

Debt Capacity And Debt Financing

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ABSTRACT

The pecking order theory of capital structure predicts that firms will finance a significant proportion of their financial deficit (investments + dividends – operating cash flows) with debt capital. I also hypothesize that the amount of debt financing a firm actually uses is also related to its unused debt capacity. The empirical analysis in this study confirms that firms follow the pecking order theory in financing their financial deficits. Further, it is shown that firms with more unused debt capacity finance more of their financial deficits with debt than other firms. Specifically, the data indicates that firms with the most unused debt capacity finance approximately 50% of their financial deficits with debt while firms with less unused debt capacity finance approximately 25% of their financial deficits with debt. The data also indicate that a failure to adjust for credit availability in an empirical analysis of financial deficit financing will significantly under estimate the degree to which firms follow the pecking order theory. It is also confirmed that most firms seem to have a target capital structure but the actual firm debt ratio only reverts to the target at a rate of 5-10% per year. Additionally, the data also shows that a combination of an investment grade credit rating and relatively low debt outstanding is a better proxy for credit availability than the more commonly used total assets.

INTRODUCTION

In finance there are two main theories that seek to explain how businesses finance their investments: the pecking order theory and the tradeoff theory. In the pecking order theory (see Myers (1984)), firms prefer to finance their investments (and dividends) with internally generated funds to avoid the under investment problem associated with risky debt and informational asymmetries between managers and the security markets. If firms do not have sufficient internally generated funds to finance their investments they will issue debt to finance their financial deficit (investments + dividends – operating cash flows). Only in extreme cases will they finance their investments with external equity capital. As a consequence, firms following the pecking order theory do not have an optimal capital structure and their observed capital structure is just an artifact of their past investment opportunities and the availability of internally generated funds. In the tradeoff theory firms choose their optimal capital structure by balancing the costs and benefits of additional debt financing (see Fama and French (2002)). These costs include the tax savings generated by the tax deductibility of interest, expected bankruptcy costs, and the agency costs of debt and equity. Recent empirical tests of these theories have generally found some degree of support for both theories (see Shyam-Sunder and Myers (1999), Fama and French (2002), Frank and Goyal (2003) and Flannery and Rangan (2006)).

Both of these theories focus on the desired amount of debt firms wish to use in financing their investments and generally ignore the ability of firms to obtain their desired amount of debt financing. The failure to account for the ability to borrow in empirical tests can lead to misleading results. If firms follow the pecking order theory and credit availability is a determinant of how much debt financing a firm obtains, then firms with greater credit availability should finance a greater proportion of their financial deficit with debt. If this is true, then in broad based empirical analyses where no account is taken of credit availability, the results will under estimate the extent to which firms follow the pecking order theory. Consequently, the main focus of this study is to determine whether credit availability affects how much debt firms actually use in financing their financial deficits and how accurately the pecking order theory predicts how firms finance their financial deficits.

DATA

The ability of a firm following the pecking order theory to use debt financing to finance its financial deficit may be limited by the amount of credit available to the firm, that is, its unused debt capacity. A firm's unused debt capacity is its debt capacity (the maximum amount of money creditors will lend) minus the amount of debt the firm has outstanding. A firm's outstanding debt is an observable variable but its debt capacity is not. To proxy for debt capacity we use the firm's credit rating. Specifically, firms with an investment grade credit rating should be able to borrow more money than firms with a junk credit rating. This results because some lenders, like banks and insurance companies, are prohibited by rule or law from investing in less than investment grade debt. Still others, like investment grade bond funds, refuse by policy to invest in junk rated debt. Combining the two components of unused debt capacity, firms with an investment grade credit rating and a long-term debt to assets ratio that is less than the 75th percentile for the sample firms (.355) are classified as firms with the greatest unused debt capacity.

The base sample of firms is all firms listed on the COMPUSTAT data base that have data for 2004. To abstract from exchange listing effects, all firms not listed on the NYSE are excluded from the sample. Additionally, all financial firms and utilities are eliminated from the sample. This leaves a final sample of 1338 firms. All data reported here comes from the COMPUSTAT data base and is for 2004 unless noted otherwise. From the final sample of firms a subsample of firms with an investment grade credit rating and a long-term debt to total assets ratio at the end of 2003 (Debt/Assets (-1)) of less than the 75th percentile of sample firms (.355) are classified as firms with the most unused debt capacity. This subsample contains 260 firms.

