Profits and Capital Structure*

Murray Z. Frank† Vidhan K. Goyal‡

October 28, 2008

ABSTRACT

It is well known that in a leverage regression, profits are negatively related to leverage. The literature (e.g., Myers, 1993; Fama and French, 2002) considers this to be a key rejection of the static trade-off theory. In this paper, we show that: 1. The literature has misinterpreted the evidence as a result of the wide-spread use of the familiar, but theoretically inappropriate, and empirically misleading use of leverage ratios. It has been a key source of confusion. 2. Empirically, consistent with the static trade-off theory, highly profitable firms typically issue debt and repurchase equity, while low profit firms typically reduce debt and issue equity. 3. Firm size matters. Large firms make more active use of debt, while small firms make more active use of equity. 4. In the trade-off model, financing decisions depend on market conditions ('market timing'). Empirically, poor market conditions have a particularly strong effect on small and low profit firms.

JEL classification: G32

Keywords: Capital structure, Trade-off theory, Profits, Agency theory, Leverage ratios

---

*We thank Raj Aggarwal, Paul Povel, Jay Ritter, Michael Roberts, and seminar audiences at Florida and Minnesota for helpful comments. Murray Z. Frank thanks Piper Jaffray for financial support. Vidhan K. Goyal thanks the Research Grants Council of Hong Kong for financial support. We alone are responsible for any errors.

†Murray Z. Frank, Piper Jaffray Professor of Finance, Carlson School of Management, University of Minnesota, Minneapolis, MN 55455. Tel.: (612) 625-5678. murra280@umn.edu

‡Vidhan K. Goyal, Department of Finance, Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong. Tel.: +852 2358-7678. goyal@ust.hk

I. Introduction

It is widely reported that in the static trade-off theory of capital structure, a more profitable firm is predicted to have a higher leverage ratio.[1] It is also well known that empirically more profitable firms tend to have lower leverage ratios. This fact – and it is a fact – is widely regarded as a particularly serious defect of the trade-off theory.[2] As a result, the static trade-off theory is widely regarded as defective[3] and so more complex theories, such as dynamic trade-off models, the pecking order theory and behavioral theories, have drawn the attention of many scholars.

When testing any theory – including the static-trade-off theory – researchers necessarily make use of a statistical structure. The results are conditional on that structure. In corporate finance, this structure is typically a linear regression that explains a leverage ratio. Intuitively plausible verbal arguments are employed to make predictions for the signs of the coefficients. This is so common that the linear regression is frequently adopted without explicit justification. Implicitly, the structure is treated as if it were innocuous. The structure is important since it highlights some features of the data and hides others. This turns out to matter for capital structure.

In this paper we show how the implicit structural assumptions have led to a misinterpretation of the evidence on how firms react to profitability. The result of this misinterpretation has been a widely held belief that typically more profitable firms reduce their debt – contrary to what is expected in the static trade-off theory. This belief is not generally correct.

To explain why this misinterpretation became widespread, we highlight two important structural issues. The first issue goes back to the theoretical question: what is the impact of some exogenous factor, x (e.g., profits) on capital structure? In a static trade-off model of capital structure, the firm will choose both debt, D, and equity E, giving a pair of first

[1] "In the trade-off model, agency costs, taxes, and bankruptcy costs push firms to increase debt as earnings increase" (Fama and French, 2002, pages 8-9).

[2] "The most telling evidence against the static trade-off theory is the strong inverse correlation between profitability and financial leverage" (Myers, 1993, page 6).

[3] "[T]here is consensus in the profession that a simple friction-free trade-off model cannot explain the evidence" (Welch, 2007, page 18).

order conditions, $D = D(x)$ and $E = E(x)$. What does the theory say the effect of x will be on D? It is the derivative, $D'(x) > 0$. What does this theory say the effect of x will be on E? It is the derivative, $E'(x) < 0$.

How does the literature test these comparative static predictions? The normal method is to form a leverage ratio, $L \equiv \frac{D(x)}{D(x)+E(x)}$. Then, a regression is estimated as $L = \alpha + \beta x$. To test the prediction $D'(x) > 0$, the empirical question is whether or not we can reject the hypothesis that $\beta > 0$. If x is profits, and the theory says that $D'(x) > 0$, then finding $\beta < 0$ is interpreted as rejecting the theory. In such regressions, profits are regularly found to be negatively related to leverage ratios and hence the common impression that the static trade-off theory is deeply defective.

What is wrong with the common impression? Running a leverage regression amounts to asking, what is the effect of x on $\frac{D(x)}{D(x)+E(x)}$? It is not $D'(x)$. Taking the derivative of the leverage ratio with respect to x, we get,

$$\frac{D'(x)}{D(x)+E(x)} - \frac{D(x)\left(D'(x)+E'(x)\right)}{(D(x)+E(x))^2}. \tag{1}$$

This does not necessarily have the same sign as D'. It depends on the sign and the magnitude of $-\frac{D(x)(D'(x)+E'(x))}{(D(x)+E(x))^2}$.

Another way to think about the problem is that in the leverage ratio, there are two possible sources of variation. Variation may operate through an effect on D, or through an effect on E. In the leverage ratio context these cannot be distinguished. Commonly the ratio is interpreted as if the effect operated through an effect on D. Empirically we find that there is much more variation from year to year in E. This is true both for book and for market based definitions of E. This makes a big difference for the interpretation of the evidence.

The second issue is better recognized in the literature – although its full impact seems not to have been recognized. In the above derivation, for simplicity, we do not draw a sharp distinction between the stocks and the flows of debt and equity. In practice, this distinction is extremely important. Going back at least to Fischer et al. (1989), it has been understood that many firms do not immediately take offsetting actions when hit by financial shocks.[4] Thus, the levels of debt and equity for a typical firm are not perfectly synchronized with the flows of debt and equity. Accordingly, to understand the impact of profits, we need to distinguish gross issuing decisions, net issuing decisions, and the levels of securities outstanding for both debt and equity.[5]

These two issues interact. The leverage ratios are appealing, in part, because they correct for firm size. However, in a world with fixed security issuance costs small firms may have a harder time justifying the expenditure of a fixed cost.[6] They may take a financing method that has a somewhat greater variable cost (e.g. equity) in exchange for avoiding the high fixed cost of issuing public debt.[7] When a scholar normalizes by total assets this difference gets hidden and empirical results then depend on other factors that determine how many of each type of firm get included in the basic regression.

Empirically, fixed costs imply that small firms use financial markets somewhat differently than do large firms. Small public firms make much greater use of equity finance when compared to otherwise similar large firms. Therefore, to understand how debt responds to profitability, it is important to distinguish between the responses of large firms and those of small firms.

Our empirical work starts with data description. We sort firms by size and by profits. Among the largest firms, the level of debt declines and the level of equity increases with profitability. By contrast, among the smallest firms, the level of debt is roughly independent of profitability, while the value of equity is clearly increasing in profits. These observations provide the underpinnings of the typical leverage ratio regression reported in the literature.

[4] Fischer et al. (1989) show that transaction costs result in firms often not responding to small shocks. This idea has been further developed in different ways by Welch (2004), Leary and Roberts (2005), Strebulaev (2007), and Bazdresch (2008) among others.

[5] A further complication is stressed by Welch (2007). Due to non-financial operating commitments, the sum of financial debt and equity is not total assets. Where non-financial commitments enter the analysis can matter in important ways. Lumping them together with financial debt can then be a further source of misunderstanding.

[6] Lee et al. (1996) provide some estimates of issuing costs.

[7] Frank and Goyal (2007b) suggest that part of what drives financing decisions seems to be something like a hierarchy, in which bank debt has low fixed cost and high variable costs, equity is in the middle, and public debt has high fixed costs but low variable costs. Bazdresch (2008) provides a model with a somewhat similar flavor.

Of course, the existing debt and equity levels are the result of past decisions (Welch, 2004). The static trade-off theory makes predictions about issuing decisions. More profitable firms should issue debt and repurchase equity. Less profitable firms should do the reverse. As stressed by Leary and Roberts (2005) the manner in which these issuing decisions translate into levels of debt and equity depends on the form and magnitude of the adjustment costs.

In the data, we show that small low-profit firms tend to reduce debt, while more profitable small firms tend to issue some debt. The patterns for equity issuances are the reverse. Small low-profit firms tend to issue equity while more profitable small firms do not issue equity. They tend to repurchase equity.

The relationship is slightly more complex for larger firms. Changes in debt are not monotonically related to profits among large firms. There is a U-shaped relationship. The non-monotonicity is driven by a relatively small number of very large firms that have reasonably high market-to-book ratios despite low current profitability. These firms typically have increases in the market value of their equity that exceed the magnitude of their debt issues. When we turn to consideration of the medians, the impact of this set of large firms is mitigated.

For large firms, at the medians, the more profitable firms issue relatively more debt, when compared to the less profitable large firms. Large firms with low profits tend to issue equity, while those with high profits repurchase equity. Thus at the medians, the patterns for large and small firms are essentially similar.

When we turn to the use of regressions we find that the basic patterns in the data are quite robust to alternative conditioning factors. More profitable firms do *borrow* more. More profitable firms also tend to repurchase equity. This is exactly what is predicted by the trade-off theory. We also find that there is some evidence of time variation in corporate financing. When times are good, firms tend to issue more debt when compared to otherwise similar firms in bad times. Small, low profit firms are particularly prone to issuing equity in good times. Large, high profit firms are particularly prone to issuing debt and repurchasing equity in good times.

There is a huge prior literature on our topic, and so we cannot review all related studies. For a recent review of the literature see Frank and Goyal (2007b). The fact that there is an inverse relationship between profitability and leverage ratios has generated a variety of responses from scholars.[8]

One common response in the literature has been to argue that the trade-off theory predictions on profitability are more complex than are those based on static models (see Strebulaev, 2007). In a dynamic trade-off model, leverage can appear to be negatively related to profitability in the data due to various frictions. Empirically, the response has been to argue that leverage and profitability are negatively related because firms passively accumulate profits (see Kayhan and Titman, 2007).[9] This implies that at rebalancing points, leverage should be positively related to profitability. Mackie-Mason (1990) shows that companies with tax loss carry forwards are more likely to issue equity. Hovakimian et al. (2001) and Gomes and Phillips (2007) show that highly profitable firms are indeed more likely to issue debt.[10]

Welch (2004, 2007) makes the important point that changes in debt and equity values and changes in debt ratios are conceptually different. This distinction also plays a role in our analysis. Welch (2007) stresses the fact that non-financial liabilities should not be treated together with financial debt. We have adopted his approach to distinguishing between financial and non-financial debt in the empirical work reported here.

This paper is organized as follows. Section II describes the construction of the data and variables and provides some summary statistics. Section III provides results from the fixed effects estimates of leverage ratios. Section IV provides the main results on debt and equity issuance regressions. Section V examines debt and equity issuances when scaled by total issuances and total capital. Section VI explores debt and equity issuance responses by firms during good and bad times. Section VII concludes the paper.

[8] A partial list of papers documenting an inverse relation include Auerbach (1985), Graham and Tucker (2006), Long and Malitz (1985), Titman and Wessels (1988), Fischer et al. (1989), Rajan and Zingales (1995), and Booth et al. (2001). Frank and Goyal (2007a) show that the inverse relation between leverage and profitability has become weaker in the recent decades.

[9] However, Chen and Zhao (2005) conclude that neither transaction costs nor taxes can properly explain the negative relation between leverage and profitability.

[10] By contrast, Jung et al. (1996) finds no relation between the likelihood of equity issuance and profitability.

II. Data

As described in Appendix B, the data are constructed from the usual Compustat and CRSP databases. Since we are using Execucomp data, we begin in 1993, and the firms are somewhat larger than the broader population of public firms.

