scaled by proceeds of the offering. Independent variables include an indicator for firms in the low predicted bond rating group defined based on the probability of having a bond rating from model (1) in Table 3, the natural log of the issue proceeds, market-to-book, leverage, the fraction of secondary shares in the issue, and indicators for each year. Abnormal returns are estimated over the three-day period {-1,1} surrounding the issue announcement based on residuals from a market model estimated over the period beginning 220 days and ending 21 days prior to the announcement. Equity issue announcements come from the Securities Data Corporation New Issues Database and cover the years 1980-2001. Large issuers are classified as those where the proceeds from the issue are greater than 5% of total book assets measured at the end of the year prior to the issue. The initial sample consists of 67,200 firm-year observations from the period 1971-2001. t-statistics based on robust standard errors are reported in parentheses.

	All Issuers CAR {-1, +1}	Large Issuers Only CAR {-1, +1}	All Issuers Dollar Loss	Large Issuers Only Dollar Loss
Intercept	-0.044	-0.032	-0.177	-0.074
	(3.81)	(-0.91)	(-2.68)	(-0.43)
Low Predicted Rating Group	0.009	0.012	0.085	0.085
	(2.52)	(2.99)	(4.31)	(4.21)
Log(Proceeds)	0.003	0.005	0.002	0.008
	(1.96)	(2.92)	(0.31)	(0.97)
Market-to-Book Ratio	-0.002	-0.002	-0.013	-0.009
	(-2.66)	(-1.80)	(-2.84)	(-1.82)
Leverage	0.005	0.002	0.053	0.051
	(0.68)	(0.29)	(1.37)	(1.28)
Fraction Secondary Shares	-0.005	-0.015	-0.043	-0.046
	(-1.51)	(-2.80)	(-2.16)	(-1.67)
Year Dummies	Yes	Yes	Yes	Yes
N	2,275	1,932	2,126	1,840
R-Squared	0.014	0.018	0.024	0.020

Figure 1. Financing Behavior of Firms With Bond Ratings

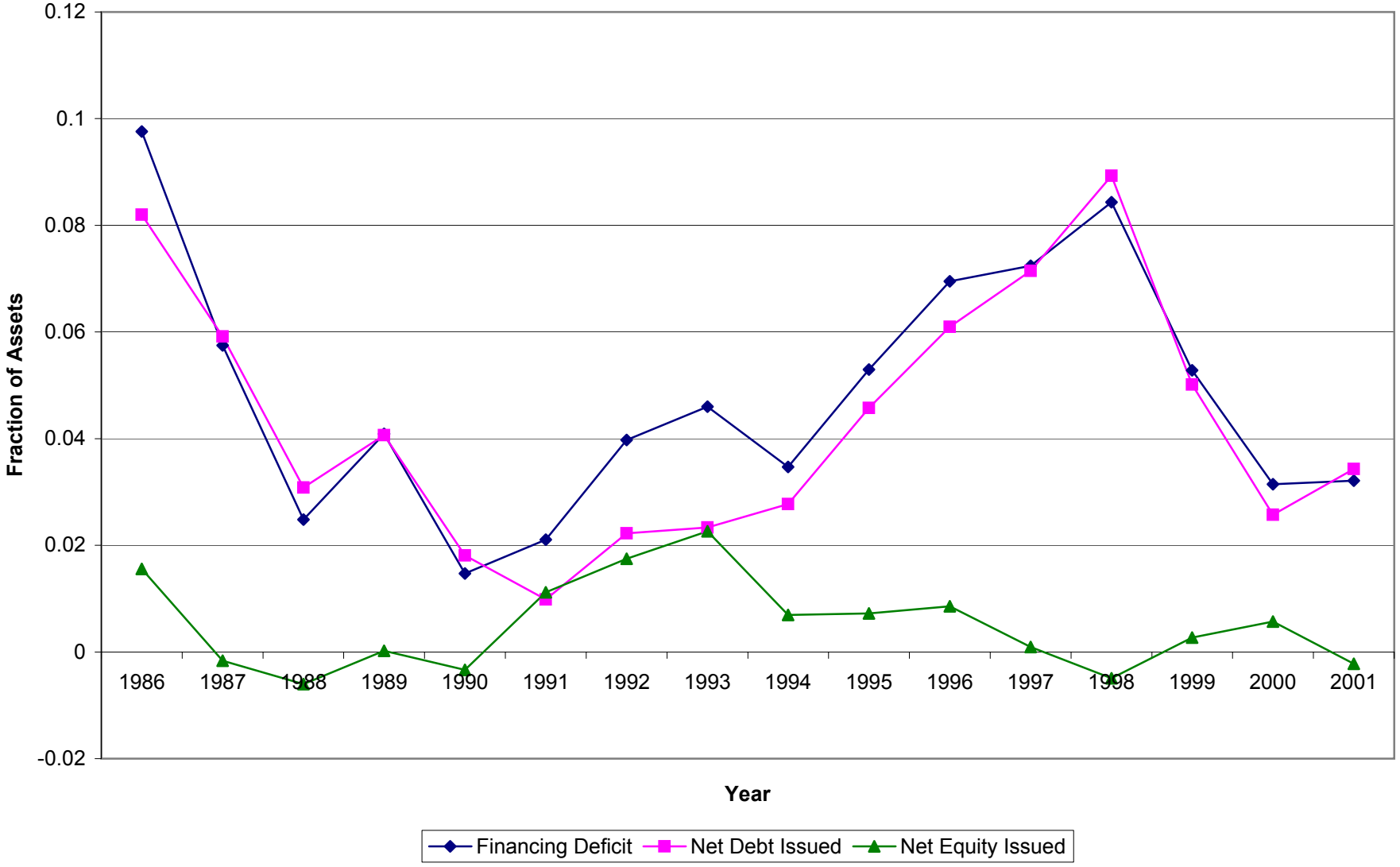

Figure 2. Financing Behavior of Firms Without Bond Ratings