Table 1
Summary Statistics for Selected Variables

Panel A: Firm Size		
	Full Sample	Unused Debt Cap.
Assets (\$M)	8,228	4,026
MVE (\$M)	8,311	2,886
Panel B: Investments & Capital		
Investment/Assets	.166	.198
Δ Debt/Assets	.029	.059
Debt Issued/Assets	.024	.051
Equity Issued/Assets	.007	.015
Debt/Assets (-1)	.244	.231
Panel C: Profitability, R&D, etc.		
CF/Assets	.116	.102
R&D/Assets	.019	.015
PPE/Assets	.370	.363

M = million

Table 1 contains summary statistics for the full sample of firms and the subsample of firms classified as having the most unused debt capacity. The firms in the full sample have mean total assets (Assets) of \$8,228 million while the firms in the most unused debt capacity subsample have mean Assets of \$4,026 million. The market value of common equity (MVE) shows a somewhat larger size differential. To adjust for this size differential all variables in Panels B and C are scaled by Assets. As evidenced by the similar mean

Investment/Assets ratios (.166 vs .198), the two groups of firms are making proportionately equivalent investments in new assets. Investment is measured by the change in total assets from 2003 to 2004. However, the subgroup of firms with the most unused credit capacity is using much more debt to finance their investments. Looking at the change in long-term debt to total assets ratio (Δ Debt/Assets), the firms with the most unused debt capacity are, on average, financing with twice as much debt as the typical sample firm (.029 versus .059). If debt financing is measured by the net long-term debt issued to total assets ratio (Debt Issued/Assets), similar results are obtained. Firms with the most unused debt capacity have a mean Debt Issued/Assets ratio of .051 versus .024 for the full sample of firms. These results indicate that the amount of unused debt capacity a firm has effects how closely its financial deficit financing follows the pecking order theory. There does not seem to be any major differences between the two groups of sample firms in regards to profitability (operating cash flow to total assets (CF/Assets)), research and development expenditures (R&D/Assets) or net property, plant, and equipment (PPE/Assets).

EMPIRICAL ANALYSIS

Next, a regression analysis is used to test for the relationship between unused credit capacity and the amount of debt financing used to fund the firm's financial deficit. In the first series of regressions, the dependent variable is Debt Issued/Assets and the primary explanatory variable is the firm's financial deficit (Fin Def). The financial deficit is the sum of investments (change in total assets) and cash dividends paid less operating cash flow (income before extraordinary items plus depreciation and amortization). The pecking order theory predicts that the coefficient of this variable should be positive. A second explanatory variable employed is an interactive variable calculated as the dummy variable Unu Debt Cap multiplied by Fin Def. Unu Debt Cap takes on a value of one if a firm is in the subsample of firms with the most unused debt capacity (described above) and zero otherwise. If firms with more unused debt capacity finance a larger part of their financial deficit with debt than other firms then the coefficient of the interactive variable should be positive. Debt/Assets (-1) will also be used as an explanatory variable. If the tradeoff theory is correct a firm's debt to asset ratio should be mean reverting and the sign of this variable should be negative. See Fama and French (2002) for a more detailed discussion of this point. The natural log of total assets in 2003 (ln Assets (-1)) is also included in some of the regressions to account for any size effects on firm capital structure. Many studies have found a direct relationship between firm size and the amount of debt in the firm's capital structure. This is conventionally interpreted to mean that larger firms have better access to the credit markets and can raise more debt capital than smaller firms. Therefore, ln Assets (-1) is measuring essentially the same thing as the Unu Debt Cap dummy variable. The regression analysis should indicate which is the better measure of access to debt financing. Five other control variables will also be employed to account for other factors that have been found to affect the amount of debt a firm has in its capital structure. These factors include profitability, variability of firm cash flows, net property, plant and equipment, research and development expenditures, and depreciation and amortization expense. All of these variables are scaled by total assets. The values of these variables are lagged one year to eliminate any endogeneity problems. Since these variables are not of primary interest in this study a further discussion of them is omitted.

The results of the regressions employing net debt issued divided by total assets as the dependent variable are presented in Table 2. In the first regression the coefficient of Fin Def is .233 and significant at the 1% level (z value = 24.0). This implies that, on average, the sample firms are financing 23.3% of their financial deficits with debt. This supports Frank and Goyal's (2003) finding that since the 1990s firms have been using much less debt to finance their financial deficits than they were previously (up to 75%). In the second regression, the interactive variable is included as an explanatory variable. The coefficient of Fin Def is positive (.190) and significant at the 1% level. The value of this coefficient implies that firms with moderate levels of unused debt capacity finance 19% of their financial deficits with debt. The coefficient of the interactive variable is also positive (.157) and significant at the 1% level. This confirms the central thesis of this study that firms with the most unused debt capacity finance more of their financial deficits with debt than other firms. Specifically, firms with the most unused credit capacity finance 34.7% ($19.0 + 15.7$) of their financial deficits with debt, which is 15.7% more than firms with less unused debt capacity. Comparing this result to the coefficient of Fin Def in the first regression (.233 or 23.3%) indicates that failing to adjust for credit availability will result in an under estimate of the extent to which firms follow the pecking order theory. In the third regression, the lagged debt ratio (Debt/Assets (-1)) is added as an explanatory variable. The coefficient of this variable is negative (-.056) and significant at the 1% level. The sign and scale of

this coefficient indicate that the debt ratio is mean reverting toward a target debt ratio but at a very slow rate, 5.6% per year. This result is consistent with the tradeoff theory of firm capital structure. The coefficients of the financial deficit and interactive variables are little affected by including this extra explanatory variable.