Table I provides summary statistics for the financial variables, pay-performance sensitivity and interest rate variables. The numbers are not surprising. The average debt (in constant US$) is about $1,542 million while the median is $233 million. A significant fraction of firms have zero debt (the 10^{th} percentile is 0). Book equity is slightly larger than book debt. Market equity is more than three times larger than book debt.

If there were no fixed costs for issuing or retiring securities, then we would expect to see very many small actions and very few large actions (Leary and Roberts, 2005). If there were significant fixed costs for issuing or retiring outstanding securities, then small issues might not be worthwhile. Table I shows that although most firms issue little debt or equity in a given year, the averages are large. This suggests that when firms actually issue debt and equity, they intervene massively.

The mean constant dollar debt issue is $420 million (the median is $31 million). As a fraction of assets, the mean debt issue is 9% of assets (the median is 3%). About 32% of the firms issue no debt; 9% issue between 0 and 1% of the value of their assets as debt; another 17% issue between 1 and 5% of the value of their assets as debt; and the remaining 42% issue in excess of 5% of the value of their assets as debt.

The mean equity issue is $51 million (the median is about $5 million). As a fraction of assets, the mean and median equity issues are 3% and 0.5%, respectively. About 17% of the firms issue no equity; 47% of the firms issue between 0 and 1% of the value of their assets as equity; another 26% issue between 1 and 5% of the value of their assets as equity; and the remaining 10% of the firms issue in excess of 5% of the value of their assets as equity.

Average debt repayments are larger than are equity repurchases. This perhaps reflects the finite maturity of debt and its contractual repayment. The median firm does not repurchase equity. The median book leverage is 0.34 (the average is 0.35). The median market leverage is 0.17 (the average is 0.22).

The next step is to examine how these patterns in the data vary as the firm size and profitability vary. The possible importance of fixed costs causes us first to focus on the probability of issuing debt or equity, and only later to consider the average dollar magnitudes.

A. Frequency of Financing Activity

Table II tabulates the percentage of firms issuing or repurchasing debt and equity as classified by lagged values of firm size and profitability levels. In Table II, we employ the conventional 5% cut-off rule to exclude minor fluctuations. Firms 'issuing debt' are therefore those that issue debt (both short-term and long-term) in excess of 5% of the value of their assets. Other decisions are similarly defined using a 5% cutoff.

First we sort by firm size (Panel A, Table II). Larger firms are prone to issuing debt and to retiring debt. These forces roughly cancel each other so that large firms are neither dramatically more nor less likely to be net debt issuers than are small firms. Firm size interacts with equity issuing quite differently. Large firms are much less prone to issue equity. They are roughly equally likely to repurchase equity. As a result, small firms are much more likely to issue net equity than are large firms.

Second, we sort by profitability (Panel B, Table II). The probability of issuing debt is roughly independent of firm profitability. Similarly, there is only a weak relation between the profitability and the probability that the firm retires debt. Unlike the probability of issuing debt, the probability of issuing equity is strongly related to profitability. Low-profit firms are **much** more likely to issue equity than are high-profit firms. High-profit firms are **much** more likely to repurchase equity. Accordingly, low profitability firms are much more likely to be net equity issuers than are high profitability firms.

How do size and profitability interact? To examine this question, we first sort firms annually by firm size and then, within each size quintile, we sort firms based on profitability. The sorting is done based on firm characteristics in year t-1.

The bottom part of Table II reports results for the smallest and the largest size quintiles. Among the small firms, the likelihood of debt issuance increases with greater profitability. However, debt issuing among small firms drops in the most profitable quintile of firms. The basic point here is that there is little or no relation between profitability and the likelihood of issuing debt for smaller firms. However, larger firms are different. For larger firms, there is a fairly clear pattern of the increasing likelihood of net debt issuance with increasing profitability.

The effects of profitability on equity issuance and repurchases are much more consistent across size quintiles. As profitability increases, firms generally are less likely to issue equity and more likely to repurchase it. Equity issuance concentrates in the low profits quintile.

The last four columns consider firms that issue both debt and equity, firms that issue debt and repurchase equity, firms that issue equity and retire debt, and firms that undertake no (nontrivial) issuing activity. A small fraction of firms issue both debt and equity in the same year. By contrast, a much large fraction of firms (roughly 30 to 40%) issue neither security.

Importantly, Column (8) shows that the likelihood of issuing debt and simultaneously repurchasing equity increases with profitability. Column (9) shows that, conversely, the likelihood of issuing equity and retiring debt declines with profitability. The effects of sorting on firm size and firm profitability mirror the results reported for all firms. Again, we find that low-profit firms are less likely to issue debt and to repurchase equity; they are more likely to issue equity and retire debt. Firms with high profitability exhibit the reverse pattern.

B. Magnitude of Financing Activity

In the previous section, we considered the probability of having a nontrivial level of activity for either debt or equity. The next question is how large are the dollar values involved. In Table III, we sort the firms according to profits and then tabulate the levels and changes in both debt and equity. We do this first for all firms and then for small versus large firms.

For all firms, we observe in Column (1) that high-profit firms have less debt than do low-profit firms. This is a reflection of the well-known fact that more profitable firms have lower leverage ratios. This fact is primarily driven by large firms and it is not found among small firms. We might expect more profitable firms to have higher equity values. This pattern roughly holds in Columns (3) and (5), although there are some minor fluctuations observed. Columns (1), (3), and (5) show that firms in our sample are quite typical of what has been found in previous studies, which stands to reason because we are studying firms from the most commonly used data set for such studies.

In Column (2) of Table III, we find a potentially surprising U-shaped relationship between the change in debt and firm profitability. Medium profitability firms have smaller changes in debt than do either profitability extremes. At first, this seems surprising. However it reflects a mixing together of quite different firms.

When we sort firms by size, we see radically different behavior between small and large firms. Small, unprofitable firms reduce their debt. Large firms in the lowest profitability quintile issue lots of debt. By excluding the bottom profitability quintile of large firms, we find that the change in debt for large firms is positively related to profitability. The anomalous low-profit quintile of large firms is also reflected on the equity side (see Columns (4) and (6) in particular).

Does the large change in debt among large low-profit firms contradict the trade-off theory? The answer is not certain. According to trade-off theory, low-profit firms should reduce their debt. It appears that these firms increase their debt. However, as can be seen in Column (6), the market value of equity for these firms increases by more than does the value of the debt. In a meaningful sense, these firms are actually reducing their debt loads.

Since the U-shaped pattern is surprising, it is important to assess how typical it really is for the full sample of firms. Accordingly, in Table IV, we repeat the sorting in Table III, but now we report the median values instead of the mean values for each category. The U-shaped pattern disappears entirely. Thus, in an important sense, the U-shape is not typical. It is driven by outlier observations.

These outlier observations are not from errors in data recording. Hence, it is of interest to get a clearer sense of the large low-profit firms. We sorted this set of firms into quintiles according to the magnitude of the debt issued. (To save space we do not report these results in the form of a table.) Not surprisingly, the top debt issuers in this subset are indeed very large firms. More interestingly, despite their low profits, these large firms have fairly high market-to-book ratios (0.96 compared to 0.85 for the lowest debt issuers). It appears that, despite their low current profits, the equity market has a relatively favorable opinion of these firms, when compared to otherwise similar firms that do not issue so much debt. This makes the debt issuing somewhat less surprising.

Table III further shows that the value of equity is positively related to profits, as might be expected. Theoretically more interesting is how equity issuing relates to profits. For all firms, we find that firms in the lowest profitability quintile issue equity. As profitability rises, firms switch to being net repurchasers of equity. The greater the profits, the greater the observed equity repurchasing. While this basic pattern is found among all firms, it is particularly strong among the larger firms.

The finding that more profitable firms tend to repurchase equity is what might be expected from the basic trade-off theory. The fact that in general high profit firms tend to issue more debt is also as predicted. The existence of large debt issues by large low-profit firms is unexpected in the static trade-off theory.

Table IV illustrates an important issue concerning the use of leverage ratios. Such ratios are often interpreted as essentially reflecting the use of debt by the firm. That kind of verbal interpretation, while common, is empirically misleading. For the typical firm change in the value of equity is of an order of magnitude larger than the change in debt. For example, in the third profit quintile for large firms, the median change in debt was \$8.4 million, the change in book value of equity was \$164.4 million, and the change in the market value of equity was \$455.8 million. This suggests that the observed variation in the leverage ratios are primarily driven by the changes in equity in the denominator, rather than by changes in debt in the numerator. Since equity issues are often small, this implies that the variation in the leverage ratio must be primarily being driven by internal operations more than by external financing actions. This again points to the fact that leverage ratios can provide a misleading account of actual patterns in the data.

Table III can also be used to cast light on equation (1). Suppose that we loosely think of D' as ΔD.[11] Consider "All Firms" to be in the middle profitability category (3). Then, we see that such firms increase their debt since $\Delta D = 86.0$. If we use book value of equity for the remaining variables, then we find that $\frac{86}{4491.9} - \frac{1297.6(86+156.5)}{(4491.9)^2} = 3.55 \times 10^{-3}$. We conclude that all is well, in the sense that the adjustment does not change the sign. However, if we use the market value of equity for the remaining variables, we find that $\frac{86}{1297.6+4528} - \frac{1297.6(86+480)}{(1297.6+4528)^2} = -6.88 \times 10^{-3}$. In this case, we find that the adjustment reverses the sign. This shows that the adjustment can have a material effect on the inference. These differences can matter.

The natural next question is how well do these results hold when we condition on other familiar leverage factors. To answer this question properly requires that we move beyond simple sorting. In light of the literature, we turn to the use of regressions.

III. Estimating a Leverage Ratio

The previous literature focuses on estimates using leverage ratios. Hence, we start with a similar estimation to check whether our results match those of previous studies. Table V presents the results. Some scholars advocate book leverage ratios while others

[11] This approximation is clearly not tight from a theoretical perspective. In theory we argue against the use of leverage ratios altogether. We are using it simply to show that it is easy to get sign reversals. Such reversals can be found for average firms and not just at the tails of the empirical distributions.

advocate market leverage ratios. We report results for both. Book leverage is defined as debt over debt plus book equity. Market leverage is defined as debt over debt plus market equity.[12] Consider Columns (1) and (4) in Table V. As found by many previous studies, the coefficient on profitability is negative and statistically significant. The effect is stronger in the market-based regression (Column (4)) than in the book-based regression (Column (1)). Columns (2), (3), (5), and (6) show that the effect of profits is robust to the inclusion of past debt and to the inclusion of debt repayments and equity repurchases. This robustness will be important later when we run a pair of regressions.

The coefficients on other factors largely match what has been reported by earlier studies. A higher market-to-book ratio is associated with lower leverage. Larger firms are typically more highly levered. The coefficients on tangibility are positive when we do not include past debt or debt repayments or equity repurchases.

The conclusion from Table V is clear. The leverage regression results match results reported by previous studies.

IV. Estimating Debt and Equity Regressions

We now estimate debt and equity issuances separately instead of estimating them as a ratio. Both debt and equity issuances are functions of the same basic factors. As we are concerned about unobservable firm heterogeneity that may affect results because of a possible omitted variable bias and imprecision in the debt and equity targets, we use firm-fixed effects in all of the specifications.

The empirical model that is estimated is as follows.

[12] These leverage definitions are consistent with Welch (2007). Welch argues that commonly used leverage definitions, such as the debt-to-assets ratio, are noisy because assets include non-financial liabilities.

$$
\begin{aligned}
Ln(DebtIssuance)_t &= \alpha + \beta_1 Ln(D)_{t-1} + \beta_2 Ln(Cash)_{t-1} + \beta_3 Govt.BondYield_{t-1} \\
&\quad + \beta_4 Ln(TOTPPS^{-1})_t + \beta_5 Profitability_{t-1} + \beta_6 \left(\frac{M}{B}\right)_{t-1} \\
&\quad + \beta_7 Tangibility_{t-1} + \beta_8 Ln(Assets)_{t-1} + Firm_i + \epsilon_{i,t};
\end{aligned}
$$

$$
\begin{aligned}
Ln(EquityIssuance)_t &= \alpha + \beta_1 Ln(D)_{t-1} + \beta_2 Ln(Cash)_{t-1} + \beta_3 Govt.BondYield_{t-1} \\
&\quad + \beta_4 Ln(TOTPPS^{-1})_t + \beta_5 Profitability_{t-1} + \beta_6 \left(\frac{M}{B}\right)_{t-1} \\
&\quad + \beta_7 Tangibility_{t-1} + \beta_8 Ln(Assets)_{t-1} + Firm_i + \epsilon_{i,t}.
\end{aligned}
$$

The regressions include fixed effects. Petersen (2007) argues that standard errors produced by fixed effects are unbiased only when the firm effect is permanent. If the firm effect decays over time, standard errors are no longer unbiased and it is still important to estimate clustered standard errors. Thus, we report panel-robust standard errors adjusted for clustering at the firm level. In Table VI, Columns (1) and (2), we present estimates of the debt issues. In Columns (3) and (4), we report estimates of the equity issues.

The theory predicts that debt issues should be higher when more debt is expected to be repaid. Assuming debt repayments are increasing in past debt, debt issues will respond positively to lagged values of outstanding debt. If, on the other hand, high past debt values mean that such firms are over-levered, debt issues will respond negatively to lagged values of outstanding debt. The results in Column (1) are more supportive of this second explanation; higher outstanding debt reduces the amount of debt issues. Consistently, higher outstanding debt *increases* the amount of equity issuances.

More directly, one can examine actual debt repayment and equity repurchases during the year. We expect increasing amounts of debt and equity payments to trigger larger issue responses. Thus, in Column (2), we use a specification similar to that in Column (1), but replace $Debt_{t-1}$ with the log of debt repayment and the log of equity repurchases. In this case, the results show that debt issuances are positively related to both debt repayments and equity repurchases. Column (4) shows that equity issuances are larger when firms repay debt. But equity issuances are unrelated to equity repurchases. The coefficient estimates suggest that debt and equity issue responses are greater when firms repay debt than when firms repurchase equity.

We expect firms with greater beginning-of-period cash balances to issue less debt and less equity. Consistent with this prediction, we find that lagged cash balances negatively affect both debt and equity issuances. However, the coefficients on lagged cash balances in the equity issuance regression are not different from zero at conventional levels.

The cost of funds should affect debt and equity issuances. The opportunity cost of funds is proxied by yield on 10-year Treasury bonds. The government bond yield has opposite effects on debt and equity issues. Firms issue more debt and less equity when the yield on government bonds is higher. Perhaps higher government bond yields are a signal of worsening economic performance and of a reduction in expected growth opportunities. This may explain why bond yields positively affect debt issues and negatively affect equity issues.

Agency effects are often lumped in the trade-off theory. In order to reflect a possible role for such effects we include pay-for performance sensitivities. We find opposite signs on the pay-performance sensitivities. The results suggest that higher pay-performance sensitivity results in more debt and less equity issues. However, the effects are fairly weak.

We now report results on the leverage factors. As stated above, four factors are included in these tests: (i) profitability, (ii) the market-to-book assets ratio, (iii) tangibility of assets, and (iv) firm size (measured by the log of assets). Rajan and Zingales (1995) show that these factors are related to leverage in G7 countries. A number of studies have used these factors to estimate leverage targets. Frank and Goyal (2007a) show that these factors are robustly related to leverage in the US. In addition, we include firm fixed effects since recent work by Lemmon et al. (2007) suggests persistence in capital structures and the importance of firm fixed effects in explaining cross-sectional variation in leverage.

Firm fixed effects control for unobservable firm characteristics which may affect leverage targets and hence debt and equity issuances.

The results in Columns (1) and (2), which examine debt issues, show that profits *positively* affect debt issuances. The effects are large and statistically significant at the 1% level. Columns (3) and (4), which examine equity issues, show negative effects of profitability on equity issues but the effects are weak. This confirms our basic claim that inferences based on leverage ratios can substantially differ from inferences made on debt and equity separately.

Continuing with our analysis of the results on leverage factors, we note that the market-to-book ratio *positively* affects both debt issues and equity issues. In the existing literature, it is common to find a negative relation between the market-to-book ratio and leverage.[13] Although the market-to-book ratio increases both debt and equity issuances, the effects are much larger on equity than on debt. We conjecture that the negative relation between the leverage ratio and the market-to-book ratio reflects the relative magnitudes of debt and equity responses triggered by changes in growth opportunities.

The results show that asset tangibility positively affects debt issues but negatively affects equity issues. The effects of tangibility on equity issues are weak. Finally, we note that firm size as measured by the natural log of assets positively affects both debt and equity issuances. These are large and statistically significant effects. The effect of firm size is substantially larger on debt issuances than it is on equity issuances, which may explain the commonly observed positive relation between firm size and leverage ratios.

We perform a number of robustness tests to validate these findings. First, we estimate specifications similar to those examined in Table VI but with both lagged outstanding

[13] The market-to-book ratio is commonly considered as a proxy for growth opportunities. Growth firms are expected to finance with relatively more equity to avoid debt-related agency conflicts (Myers, 1977). A number of previous studies has found a negative relation between leverage and growth opportunities (see Smith and Watts, 1992; Rajan and Zingales, 1995; Hovakimian et al., 2001; Goyal et al., 2002; Barclay et al., 2006; Frank and Goyal, 2007a). The market-timing literature also predicts a negative relation between the market-to-book ratio and leverage (Baker and Wurgler, 2002). Flannery and Rangan (2006), Kayhan and Titman (2007), and Liu (2007) suggest that it is difficult to disentangle the effect of growth opportunities and market timing in cross-sectional regressions of the market-to-book ratio on leverage. Graham and Harvey (2001) provide a very useful survey of executive's opinions about the importance of various factors.

debt and debt repayments and equity repurchases. In unreported results, we note qualitatively identical results to those reported here. Second, we replace the yield on 10-year government bonds with the yield on Moody's Baa corporate bonds. We find that the yield on Baa debt negatively effects equity issues, similar to the results reported earlier. However, in contrast to findings reported above, the effect of cost of funds on debt issues is negative but statistically insignificant. The negative sign on the Baa bond yield in these regressions is consistent with the predictions of the model. None of the other conclusions is affected by this replacement.

We also examine a larger sample of firms for which we do not require the intersection of Compustat with Execucomp firms. A focus on the broader Compustat sample increases comparability with previous studies. However, this implies dropping the pay-performance sensitivity variable from consideration because this variable cannot be estimated for non-Execucomp firms. The sample sizes are much larger; we now have 62,148 firm-year observations compared to 16,717 reported in Table I. Even with this larger sample, we report results that are very similar to those reported earlier. If anything, the significance levels increase. An example is the positive effect of tangibility on debt issues, which is highly significant in the larger sample.

Overall, the results from the debt and equity issuance regressions are largely consistent with the trade-off theory. The coefficient estimates on the leverage factors generate several interesting results. Profits *positively* affect debt issuances. Equity issues show a weak negative relation to profits. The market-to-book positively affects both debt and equity issuances but the effects on equity issues are significantly larger than on debt issues. Firm size positively affects debt and equity issuances, but the effects on debt issues are larger than on equity issues. Tangibility positively affects debt issues and negatively affects equity issues.

V. Is Scaling Empirically Important?

In the preceding section, we provided results for unscaled debt and equity issues. This seems appropriate to us. However it involves making two changes relative to past practice. We would like to determine if both changes are crucial. Accordingly, in this section, we take a step back to consider prior literature which scales variables.

The questions are, how does scaling affect the results and why. We consider two scaling variables in this section. In the first set of regressions, we scale debt and equity issues by total issues. In the second set of regressions, we scale debt and equity issues by total capital (debt plus book equity).[14]

Columns (1) to (4) of Table VII provide results from specifications that are similar to those in the previous section with the difference that debt issues and equity issues are expressed as a fraction of the aggregate issues. Focusing first on the debt issue to total issue regressions in columns (1) and (2), we notice two differences between the unscaled versions in Table VI and the scaled versions in Table VII. First, we find that the coefficient estimates on the pay-performance sensitivity now become highly significant. They are insignificant in the unscaled version. Second, the market-to-book ratio loses its significance.

Scaling, however, has a more serious impact on our inferences on equity issues. There are both changes in sign and changes in significance. First, the sign on the past cash balance changes. It turns from being negative and insignificant to being positive and significant. Second, the signs on debt repayments and equity repurchases change from being positive in the unscaled version to negative and significant in the scaled version. Third, the significance levels on the pay-performance sensitivity and profitability increase; they turn from being insignificant in the unscaled regressions to highly significant in the scaled versions. Fourth, the significance on the market-to-book ratio declines; it now becomes insignificant. Fifth, the significance on tangibility increases; it becomes highly

[14]More than a century ago the famous statistician Pearson pointed out that scaling two independent variables by the same third variable, induces spurious correlation. Barraclough (2007) points out that this idea extends to capital structure regressions. If you scale both the right hand and left hand side variables in a regression by the same variable, that can induce a spurious correlation.

significant in the scaled version. Finally, the effect of firm size on equity issues reverses. Firm size positively affects unscaled equity issues but the effect becomes negative and significant in the scaled version. Scaling has large and complex effects on both the signs and significance levels.

In Columns (5) to (8), we examine debt and equity issues scaled by the total capital (debt plus book equity). Again, we find differences between these results and those in Table VI.

This section shows that scaling indeed matters. Whether or not it is appropriate to scale or not, depends on the theory being tested. Despite the wide use of scaling, we are not aware of an explicit model of the trade-off theory in which scaling is appropriate.

VI. Are Financial Market Conditions Important?

Proponents of market timing believe that financing decisions ought to depend on market conditions. This should also be observed in a trade-off theory. In order to test this, we require a definition of good times and bad times. Our empirical strategy is to estimate good times versus bad times at the level of 4-digit industry. We define an industry as having "good times" if the median firm in that industry has a market-to-book that is higher than the 67^{th} percentile of the time-series distribution of the industry median market-to-book ratios. Conversely, an industry is defined as having bad times if the median firm in the industry has a market-to-book ratio that is lower than the 33^{rd} percentile of the time-series distribution of the industry median market-to-book ratios.

Panel A of Table VIII tabulates issuance activity for profitability sorts in both good times and in bad times. While the patterns of debt and equity issuances are similar during the two periods, issuance activity is significantly more pronounced during good times.

Panel B reports the issuance activity for the smallest and the largest firm during the good times and bad times. Within each size quintile, firms are sorted on profitability. We find that small, low-profit firms are more likely to issue equity in good times than in bad times. Debt issuances are significantly higher in good times. Large, high-profit firms are significantly more likely to issue debt and repurchase equity in good times than in bad times.

Panel C reports median values of the levels and changes in debt and equity. Large firms have significantly more debt compared to small firms. During bad times, large firms retire substantial amounts of debt. During good times, large firms raise significant amounts of debt. Most large firms are much less affected by the state of the market. As their profitability improves, the median large firms buys equity in both periods. The least profitable small firms makes larger issue of equity in good times than in bad times.

Table IX estimates debt and equity issuances in good and bad times. In most cases, the results in good times are quite similar to the results in bad times. The effect of profitability on debt issues is stronger in bad times than in good times. In good times, profitability has a negative impact on equity issues but in bad times profitability has a positive impact on equity issues. In other words, more profitable firms seem to avoid issuing equity in good times, but they are more willing to issue equity in bad times. We also find that equity issuances in bad times are strongly related to debt repayments. In good times, the effect of debt repayment on equity issuance is weak.

As a matter of theory, the static trade-off theory implies time-varying capital structure choices even when the target is time invariant. Table IX show that, as an empirical matter, profitability has a time-varying impact on leverage choices.