Table 2
Regression Analysis of Net Debt Issued

Dependent Variable: Net Debt Issued / Assets				
Intercept	.008 ^b	.007 ^a	.020 ^c	-.001
(z value)	(2.00)	(1.89)	(3.52)	(-0.20)
Fin Def	.233 ^c	.190 ^c	.194 ^c	.252 ^c
	(24.0)	(17.2)	(18.1)	(18.8)
Unu Debt Cap · Fin Def	-	.157 ^c	.151 ^c	.223 ^c
		(7.52)	(7.47)	(10.2)
Debt/Assets (-1)	-	-	-.056 ^c	-.026 ^a
			(-3.09)	(-1.69)
ln Assets (-1)	-	-	-	-.002
				(-0.90)
Control Var.	No	No	No	Yes
Adj. R ²	.32	.35	.38	.51
F value	577 ^c	330 ^c	241 ^c	123 ^c
N	1200	1200	1170	1051

a = significant at the 10% level

b = significant at the 5% level

c = significant at the 1% level

In the last regression, ln Assets (-1) and the five control variables are added to the regressions. To conserve space the coefficients of the five control variables are not reported. Adding these additional variables increases the Adj. R² from .38 to .51 and increases the magnitudes of the coefficients of Fin Def and the interactive variable. These new coefficients imply that firms with the most unused debt capacity finance 47.5% of their financial deficits with debt while other firms only finance 25.2% of their financial deficits with debt. Also, the coefficient on ln Assets (-1) is insignificant, indicating that the unused debt capacity proxy used in this study is a better proxy for debt financing capability than firm size (ln Assets (-1)). The coefficient of the lagged debt ratio remains negative and significant but is smaller in magnitude than in the previous regression.

In the second set of regressions, an alternate measure of debt financing (the change in long-term debt divided by total assets) is used as the dependent variable. The results of these regressions are contained in Table 3. As in the previous regressions, the coefficients of Fin Def are all positive and significant at the 1% level. The coefficients of the interactive variable are also all positive and significant at the 1% level. Additionally, the coefficients of both variables are significantly larger than the corresponding coefficients in the previous regressions. Using the coefficients from the fourth regression implies that firms with the most unused debt capacity finance 55.2% of their financial deficits with new debt while firms with less unused debt capacity finance 25.9% of their financial deficit with debt capital. The coefficients of Debt/Assets (-1) also remain negative and statistically significant and are somewhat larger than in the previous regressions. This confirms that the sample firms debt ratios exhibit mean reversion toward a target capital structure. The coefficient of ln Assets (-1) remains insignificant.

Table 3
Regression Analysis of the Change in Long-Term Debt

Dependent Variable: Change in LT Debt/Assets				
Intercept	.008 ^b	.008 ^b	.032 ^c	.005
(z value)	(2.16)	(2.04)	(5.61)	(0.32)
Fin Def	.303 ^c	.254 ^c	.254 ^c	.259 ^c
	(31.9)	(24.1)	(24.4)	(22.1)
Hi Debt Cap · Fin Def	-	.196 ^c	.193 ^c	.293 ^c
		(9.40)	(9.40)	(13.7)
Debt/Assets (-1)	-	-	-.103 ^c	-.090 ^c
			(-5.56)	(-5.73)
ln Assets (-1)	-	-	-	-.001
				(-0.17)
Control Var.	No	No	No	Yes
Adj. R ²	.45	.48	.50	.56
F value	1020 ^c	590 ^c	413 ^c	162 ^c
N	1254	1254	1254	1129

a = significant at the 10% level

b = significant at the 5% level

c = significant at the 1% level

CONCLUSION

The pecking order theory of capital structure predicts that firms will finance a significant proportion of their financial deficit (investments + dividends – operating cash flows) with debt capital. I also hypothesize that the amount of debt financing a firm actually uses is also related to its unused debt capacity. The empirical analysis in this study confirms that firms follow the pecking order theory in financing their financial deficits. Further, it is shown that firms with more unused debt capacity finance more of their financial deficits with debt than other firms. Specifically, the data indicates that firms with the most unused debt capacity finance approximately 50% of their financial deficits with debt while firms with less unused debt capacity finance approximately 25% of their financial deficits with debt. The data also indicate that a failure to adjust for credit availability in an empirical analysis of financial deficit financing will significantly under estimate the degree to which firms follow the pecking order theory. It is also confirmed that most firms seem to have a target capital structure but the actual firm debt ratio only reverts to the target at a rate of 5-10% per year. Additionally, the data also shows that a combination of an investment grade credit rating and relatively low debt outstanding is a better proxy for credit availability than the more commonly used total assets.

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