VII. Conclusion

The empirical relationship between profits and corporate use of debt finance has been widely misinterpreted. More profitable firms tend to issue more debt and they tend to repurchase equity. Firm size matters. Larger firms tend to be more active in the debt markets while smaller firms tend to be more active in the equity markets.

What do these facts mean for theory? It depends on what one is prepared to assume. We use a particularly simple empirical strategy. We estimate a pair of linear regressions: one explaining debt issuance and the other explaining equity issuance.

Empirically we find that there is a particular group of firms that has had a big influence on the common rejection of the trade-off theory. Large, low-profit firms typically have high debt levels and they often increase their debt by quite a bit despite their low profit status. However, these firms experience an even larger increase in the market value of their equity. Apparently, the market is expecting significant future profits from these firms despite low current profits. Thus, if the market is correct on average, the debt issuance by these firms may not be so surprising.

Overall, the empirical evidence on issuance seems rather easy to understand from the perspective of the static trade-off theory. Firms with more profits are less likely to issue equity, and more likely to repurchase equity. Firms with more profits do tend to issue debt. Market conditions also seem to have a fairly natural effect on issuance. The effect of bad market conditions is particularly strong on small and low-profit firms. Larger firms and more profitable firms are less strongly affected.

References

Aggarwal, R.K., and A.A. Samwick, 2003, Performance incentives within firms: The effect of managerial responsibility, *Journal of Finance* 58, 1613–1649.

Auerbach, A.J., 1985, Real determinants of corporate leverage, in B.M. Friedman, (ed.) *Corporate capital structures in the United States* (University of Chicago Press, Chicago, IL).

Baker, M., and J. Wurgler, 2002, Market timing and capital structure, *Journal of Finance* 57, 1–32.

Barclay, M.J., E. Morellec, and Jr. C.W. Smith, 2006, On the debt capacity of growth options, *Journal of Business* 79, 37–59.

Barraclough, K., 2007, Scaling regression equations: Solution or problem? Working Paper, Vanderbilt University.

Bazdresch, S., 2008, Financial lumpiness and investment Working Paper, University of Minnesota.

Booth, Laurence, Varouj Aivazian, Asli Demirguc-Kunt, and Vojislav Maksimovic, 2001, Capital structures in developing countries, *Journal of Finance* 56, 87–130.

Chen, L., and X. Zhao, 2005, Profitability, mean reversion of leverage ratios and capital structure choices, working paper, Michigan State University and Kent State University. **URL:** *http://ssrn.com/abstract=614082*

Core, J.E., and W.R. Guay, 2002, Estimating the value of employee stock option portfolios and their sensitivities to price and volatility, *Journal of Accounting Research* 40, 613–630.

Fama, E., and K.R. French, 2002, Testing trade-off and pecking order predictions about dividends and debt, *Review of Financial Studies* 15, 1–33.

Fischer, E., R. Heinkel, and J. Zechner, 1989, Dynamic capital structure choice: theory and tests, *Journal of Finance* 44, 19–40.

Flannery, M., and K. Rangan, 2006, Partial adjustment towards target capital structures, *JFE* 79, 469–506.

Frank, M.Z., and V.K. Goyal, 2007a, Capital structure decisions: Which factors are reliably important?, working Paper, University of Minnesota and HKUST.

Frank, M.Z., and V.K. Goyal, 2007b, Trade-off and pecking order theories of debt, in B.E. Eckbo, (ed.) *Handbook of Corporate Finance: Empirical Corporate Finance, Vol. 2. In: Handbook of Finance Series, Chapter 12*, – (Elsevier/North-Holland, Amsterdam).

Gomes, A.R., and G.M. Phillips, 2007, Private and public security issuance by public firms: The role of asymmetric information, washington University and University of Maryland Working Paper.

Goyal, V.K., K.M. Lehn, and S. Racic, 2002, Growth opportunities and corporate debt policy: the case of the U.S. defense industry, *Journal of Financial Economics* 64, 35–59.

Graham, J.R., and C. Harvey, 2001, The theory and practice of corporate finance: evidence from the field, *Journal of Financial Economics* 60, 187–243.

Graham, J.R., and A.L. Tucker, 2006, Tax shelters and corporate debt policy, *JFE* 81, 563–594.

Holmstrom, B., and P. Milgrom, 1987, Aggregation and linearity in the provision of intertemporal incentives, *Econometrica* 55, 303–328.

Hovakimian, A., T. Opler, and S. Titman, 2001, The debt-equity choice, *Journal of Financial and Quantitative Analysis* 36, 1–24.

Jensen, M.C., and W.H. Meckling, 1976, Theory of the firm: managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305–360.

Jung, K., Y. Kim, and R. Stulz, 1996, Timing, investment opportunities, managerial discretion, and the security issue decision, *Journal of Financial Economics* 42, 159–185.

Kayhan, A., and S. Titman, 2007, Firms' histories and their capital structures, *Journal of Financial Economics* 83, 1–32.

Leary, M.T., and M.R. Roberts, 2005, Do firms rebalance their capital structures?, *Journal of Finance* 60, 2575–2619.

Lee, I., S. Lochhead, Ritter J.R., and Q. Zhao, 1996, The costs of raising capital, *Journal of Financial Research* XIX, 59–74.

Lemmon, M.L., M.R. Roberts, and J.F. Zender, 2007, Back to the beginning: Persistence and the cross-section of corporate capital structure, *Journal of Finance, Forthcoming* .

Liu, Xiaolei Laura, 2007, Do firms have target leverage ratios? evidence from historical market-to-book and past returns, working paper, HKUST.

Long, M.S., and I.B. Malitz, 1985, The investment-financing nexus: Some empirical evidence, *Midland Finance Journal* 53–59.

Mackie-Mason, J.K., 1990, Do taxes affect corporate financing decisions?, *Journal of Finance* 45, 1471–1493.

Myers, S.C., 1977, Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147–175.

Myers, S.C., 1993, Still searching for optimal capital structure, *Journal of Applied Corporate Finance* 6.1, 4–14.

Petersen, M., 2007, Estimating standard errors in finance panel data sets: Comparing approaches, *Review of Financial Studies* forthcoming.

Rajan, R., and L. Zingales, 1995, What do we know about capital structure: Some evidence from international data, *Journal of Finance* 50, 1421–1460.

Smith, C.W., and R.L. Watts, 1992, The investment opportunity set and corporate financing, dividend and compensation policies, *Journal of Financial Economics* 32, 263–292.

Strebulaev, I.A., 2007, Do tests of capital structure theory mean what they say?, *Forthcoming, Journal of Finance* .

Titman, S., and R. Wessels, 1988, The determinants of capital structure choice, *Journal of Finance* 43, 1–21.

Welch, I., 2004, Capital structure and stock returns, *Journal of Political Economy* 112, 106–131.

Welch, I., 2007, Common flaws in empirical capital structure research Working Paper, http://ssrn.com/abstract=931675.

Appendix A. A Simple Static Trade-Off Model

When estimating linear regressions implicitly it is assumed that the main theoretical relationships are in fact linear, or nearly so. In this paper we have estimated a pair of linear regressions, one for debt issues and one for equity issues. This naturally raises the question of whether it is possible to provide a theoretical justification. In this appendix we show that it can be done within a static tradeoff agency-theoretic setting.[15] In this model, the Board of Directors chooses the executive compensation package while the CEO chooses debt issues and equity issues.

The Firm. The firm's revenue is given by $p(I - \frac{1}{2}I^2)$ where p is the output price (assumed to be greater than 1) and I is the level of investment. Investment $I = D + E + C - B$, where D is debt issued, E is equity issued, C is cash, and B is the payment due on the outstanding bonds. Outside investors are risk-neutral and the opportunity cost of funds is β. There is a random noise term, ε, with a variance of σ^2.

The target debt for the firm (D^*) is exogenous, as is the target equity (E^*). We assume that the firm would like to be close to its debt and equity targets. The firm bears a cost that is a function of the distance from the target. For analytic simplicity, the cost function is assumed to be quadratic. If there were no agency problem, then the firm's problem would be:

$$\max_{D,E}\ p(I - \frac{1}{2}I^2) - \beta(D+E) - \frac{1}{2}(D-D^*)^2 - \frac{1}{2}(E-E^*)^2 + \varepsilon \qquad \text{(A1)}$$
$$\text{s.t. } I = D + E + C - B.$$

Here, the costs are assumed to be symmetric. This is not essential. More generally, we could replace $\frac{1}{2}(D-D^*)^2$ with $\frac{k_D}{2}(D-D^*)^2$, and $\frac{1}{2}(E-E^*)^2$ with $\frac{k_E}{2}(E-E^*)^2$ where k_D and k_E become parameters that need to be estimated. The model that we are actually analyzing amounts to an assumption that $k_D = k_E = 1$.

The targets are exogenous to the model. This is easily generalized as follows. Suppose that there is a set of exogenous factors, denoted f_i, that determines the target values in a linear manner. Then, we have

$$D^* = a_0 + \sum_i a_i f_i \text{ and } E^* = b_0 + \sum_i b_i f_i. \qquad \text{(A2)}$$

These expressions can be substituted for D^* and E^* without fundamentally changing the analysis that follows. When empirically testing the model, we make use of this substitution.

[15]Different scholars seem to use the term "static-trade-off" to means some what different ranges of models. There is a range of costs and benefits that are commonly included within the static trade-off framework (Frank and Goyal (2007b)). Since Jensen and Meckling (1976), agency conflicts have been widely regarded as potentially important for the firm's choice of capital structure. Most scholars include agency costs within the static trade-off family of models (e.g., Fama and French, 2002).

It is worth stressing the fact that we are assuming the target takes the form of a pair of numbers one for desired debt level (D^*) and another for the desired equity level (E^*). This is not innocuous, nor is it accidental. It is done for simplicity. The obvious alternative would be to instead assume that there is actually a target leverage ratio (L^*). Unfortunately that leads to analytical problems.[16]

The Manager. The firm is actually being run by a manager who earns a wage, $W = w + \alpha\pi$, where w is a fixed base salary, α is the pay-for-performance component, and π is the corporate profit.[17] The manager has a coefficient of risk aversion denoted by r. The manager has a per-unit agency cost of debt denoted as δ and a per-unit agency cost of equity denoted as γ. The manager chooses debt (D) and equity (E) to maximize the certainty equivalent (CE) of income . This is given by

$$CE = w + \alpha[\, p(I - \frac{1}{2}I^2) - \beta(D+E) - \frac{1}{2}(D - D^*)^2 - \frac{1}{2}(E - E^*)^2] - \delta D - \gamma E - \frac{r}{2}\alpha^2\sigma^2.$$

The first-order conditions for the manager are

$$\frac{\partial CE}{\partial D} = 0\,, \frac{\partial CE}{\partial E} = 0.$$

It is assumed that the second-order conditions are satisfied and that the parameters are in the range with an interior solution. To simplify the notation, we define $A_0 = (1 - (\frac{p}{1+p})^2)$, $A_1 = (\frac{p}{1+p})$, and $A_2 = (\frac{1}{1+p})$.

By solving the first-order conditions, we get:

$$\begin{aligned} D &= A_0A_1(1-A_1)(1+B-C) + A_0A_2(D^* - A_1E^* + (\gamma A_1 - \delta)\frac{1}{\alpha} + (A_1 - 1)\beta) \quad \text{(A3)} \\ E &= A_0A_1(1-A_1)(1+B-C) + A_0A_2(E^* - A_1D^* + (\delta A_1 - \gamma)\frac{1}{\alpha} + (A_1 - 1)\beta). \end{aligned}$$

These equations provide an obvious empirical specification,

$$\begin{aligned} D &= d_0 + d_1B + d_2C + d_3\beta + d_4D^* + d_5E^* + d_6\frac{1}{\alpha} + \varepsilon_d; \quad \text{(A4)} \\ E &= e_0 + e_1B + e_2C + e_3\beta + e_4D^* + e_5E^* + e_6\frac{1}{\alpha} + \varepsilon_e. \end{aligned}$$

If the model is valid, what do we expect to find when we estimate equation (A4)? The predictions can be described in the following manner:

[16] If we assume a quadratic penalty function, we can set the problem as choosing D and E to maximize $\pi = p(I - \frac{1}{2}I^2) - \beta(D+E) - \frac{1}{2}(\frac{D}{D+E} - L)^2$. Then the first order conditions are $\frac{\partial \pi}{\partial D} = p + Bp - Cp - \beta - pD - pE + \frac{LDE - DE + LE^2}{D^3 + E^3 + 3DE^2 + 3D^2E} = 0$ and $\frac{\partial \pi}{\partial E} = p + Bp - Cp - \beta - pD - pE + \frac{D^2 - LDE - LD^2}{D^3 + E^3 + 3DE^2 + 3D^2E} = 0$. Solving these simultaneously for D and for E does not provide a nice regression structure.

[17] This functional form is often attributed to Holmstrom and Milgrom (1987); it has also been used by Aggarwal and Samwick (2003)

Hypothesis 1 *Debt issues are increasing with the payments due on outstanding bonds ($d_1 > 0$), the debt target ($d_4 > 0$), and decreasing with cash ($d_2 < 0$), the opportunity cost of funds ($d_3 < 0$), and the equity target ($d_5 < 0$). Equity issues are increasing with existing debt ($e_1 > 0$), and the equity target ($e_5 > 0$), and decreasing with cash ($e_2 < 0$), the opportunity cost of funds ($e_3 < 0$), and the debt target ($e_4 < 0$).*

We do not directly observe the targets for debt and equity. Instead we use conventional proxy variables as in equation (A2). In equation (A4), we will have opposite signs on the coefficients on D^* and E^*. It is natural to model the target debt and equity as functions of factors as in equation (A2). Doing so gives us

$$\begin{aligned} D &= (d_0 + d_4 a_0 + d_5 b_0) + d_1 B + d_2 C + d_3 \beta + \sum_i (d_4 a_i + d_5 b_i) f_i + d_6 \frac{1}{\alpha} + \varepsilon_d \qquad \text{(A5)} \\ E &= (e_0 + e_4 a_0 + e_5 b_0) + e_1 B + e_2 C + e_3 \beta + \sum_i (e_4 a_i + e_5 b_i) f_i + e_6 \frac{1}{\alpha} + \varepsilon_e. \end{aligned}$$

In equation (A5), the estimated coefficients on f_i are mixes of deeper parameters that are not restricted by the model.

The coefficients d_6 and e_6 can have either sign when considered individually. However, recall that $A_1 = \frac{p}{1+p} < 1$. Thus if there are strictly positive agency costs (i.e., $\delta > 0$ and $\gamma > 0$), then we have:

Hypothesis 2 *The signs of d_6 and e_6 depend on $(\gamma A_1 - \delta)$ and $(\delta A_1 - \gamma)$. A greater agency cost of debt is associated with reduced debt ($\frac{\partial D}{\partial \delta} < 0$) and increased equity ($\frac{\partial E}{\partial \delta} > 0$). A greater agency cost of equity is associated with increased debt ($\frac{\partial D}{\partial \gamma} > 0$) but reduced equity issues ($\frac{\partial E}{\partial \gamma} < 0$). If we assume that agency costs are strictly positive, then d_6 and e_6 have opposite signs.*

If d_6 and e_6 have the same sign, that would be evidence against the model.

Leverage Ratio. Suppose that the model is correct, but we estimate

$$\frac{D}{D+E} = c_0 + c_1 B + c_2 C + c_3 \beta + \sum_i c_i f_i + c_6 \frac{1}{\alpha} + \varepsilon_l. \qquad \text{(A6)}$$

When we estimate equation (A6), what will we find? Essentially, we will find a mess.

To see the problem, consider, for instance, the effect of past debt (B) on debt issues. In equation (A4), we have the parameters $d_1 > 0$ and $e_1 > 0$. But, in the leverage ratio form, we have,

$$\frac{\partial(\frac{D}{D+E})}{\partial B} = \frac{(-A_1 - 1)(\delta - \gamma - \alpha D^* + \alpha E^*)\, \alpha A_1 A_2}{(\gamma A_2 - 2\alpha A_1 + \delta A_2 - 2B\alpha A_1 + 2C\alpha A_1 + 2\alpha\beta A_2 - \alpha A_2 D^* - \alpha A_2 E^*)^2 (A_1 - 1)}.$$

This can be reduced to the sign of $(\delta - \gamma - \alpha D^* + \alpha E^*)$. If this term is positive, then the expression is positive overall. If it is negative, then it is negative overall.

This shows that $\frac{D}{D+E}$ is a complex expression when debt and equity are chosen optimally. In the leverage ratio, all of the exogenous parameters appear in both the numerator and in the denominator along with the parameters. As a result of the complexity, the predictions on the leverage ratio are not guaranteed to match the intuition, which is guided by the direct comparative statics. The problem will re-emerge routinely when theory suggests a first-order condition for debt as well as a first-order condition for equity while the empiricist estimates a complex ratio rather than estimating each of the equations directly.

An interesting aspect of the model is that all of the comparative statics depend crucially on p, the output price. Accordingly, it is possible to test what happens to the predictions when p changes. The empirical version of this requires us to distinguish good times from bad times (the periods of high p versus those with low p). The model predicts that the adjustments to debt and equity in response to exogenous changes will differ in good times and in bad times.

When the partial derivatives have the same sign as the original comparative static, we say that, in good times, the firm reacts more strongly. When the partial derivative has the opposite sign, we say that in good times the firm's reaction is smaller (closer to zero).

Hypothesis 3 *In good times, the firm's debt issuing decisions and the firm's equity issuing decisions will react less strongly to the opportunity cost of funds (β), the debt target (D^*), the equity target (E^*), the agency cost of debt (δ), and the agency cost of equity (γ).*

The intuition seems to be that, when times are good, the revenue effects are relatively more important. When times are not so good, the cost impacts loom larger. The expressions underlying this hypothesis are in the Appendix **??**. These results can be tested by examining whether firms adjust more rapidly in good times (high p) or in bad times (low p).

As noted in the introduction, many well-known papers have verbally hypothesized that within the static trade-off theory, greater profits should induce greater debt to shield the profits. In equation (A3) we present the solutions of the model for the choices of debt and equity. Yet profits does not appear as an explanatory variable. This is no accident.

Profits are a mix of other variables such as demand for output and the opportunity costs of resources to be used in production. Profit itself is not a natural exogenous variable. Accordingly natural theories will make predictions about how these deeper factors affect debt and equity choices. A possible, and perhaps not unreasonable, reaction would be to say simply that the static trade-off theory does not make a clear cut prediction for how profits affects debt.

Yet there really is a very strong intuition behind the verbal tradition of hypothesizing that in the static trade-off theory profits should have a positive affect on debt (Myers (1993) and Fama and French (2002)). How can we reconcile the verbal tradition with our model? The model offers two natural attempts.

The first method is to take advantage of time sequencing. In this approach we would acknowledge that profits are not properly exogenous at a moment in time. However last year has already taken place. It is predetermined from our current point of view. It can thus be taken to be exogenous.

However in a static model "last period" does not easily fit. In the model C is cash. Implicitly it comes from the past, and in a sense we might imagine that firms with high values of C are firms that have accumulated high book profits in the past. Unfortunately this method does not match the usual interpretation because C are profits that have already been successfully shielded from taxation and from agency abuse. Greater C implies lower debt issues. Taking the first difference of C will not help much either. So this method does not seem to work well.

The second method is to take advantage of equation A2. If we simply accept the verbal tradition, we can directly substitute profits as an f_i with a positive impact coefficient on debt (a_i) and a negative coefficient on equity (b_i). In that case equation A5 becomes critical to seeing how profits affects things. The impact of profits on debt issues will be be a weighted sum of the two coefficients as illustrated by the expression $(d_4a_i + d_5b_i)f_i$ and the corresponding expression for the impact on equity.

This matters. It means that even if we are prepared to directly accept the verbal hypothesis that profits has the usually asserted effect on the financing targets, the impact on debt issues and on equity issues is still not simple. It rests on a weighted sum of two terms that may plausibly have the opposite sign. To then make a prediction requires the further judgement that the one effect is more powerful than the other. Such a judgement does strike us as plausible. But it is a judgement rather than a clear cut prediction of the theory.

Appendix B. Data Construction

We use conventional data sources, starting with the merged Compustat-CRSP data. The data are annual and are converted into constant 2000 dollars using the GDP deflator. We exclude financial companies (SIC 6000-6999), firms involved in major mergers (Compustat footnote code AB) and firms with missing book value of assets. The resulting sample is merged to the Execucomp files for CEO compensation data. The merge results in a sample of 16,717 firm-year observations from 1993-2004. The ratio variables (described below) are winsorized at the 0.50% level in both tails of the distribution. This serves to replace outliers and the most extremely misrecorded data.

Debt and equity issuances: Debt issues include both long-term debt issuance (item #115) and increases in current debt (item # 301^+). Equity issues include sale of common stock (item #108).

Payments due on bonds outstanding: We consider two alternative proxies for payments due on bonds outstanding. The first is the debt repayments estimated as the reduction of long-term debt (item #114) and the decline in current debt (item # 301^-). An alternative proxy is the lagged debt outstanding (item #9 + item #34). Debt repayments are expected to be increasing in the amount of existing debt.

Available cash: Cash available is the beginning-of-period cash and marketable securities (item #1).

Leverage factors: The debt and equity targets are a function of leverage factors following the previous capital structure literature (see, for example, Rajan and Zingales (1995) and Frank and Goyal (2007a)). The factors include (i) profitability, (ii) the market-to-book ratio, (iii) tangibility of assets, and (iv) firm size. Profitability is defined as the ratio of operating income before depreciation (item #13) to assets (item #6). The market-to-book ratio is defined as the ratio of the market value of assets (market value of equity + debt + liquidation value of preferred stock - deferred taxes) to book assets. Finally, tangibility is defined as the ratio of net property, plant and equipment (item #8) divided by assets (item #6). Firm size is defined as the natural log of assets (item #6).

Costs of funds: The opportunity cost of funds is measured by the ten-year government bond rate. Interest rates are from the Federal Reserve files (`http://www.federalreserve.gov/releases/`). An alternative measure of the opportunity cost of funds, yield on Baa corporate bonds, yields similar results.

Pay-Performance Sensitivity: We value new option grants to CEOs using the modified Black-Scholes method. Execucomp provides the option exercise price (EXPRIC), stock price volatility over a 60-month period (BS_VOLAT), and the average dividend yield over a three-year period (BS_YIELD). Option maturity is the time in years between the option expiration date (EXDATE) and the option grant date, rounded to the nearest whole year. Options are assumed to be granted on July 1 of the particular year. The risk-free rates corresponding to various option maturities are read-off the Treasury yield curve, constructed monthly from the historical interest rate provided by the Federal Reserve Statistical Release. The data can be downloaded from `http://132.200.33.130/releases/h15/data.htm`. Yield on one-year bond is used for options maturing in one year; yield on two-year bonds is used for options maturing in two years; three year bond yield for options maturing in three years; five year bond yield for options maturing between four and five years; seven year bond yield for options maturing between six and eight years; 10 year bond yield for options maturing beyond nine years. The fiscal-end closing stock price is from CRSP.

Unexercised options are valued based on the approximation method in Core and Guay (2002). The method requires an estimate of the average exercise price for unexercised exercisable options. This is done by computing the ratio of the realizable value of in-the-money exercisable options (INMONEX) and the number of unexercised exercisable options (UEXNUMEX) and then subtracting this ratio from the fiscal year-end stock price. The resulting number is an estimate of the average exercise price for unexercised exercisable options held by executives. An estimate of average exercise price of unexercised unexercisable options can be similarly obtained by subtracting the ratio of (in-the-money unexercisable options (INMONUN) to the number of unexercised unexercisable options (UEXNUMUN)) from the fiscal year-end stock price. The maturity of unexercised exercisable options is assumed to be four years less than the average maturity of the new grants. In case no grants are made this year, it is set at six years. The maturity of unexercisable options is set at one less than the average maturity of the new grants. In case no grants are made this year, it is set at nine years. Stock price, risk-free rate, dividend yield and volatility are obtained from CRSP and the ExecuComp database. Pay-performance sensitivity is the change in executive's firm specific wealth (from both options and stocks) for a $1 change in shareholder wealth. The change in shareholder wealth is measured by multiplying the beginning of year market value with the annual stock returns including distributions). To obtain compounded annual returns, we cumulate CRSP monthly stock returns with dividends for each firm during its fiscal year.

Table I
Data description

Variable	N	$Mean$	SD	Distribution 10^{th}	50^{th}	90^{th}
Debt ($ millions)	16,667	1,542	8,686	0	233	3,242
Book equity ($ millions)	16,710	1,568	4,512	87	437	3479
Market equity ($ millions)	16,697	5,531	19,937	186	1,086	10,082
Assets ($ millions)	16,711	4,874	18,748	188	1050	10730
Debt issuance ($ millions)	16,711	420	2344	0	31	818
Equity issuance ($ millions)	16,711	51	246	0	5	101
Debt repayment ($ millions)	16,711	346	1,743	0	31	690
Equity repurchase ($ millions)	16,711	83	394	0	0	143
Cash balance ($ millions)	16,707	325	1381	5	62	603
Book leverage	16,666	0.35	0.29	0.00	0.34	0.67
Market leverage	16,653	0.22	0.21	0.00	0.17	0.53
Profitability	16,638	0.13	0.13	0.04	0.14	0.25
$\frac{M}{B}$	16,590	1.77	1.66	0.65	1.24	3.39
Tangibility	16,674	0.34	0.23	0.08	0.28	0.70
Pay-performance sensitivity ($) (× 1,000)	14,401	34.96	72.41	-2.44	9.59	116.59
Govt. bond yield	12	5.60	0.97	4.27	5.76	6.58
Baa corp. bond yield	12	7.75	0.65	6.76	7.90	8.37

Data sources: The sample comes from the annual Compustat and Execucomp files. Interest rates are from the Federal Reserve. The sample period is 1993–2004. All financial variables are deflated to year 2000 using the GDP deflator.

Variable definitions:

Debt	=	Long-term debt (#9) + Short-term debt (#34)
Book equity	=	Common shareholder equity (#60)
Market equity	=	Outstanding shares (#199) × Closing share price (#25)
Assets	=	Book assets (#6)
Debt issuance	=	Issuance of long-term debt (#115) + Increase in current debt ($\#301^{+}$)
Equity issuance	=	Sale of common stock (#108)
Debt repayment	=	Reduction of long-term debt (#114) + Decrease in current debt ($\#301^{-}$)
Equity repurchase	=	Purchase of common (#115)
Cash balance	=	Cash and marketable securities (#1)

Table I Continued.

Book leverage	=	Debt/(Debt + Book equity)
Market leverage	=	Debt/(Debt + Market equity)
Profitability	=	EBITDA (#13)/Total assets (#6)
Market-to-book ratio	=	Market value of assets (MVA)/Total assets (#6), where MVA=Debt + Market equity + Preferred-liq. value (#10) - Deferred taxes (#35)
Tangibility	=	Net Property plant and equipment (#8)/Total assets (#6)
Total pay-performance sensitivity	=	Change in CEO stock and option holdings for a $ change in shareholder wealth
Yield - 10 year Govt. Bond	=	Average yield on 10-year government bond

Table II: **Debt and equity issuers: Size and profitability sorts**

The sample is non-financial firms listed on the annual Compustat and Execucomp files for the period from 1993 to 2004. The table presents the percentage of firms issuing and retiring (or repurchasing) debt and equity. A firms is classified as 'issuing debt' if it issues debt in excess of 5% of the value of its assets; as 'issuing equity' if it issues equity in excess of 5% of the value of its assets; as 'retiring debt' if it retires debt in excess of 5% of the value of its assets; and as 'repurchasing equity' if it repurchases equity in excess of 5% of the value of its assets. In addition, we also report net-debt issuers, which are firms that issued net debt over 5% of the value of their assets, and net equity issuers that issued net equity in excess of 5% of the value of their assets. We annually sort firms on lagged assets and lagged profitability and report the percentage of firms in each of these categories in Panels A and B, respectively. The bottom part of Panel B reports the percentage of firms issuing or retiring securities by profitability within the smallest and largest asset quintiles.

Table II Continued

		Percentage of firms									
		Issuing Debt	Retiring Debt	Iss. Net Debt	Issuing Equity	Repurch. Equity	Iss. Net Equity	Iss. Both D&E	Iss. Debt Rep. Equity	Iss. Equity Ret. Debt	Iss. None Rep. None
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Sorts on firm size											
Size	Small	23.1	20.5	14.4	15.8	10.4	13.7	2.2	0.9	1.8	37.5
	2	35.5	31.7	19.2	7.5	11.5	6.3	1.2	1.9	1.0	31.3
	3	39.5	35.1	19.9	7.1	12.3	5.1	1.1	1.8	0.7	28.4
	4	40.4	34.6	19.3	4.7	12.1	4.0	1.1	2.7	0.6	28.5
	Large	42.1	37.6	15.9	2.7	10.5	2.1	0.6	2.8	0.4	28.0
Panel B: Sorts on firm profitability											
All firms	Low π	32.8	31.6	15.3	12.8	3.3	12.2	2.7	0.4	1.6	31.4
	2	37.2	35.8	15.7	7.2	5.1	6.5	1.3	0.9	1.3	31.3
	3	40.0	35.8	18.8	5.8	7.5	4.7	1.0	1.5	0.5	29.8
	4	37.6	31.3	20.0	5.0	13.9	4.0	0.9	2.5	0.6	31.5
	High π	33.0	24.8	18.8	7.1	27.2	3.8	0.3	4.9	0.5	29.9
Small firms	Low π	19.7	15.5	15.1	31.1	2.1	30.8	7.0	0.3	3.0	32.0
	2	20.8	23.8	10.0	12.6	6.0	11.1	1.2	0.3	2.2	42.6
	3	28.6	22.9	17.1	12.6	10.0	10.2	1.3	1.0	1.2	35.1
	4	26.8	22.9	17.4	10.0	13.8	7.8	0.7	1.3	1.3	38.8
	High π	20.1	17.8	12.4	12.8	20.1	8.7	0.5	1.7	1.4	39.4
Large firms	Low π	43.6	43.7	14.8	5.1	2.7	4.5	1.3	0.4	0.9	27.2
	2	43.6	41.1	13.2	1.8	5.1	1.8	0.3	2.0	0.6	26.5
	3	44.0	41.9	16.4	2.1	4.8	1.8	1.1	1.2	0.3	28.8
	4	40.5	35.0	17.3	2.0	11.3	1.4	0.5	2.7	0.2	31.1
	High π	38.3	25.3	17.3	2.6	29.2	1.1	0.0	8.0	0.2	26.7

Table III: **Profitability sorts for the smallest and largest firms**

The sample is non-financial firms listed on the annual Compustat and Execucomp files for the period from 1993 to 2004. The table presents debt and equity, changes in debt and equity and equity issuances for firms sorted on profitability within size classes. The table reports information for all firms sorted on profitability and for profitability sorts within the smallest and largest firms. The sorts are done annually.

		D	ΔD	BVE	ΔBVE	MVE	ΔMVE	Equity Iss.	Assets
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All Firms	Low π	2135.0	131.4	1325.7	62.6	3614.8	439.5	23.9	5648.4
	2	2476.6	38.8	1715.2	13.4	3535.1	106.7	-1.3	6553.1
	3	1297.6	86.0	1586.3	156.5	4528.0	480.0	-31.8	4491.9
	4	1052.3	52.5	1586.5	125.8	5935.2	256.7	-55.0	4068.9
	High π	765.9	113.3	1639.2	240.7	10132.9	795.9	-114.1	3633.1
Small Firms	Low π	23.7	-1.0	68.5	-13.0	283.8	11.8	11.2	132.3
	2	31.1	-3.2	116.4	-1.1	273.9	28.9	5.1	200.1
	3	30.8	0.7	123.8	8.5	348.1	65.4	2.6	208.1
	4	20.0	1.5	130.9	15.6	419.8	53.8	1.4	201.6
	High π	23.8	0.7	122.3	23.4	643.9	89.1	-1.4	196.6
Large firms	Low π	10369.8	660.9	5600.0	291.4	14741.7	1697.3	51.0	26335.1
	2	7871.2	75.4	4734.9	3.1	9800.6	218.2	-21.7	19987.1
	3	5555.9	299.8	5163.3	333.9	12609.8	1124.6	-66.4	16903.4
	4	4778.7	284.6	6445.4	643.9	24031.4	1280.4	-240.4	17860.7
	High π	4174.0	454.1	7755.6	1026.4	46667.4	3228.4	-533.6	18519.0

Table IV: **Median Profitability Sorts**

The sample is non-financial firms listed on the annual Compustat and Execucomp files for the period from 1993 to 2004. The table presents debt and equity, changes in debt and equity and equity issuances for firms sorted on profitability within size classes. The table reports information for all firms sorted on profitability and for profitability sorts within the smallest and largest firms. The sorts are done annually. For each category we report the value at the median firm.

		D	ΔD	BVE	ΔBVE	MVE	ΔMVE	Equity Iss.	Assets
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All Firms	Low π	163.7	-0.1	253.6	1.5	544.9	19.1	1.6	698.2
	2	489.1	-0.9	564.5	15.5	1039.4	46.1	0.5	1674.3
	3	354.5	0.0	536.2	28.3	1167.8	61.1	0.4	1366.6
	4	222.2	0.0	502.8	35.0	1397.8	70.1	0.0	1104.5
	High π	72.2	0.0	364.5	41.9	1560.9	94.7	-0.6	692.0
Small Firms	Low π	4.4	0.0	56.7	-6.0	164.1	-5.3	1.7	110.5
	2	12.2	-0.2	109.7	0.7	185.7	1.6	0.4	201.8
	3	10.5	0.0	118.0	7.8	256.5	17.5	0.5	207.7
	4	4.9	0.0	127.7	13.5	329.1	20.3	0.5	208.4
	High π	1.4	0.0	122.9	22.2	507.8	61.1	0.6	191.9
Large firms	Low π	3497.1	-4.5	2837.3	81.3	4942.7	354.6	4.2	10583.0
	2	4003.8	-6.1	3238.4	74.0	5837.0	304.8	0.0	11353.9
	3	3237.3	8.4	3160.0	164.4	6609.7	455.8	0.0	10162.8
	4	2957.7	39.7	3726.5	238.0	10995.6	685.1	-13.4	10264.9
	High π	2610.8	49.6	4985.7	414.6	23401.1	959.4	-152.4	12024.1

Table V: **Book and market leverage ratios**

The sample comes from the annual Compustat and Execucomp files during the period 1993-2004. Financial firms are excluded. The table presents the firm fixed effects estimates of the following leverage ratio regression:

$$\begin{aligned} LeverageRatio_t &= \alpha + \beta_1 Ln(D)_{t-1} + \beta_2 Ln(Cash)_{t-1} + \beta_3 Govt.BondYield_{t-1} \\ &+ \beta_4 Ln(TOTPPS^{-1})_t + \beta_5 Profitability_{t-1} + \beta_6 \left(\frac{M}{B}\right)_{t-1} + \beta_7 Tangibility_{t-1} \\ &+ \beta_8 Ln(Assets)_{t-1} + Firm_i + \epsilon_{i,t}, \end{aligned}$$

where $Leverage\ Ratio_t$ is the ratio of debt over debt plus book equity in Columns (1) - (3), and the ratio of debt over debt plus market equity in Columns (4) - (6). $Debt_{t-1}$ is the beginning-of-period total debt outstanding, $Cash_{t-1}$ is the beginning-of-period cash balance. $Govt.BondYield$ is the yield on ten-year government bond from the Federal Reserve web-site. $TOTPPS^{-1}$ is the inverse of CEO pay-performance sensitivity. The leverage factors, $Profitability_{t-1}$, $\left(\frac{M}{B}\right)_{t-1}$, $Tangibility_{t-1}$, and $Ln(Assets)_{t-1}$, are described in Table I. In alternative specifications, we replace $Debt_{t-1}$ with $Debt\ repayment_t$ and $Equity\ repurchases_t$. The regressions include firm fixed effects. In parentheses, we report standard errors adjusted for clustering at the firm level.

Table V Continued

	Book Leverage			Market Leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
$Ln(Debt)_{t-1}$		0.058^a			0.032^a	
		(10.5)			(13.7)	
$Ln(Debt\ repayment)_t$			0.007^a			0.003^a
			(3.7)			(3.3)
$Ln(Equity\ repurchase)_t$			-0.004^a			-0.007^a
			(-3.0)			(-8.7)
$Ln(Cash)_{t-1}$		-0.006	-0.017^a		-0.009^a	-0.016^a
		(-1.6)	(-4.4)		(-4.5)	(-7.2)
$Govt.\ bond\ yield_{t-1}$		-0.004	-0.007		-0.001	-0.003
		(-0.8)	(-1.4)		(-0.4)	(-1.3)
$Ln(TOTPPS^{-1})$		-0.007	-0.006		-0.004	-0.004
		(-1.0)	(-0.6)		(-0.6)	(-0.6)
$Profitability_{t-1}$	-0.082^a	-0.239^b	-0.190^a	-0.108^a	-0.238^a	-0.176^a
	(-3.7)	(-2.2)	(-2.7)	(-17.5)	(-7.8)	(-6.7)

Table V Continued

	Book Leverage			Market Leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
$\left(\frac{M}{B}\right)_{t-1}$	-0.007[a]	-0.001	-0.004	-0.007[a]	-0.006[a]	-0.005[a]
	(-4.0)	(-0.3)	(-1.4)	(-13.2)	(-5.3)	(-5.2)
$Tangibility_{t-1}$	0.184[a]	-0.029	0.003	0.143[a]	-0.044	-0.030
	(5.8)	(-0.6)	(0.1)	(9.8)	(-1.5)	(-1.0)
$Ln(Assets)_{t-1}$	0.054[a]	-0.041[a]	0.034[a]	0.066[a]	0.027[a]	0.067[a]
	(11.6)	(-2.9)	(3.2)	(28.4)	(4.7)	(12.9)
$Constant$	0.023	0.504[a]	0.270[b]	-0.128[a]	-0.002	-0.103[c]
	(0.8)	(4.2)	(2.5)	(-9.7)	(-0.0)	(-1.9)
$R^2 - Adjusted$	0.446	0.593	0.611	0.700	0.757	0.765
$Observations$	62023	12438	13747	61868	12435	13743

Table VI
Debt and equity issuances

The sample comes from the annual Compustat and Execucomp files during the period 1993-2004. Financial firms are excluded. The table presents the firm fixed effects estimates of the following debt and equity issuance regressions.

$$\begin{aligned} Ln(DebtIssuance)_t &= \alpha + \beta_1 Ln(D)_{t-1} + \beta_2 Ln(Cash)_{t-1} + \beta_3 Govt.BondYield_{t-1} \\ &+ \beta_4 Ln(TOTPPS^{-1})_t + \beta_5 Profitability_{t-1} + \beta_6 \left(\frac{M}{B}\right)_{t-1} + \beta_7 Tangibility_{t-1} \\ &+ \beta_8 Ln(Assets)_{t-1} + Firm_i + \epsilon_{i,t}, \end{aligned}$$

$$\begin{aligned} Ln(EquityIssuance)_t &= \alpha + \beta_1 Ln(D)_{t-1} + \beta_2 Ln(Cash)_{t-1} + \beta_3 Govt.BondYield_{t-1} \\ &+ \beta_4 Ln(TOTPPS^{-1})_t + \beta_5 Profitability_{t-1} + \beta_6 \left(\frac{M}{B}\right)_{t-1} + \beta_7 Tangibility_{t-1} \\ &+ \beta_8 Ln(Assets)_{t-1} + Firm_i + \epsilon_{i,t}, \end{aligned}$$

where $Ln(DebtIssuance)_t$ is the natural log of the amount of debt issued and $Ln(EquityIssuance)_t$ is the natural log of the amount of equity issued. $Debt_{t-1}$ is the beginning-of-period total debt outstanding, $Cash_{t-1}$ is the beginning-of-period cash balance. $Govt.BondYield$ is the yield on ten-year government bond from the Federal Reserve web-site. $TOTPPS^{-1}$ is the inverse of CEO pay-performance sensitivity. The leverage factors, $Profitability_{t-1}$, $\left(\frac{M}{B}\right)_{t-1}$, $Tangibility_{t-1}$, and $Ln(Assets)_{t-1}$, are described in Table I. In alternative specifications, we replace $Debt_{t-1}$ with *Debt repayment*$_t$ and *Equity repurchases*$_t$. The regressions include firm fixed effects. In parentheses, we report standard errors adjusted for clustering at the firm level.

Table VI Continued

	$Ln(DebtIssuances)_t$		$Ln(EquityIssuances)_t$	
	(1)	(2)	(3)	(4)
$Ln(Debt)_{t-1}$	-0.133^a		0.063^a	
	(0.033)		(0.018)	
$Ln(Debt\ repayment)_t$		0.283^a		0.091^a
		(0.022)		(0.010)
$Ln(Equity\ repurchase)_t$		0.079^a		0.010
		(0.014)		(0.011)
$Ln(Cash)_{t-1}$	-0.329^a	-0.242^a	-0.022	-0.010
	(0.034)	(0.029)	(0.021)	(0.020)
$Govt.\ bond\ yield_{t-1}$	0.078^b	0.085^a	-0.230^a	-0.211^a
	(0.032)	(0.028)	(0.022)	(0.020)
$Ln(TOTPPS^{-1})$	-0.258^b	-0.126	0.023	0.040
	(0.120)	(0.117)	(0.099)	(0.094)
$Profitability_{t-1}$	1.520^a	1.302^a	-0.148	-0.079
	(0.379)	(0.257)	(0.220)	(0.164)
$\left(\frac{M}{B}\right)_{t-1}$	0.116^a	0.095^a	0.192^a	0.169^a
	(0.026)	(0.017)	(0.015)	(0.011)
$Tangibility_{t-1}$	0.430	0.656^c	-0.471	-0.293
	(0.405)	(0.352)	(0.319)	(0.293)
$Ln(Assets)_{t-1}$	0.787^a	0.249^a	0.161^a	0.168^a
	(0.083)	(0.060)	(0.058)	(0.046)
$Constant$	0.267	0.983	1.769^b	1.420^b
	(0.884)	(0.783)	(0.709)	(0.648)
$R^2 - Adjusted$	0.492	0.556	0.547	0.562
$Observations$	12446	13761	12446	13761

Table VII: **Scaled debt and equity issuances**

The sample comes from the annual Compustat and Execucomp files during the period 1993-2004. Financial firms are excluded. The table presents the firm fixed effects estimates of the following scaled debt and equity issuance regressions.

$$
\begin{aligned}
Issuance\ Ratio_t &= \alpha + \beta_1 Ln(D)_{t-1} + \beta_2 Ln(Cash)_{t-1} + \beta_3 Govt.BondYield_{t-1} \\
&+\beta_4 Ln(TOTPPS^{-1})_t + \beta_5 Profitability_{t-1} + \beta_6 \left(\frac{M}{B}\right)_{t-1} + \beta_7 Tangibility_{t-1} \\
&+\beta_8 Ln(Assets)_{t-1} + Firm_i + \epsilon_{i,t},
\end{aligned}
$$

where $Issuance\ Ratio_t$ is the ratio of debt issuance to aggregate issuances in Columns (1) and (2) and the ratio of equity issuance to aggregate issuances in Columns (3) and (4). In Columns (5) and (6) debt issues are scaled by book capital while in columns (7) and (8), equity issues are scaled by book capital. $Debt_{t-1}$ is the beginning-of-period total debt outstanding, $Cash_{t-1}$ is the beginning-of-period cash balance. $Govt.BondYield$ is the yield on ten-year government bond from the Federal Reserve web-site. $TOTPPS^{-1}$ is the inverse of CEO pay-performance sensitivity. The leverage factors, $Profitability_{t-1}$, $\left(\frac{M}{B}\right)_{t-1}$, $Tangibility_{t-1}$, and $Ln(Assets)_{t-1}$, are described in Table I. In alternative specifications, we replace $Debt_{t-1}$ with $Debt\ repayment_t$ and $Equity\ repurchases_t$. The regressions include firm fixed effects. In parentheses, we report standard errors adjusted for clustering at the firm level.

Table VII Continued

	Debt Issues/ Total Issues		Equity Issues/ Total Issues		Debt Issues/ (D+E)		Equity Issues/ (D+E)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Ln(Debt)_{t-1}$	-0.025[a]		0.026[a]		0.017		0.016	
	(-4.0)		(4.4)		(0.9)		(1.4)	
$Ln(Debt\ repayment)_t$		0.023[a]		-0.018[a]		0.053[a]		0.003
		(6.6)		(-5.3)		(8.7)		(0.8)
$Ln(Equity\ repurchase)_t$		0.012[a]		-0.009[a]		0.002		-0.002
		(5.3)		(-4.0)		(0.2)		(-0.4)
$Ln(Cash)_{t-1}$	-0.054[a]	-0.048[a]	0.045[a]	0.039[a]	-0.030[a]	-0.019[a]	-0.006	-0.008[c]
	(-9.3)	(-8.9)	(7.9)	(7.3)	(-4.7)	(-2.7)	(-1.3)	(-1.7)
$Govt.\ bond\ yield_{t-1}$	0.033[a]	0.031[a]	-0.041[a]	-0.038[a]	0.004	0.007	-0.004	-0.004
	(6.0)	(6.2)	(-7.3)	(-7.4)	(0.5)	(1.3)	(-0.9)	(-1.2)
$Ln(TOTPPS^{-1})$	-0.050[a]	-0.036[a]	0.049[a]	0.038[a]	-0.007	0.010	-0.004	-0.004
	(-4.4)	(-3.0)	(4.2)	(3.0)	(-1.2)	(1.5)	(-1.2)	(-1.0)
$Profitability_{t-1}$	0.296[a]	0.226[a]	-0.189[a]	-0.143[a]	0.130	0.108	-0.078	-0.203[b]
	(4.5)	(4.9)	(-3.1)	(-3.2)	(1.2)	(1.6)	(-0.6)	(-2.1)

Table VII Continued

	Debt Issues/ Total Issues		Equity Issues/ Total Issues		Debt Issues/ (D+E)		Equity Issues/ (D+E)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\left(\frac{M}{B}\right)_{t-1}$	0.002	0.003	0.005	0.003	0.007^{b}	0.005^{b}	0.008^{b}	0.011^{a}
	(0.6)	(1.0)	(1.2)	(1.1)	(2.0)	(2.4)	(2.3)	(3.9)
$Tangibility_{t-1}$	0.247^{a}	0.254^{a}	-0.236^{a}	-0.235^{a}	0.014	0.080	0.018	0.030
	(3.6)	(4.0)	(-3.5)	(-3.8)	(0.1)	(0.9)	(0.5)	(0.7)
$Ln(Assets)_{t-1}$	0.095^{a}	0.034^{a}	-0.092^{a}	-0.032^{a}	-0.037	-0.057^{a}	-0.038^{b}	-0.025^{a}
	(6.8)	(3.3)	(-6.6)	(-3.1)	(-1.4)	(-3.8)	(-2.1)	(-2.8)
$Constant$	0.227^{c}	0.321^{a}	0.765^{a}	0.645^{a}	0.422^{a}	0.289^{a}	0.273^{a}	0.273^{a}
	(1.9)	(3.0)	(6.2)	(5.8)	(4.1)	(2.8)	(3.1)	(4.2)
$R^2 - Adjusted$	0.359	0.424	0.394	0.455	0.162	0.185	-0.007	0.005
$Observations$	12446	13761	12446	13761	12438	13747	12438	13747

Table VIII
Debt and equity issues in good and bad times

The table reports frequency and magnitude of financing activity for sorts on profits for sub-samples of firms in good and bad times. An industry is defined as having "good times" if the median firm in that industry has a market-to-book which is higher than the 67^{th} percentile of the time-series distribution of industry median market-to-book ratios. Conversely, an industry is defined as having bad times if the median firm in that industry has a market-to-book ratio which is lower than the 33^{rd} percentile of time-series distribution of industry median market-to-book ratios. Panels A and B report the percentage of firms (a) issuing net debt in excess of 5% of the value of their assets, (b) issuing net equity in excess of 5% of the value of their assets, (c) issuing debt and repurchasing equity both in excess of 5% of the value of their assets, and (d) firms issuing equity and retiring debt in excess of 5% of the value of their assets. Panel C tabulates the median debt and equity levels, and the median changes in debt and equity issuances. The sample is non-financial firms listed on the annual Compustat and Execucomp files for the period from 1993 to 2004.

Table VIII Continued

			Issuing Net Debt (1)	Issuing Net Equity (2)	Issuing Debt Rep. Equity (3)	Iss. Equity Ret. Debt (4)
Panel A: Sorts on Profitability						
Bad Times		Low Profits	12.6	9.5	0.4	1.7
		2	12.9	4.9	1.0	1.5
		3	13.7	4.0	1.2	0.7
		4	17.3	3.1	2.2	0.7
		High Profits	15.6	3.1	3.4	0.1
Good Times		Low Profits	19.9	16.6	0.4	1.5
		2	19.9	9.0	1.0	1.2
		3	23.6	6.3	1.7	0.5
		4	23.8	5.2	3.2	0.8
		High Profits	22.3	3.8	5.8	0.7
Panel B: Sorts on firm size and profitability						
Bad Times	Small Firms	Low Profits	10.0	23.6	0.0	3.9
		2	8.7	5.6	0.4	0.8
		3	10.5	7.3	0.9	0.9
		4	14.5	5.7	0.5	1.0
		High Profits	7.6	8.3	0.7	0.7
	Large firms	Low Profits	10.5	5.2	0.0	1.3
		2	8.6	0.8	1.9	0.8
		3	10.9	1.8	0.0	0.5
		4	11.1	1.8	1.8	0.4
		High Profits	14.7	0.5	4.9	0.0
Good Times	Small Firms	Low Profits	22.7	41.2	0.5	3.1
		2	10.7	17.5	0.0	3.4
		3	22.7	15.7	1.2	1.7
		4	20.1	9.7	1.9	2.7
		High Profits	15.0	8.6	2.2	1.6
	Large firms	Low Profits	18.2	4.3	0.0	0.5
		2	20.7	3.7	1.6	0.5
		3	23.4	2.4	1.9	0.0
		4	25.4	2.2	5.4	0.0
		High Profits	24.5	1.2	11.2	0.4

Table VIII Continued

			D	ΔD	BVE	ΔBVE	MVE	ΔMVE	Equity Iss.	Assets
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel C: Magnitude of Financing Activity (Medians)										
Bad Times	Small Firms	Low π	4.2	0.0	74.4	-20.5	121.5	-50.8	0.7	138.4
		2	9.4	0.0	114.3	-2.0	162.7	-32.1	0.2	201.1
		3	8.9	0.0	120.0	5.2	214.4	1.9	0.2	227.1
		4	5.5	0.0	140.4	14.7	331.7	15.9	0.1	222.3
		High π	2.8	0.0	125.5	22.3	462.4	47.4	0.3	197.0
	Large firms	Low π	3173.1	91.3	2706.7	-5.1	3390.9	-49.0	2.0	10088.8
		2	4283.4	-12.5	3233.1	64.0	4792.2	33.8	1.8	12172.0
		3	3322.5	-30.4	2955.7	87.1	5550.3	-126.2	0.0	10452.0
		4	3050.2	-29.1	3524.5	233.3	8642.3	-60.5	-11.6	9861.9
		High π	2674.8	-16.9	5318.4	379.7	17962.4	-183.6	-122.8	13303.5
Good Times	Small Firms	Low π	4.0	0.0	60.1	-8.0	238.6	2.8	4.0	106.0
		2	7.9	0.0	109.5	3.4	238.2	5.8	0.6	187.4
		3	10.1	0.0	121.4	12.1	301.4	45.4	1.1	202.5
		4	5.4	0.0	120.8	15.8	398.8	89.5	1.0	205.8
		High π	1.1	0.0	110.4	27.2	608.7	151.9	1.5	182.1
	Large firms	Low π	3251.0	208.2	2978.6	179.9	6123.8	552.3	2.9	10140.1
		2	4161.9	88.6	3414.7	108.2	8213.8	675.2	3.6	12143.6
		3	3390.9	27.5	2744.0	164.2	6823.0	838.9	0.0	9714.4
		4	2678.6	93.4	3788.7	315.5	11895.3	1677.2	-29.1	10189.6
		High π	2493.0	0.0	4820.4	474.7	30405.5	3273.7	-170.5	11785.8

Table IX: **Debt and equity issuances in Good and Bad Times**

The sample comes from the annual Compustat and Execucomp files during the period 1993-2004. Financial firms are excluded. The table presents the firm fixed effects estimates of the following debt and equity issuance regressions separately for good and bad times. We define an industry as having "good times" if the median firm in that industry has a market-to-book which is higher than the 67^{th} percentile of the time-series distribution of industry median market-to-book ratios. Conversely, an industry is defined as having bad times if the median firm in that industry has a market-to-book ratio which is lower than the 33^{rd} percentile of time-series distribution of industry median market-to-book ratios.

$$\begin{aligned} Ln(DebtIssuance)_t &= \alpha + \beta_1 Ln(D)_{t-1} + \beta_2 Ln(Cash)_{t-1} + \beta_3 Govt.BondYield_{t-1} \\ &+ \beta_4 Ln(TOTPPS^{-1})_t + \beta_5 Profitability_{t-1} + \beta_6 \left(\frac{M}{B}\right)_{t-1} + \beta_7 Tangibility_{t-1} \\ &+ \beta_8 Ln(Assets)_{t-1} + Firm_i + \epsilon_{i,t}, \end{aligned}$$

$$\begin{aligned} Ln(EquityIssuance)_t &= \alpha + \beta_1 Ln(D)_{t-1} + \beta_2 Ln(Cash)_{t-1} + \beta_3 Govt.BondYield_{t-1} \\ &+ \beta_4 Ln(TOTPPS^{-1})_t + \beta_5 Profitability_{t-1} + \beta_6 \left(\frac{M}{B}\right)_{t-1} + \beta_7 Tangibility_{t-1} \\ &+ \beta_8 Ln(Assets)_{t-1} + Firm_i + \epsilon_{i,t}, \end{aligned}$$

where $Ln(DebtIssuance)_t$ is the natural log of the amount of debt issued and $Ln(EquityIssuance)_t$ is the natural log of the amount of equity issued. $Debt_{t-1}$ is the beginning-of-period total debt outstanding, $Cash_{t-1}$ is the beginning-of-period cash balance. $Govt.BondYield$ is the yield on ten-year government bond from the Federal Reserve web-site. $TOTPPS^{-1}$ is the inverse of CEO pay-performance sensitivity. The leverage factors, $Profitability_{t-1}$, $\left(\frac{M}{B}\right)_{t-1}$, $Tangibility_{t-1}$, and $Ln(Assets)_{t-1}$, are described in Table I. In alternative specifications, we replace $Debt_{t-1}$ with $Debt\ repayment_t$ and $Equity\ repurchases_t$. The regressions include firm fixed effects. In parentheses, we report standard errors adjusted for clustering at the firm level.

Table IX Continued

	Good Times				Bad Times			
	Debt Issuances		Equity Issuances		Debt Issuances		Equity Issuances	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Ln(Debt)_{t-1}$	-0.227^{b}		-0.027		-0.248^{b}		0.053	
	(-2.2)		(-0.5)		(-2.1)		(1.0)	
$Ln(Debt\ repayment)_{t}$		0.247^{a}		0.048		0.293^{a}		0.077^{a}
		(4.0)		(1.6)		(5.3)		(3.0)
$Ln(Equity\ repurchase)_{t}$		0.104^{b}		-0.005		0.108^{a}		-0.027
		(2.4)		(-0.2)		(2.7)		(-1.0)
$Ln(Cash)_{t-1}$	-0.236^{b}	-0.159^{c}	-0.072	-0.046	-0.190^{c}	-0.136	-0.088	-0.103^{b}
	(-2.2)	(-1.7)	(-1.3)	(-0.9)	(-2.0)	(-1.5)	(-1.6)	(-2.0)
$Govt.\ bond\ yield_{t-1}$	0.125	0.090	-0.305^{a}	-0.280^{a}	0.201^{c}	0.157^{c}	-0.148^{b}	-0.135^{b}
	(1.3)	(1.0)	(-4.8)	(-4.9)	(1.9)	(1.7)	(-2.4)	(-2.4)
$Ln(TOTPPS^{-1})$	-0.303	-0.171	-0.113	-0.119	-0.091	-0.042	0.091	0.082
	(-0.7)	(-0.4)	(-0.9)	(-1.4)	(-0.2)	(-0.1)	(0.8)	(0.7)
$Profitability_{t-1}$	1.923	1.573^{c}	-0.912	-0.915	2.357^{b}	2.189^{a}	0.135	0.610
	(1.3)	(1.9)	(-1.1)	(-1.5)	(2.5)	(3.5)	(0.3)	(1.4)

Table IX Continued

	Good Times				Bad Times			
	Debt Issuances		Equity Issuances		Debt Issuances		Equity Issuances	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$(\frac{M}{B})_{t-1}$	0.147	0.121^c	0.090^b	0.113^a	0.103	0.063	0.215^a	0.178^a
	(1.6)	(1.8)	(2.0)	(3.0)	(1.5)	(1.3)	(5.8)	(8.0)
$Tangibility_{t-1}$	1.361	1.623	-0.598	-0.413	0.625	0.792	-1.070	-0.792
	(1.2)	(1.5)	(-0.7)	(-0.5)	(0.4)	(0.6)	(-1.1)	(-0.9)
$Ln(Assets)_{t-1}$	0.911^a	0.294	0.448^a	0.326^b	0.418	-0.160	0.170	0.211
	(3.3)	(1.3)	(2.6)	(2.2)	(1.4)	(-0.7)	(1.0)	(1.6)
$Constant$	-0.984	0.204	2.074	2.331^c	1.282	2.384	1.139	0.848
	(-0.3)	(0.1)	(1.4)	(1.9)	(0.4)	(0.9)	(0.8)	(0.7)
$R^2 - Adjusted$	0.519	0.570	0.592	0.602	0.499	0.565	0.586	0.603
$Observations$	2925	3254	2925	3254	3196	3576	3196	3576