Tradeoff or Pecking Order: Capital Structure Policy Suitable for Financially Distressed Firms

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Most of the previous studies have analyzed the validity of Tradeoff and Pecking Order in the context of firms that are financially sound, not under financial distress. This study departs from that approach and analyzes the firms in financial distress to find empirical evidence on the issue as to whether the firms in financial distress follow a target debt ratio model or pecking order in adjusting their debt ratios. The findings show a weak support for the target adjustment model. Specifically, the firms in financial distress are found to be making a downward adjustment to the debt ratios, apparently due to potential increase in bankruptcy costs. Further, the study finds that transaction costs and bankruptcy costs influence the speed of adjustment towards the optimal debt ratio as well as the financing behavior of the firms in financial distress. The results are also supportive of the pecking order approach to capital structure adjustments by firms in financial distress.

Introduction

Extant empirical literature provides evidence in support of both static and dynamic capital structure models that have been developed by relaxing the utopian assumptions of Modigliani and Miller (MM) models (1958 and 1963). Overtime, studies expanded to include agency problems, information asymmetry, and pecking order considerations and brought out a wealth of empirical implications for capital structure decisions. According to the tradeoff literature, use of debt financing involves various costs and benefits and the managements' objective is to pursue an optimal debt level that is consistent with the maximization of firm value or shareholder wealth. The information asymmetry arguments take the view that the firms' managers use debt policy and related announcements to 'signal' to the market about the firm's quality and future prospects. An offshoot of this line of research is the pecking order hypothesis which views raising capital (debt versus equity) for funding needs in a hierarchical sequence—use of debt, internal equity, and finally external equity. Most studies, however, examined the capital structure policies of firms without regard to whether the findings and inferences apply to firms that are operationally or financially distressed.

This study makes an attempt to fill the void by focusing on firms in distress conditions. Specifically, it addresses the question: Which of the two capital structure policies—tradeoff or pecking order—do financially distressed firms follow? This study follows Shyam-Sunder and Myers (1999) in methodology and analysis. The findings reveal that firms in financial

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distress do not follow either tradeoff or pecking order approach with respect to capital structure. The results imply that, as argued by Gilson (1997), firms in distress are burdened with high transaction costs, making it difficult for them to make capital structure adjustments in their pursuit of achieving optimal debt ratios. Further, analysis carried out in this study does suggest interesting differences between the two criteria used for classifying financially distressed firms.

Literature Review

Modigliani and Miller (1958) propose a capital structure theory assuming perfect market conditions and prove that debt leverage would have no influence on the value of the firm. Later, Modigliani and Miller (1963) introduce corporate taxes into their model and show that 100% debt leverage can maximize the firm's value by reducing the overall cost of capital. Leland (1994) develops a theory of optimal capital structure considering tax benefits and the offsetting costs of financial distress that result from the use of debt financing. More recently, Shyam-Sunder and Myers (1999) propose that a value-maximizing firm would equate benefits and costs of debt at the margin and operate at the top of the 'market value of firm' curve. The curve would top out at relatively high debt ratios for safe, profitable firms with plenty of taxes to shield, without financial distress, and without impairments to the value of assets. Further, according to Shyam-Sunder and Myers (1999), the static tradeoff theory translates into a dynamic model with mean reversion towards a target or optimum leading to a prediction of cross-sectional variations in debt ratios by asset risk, profitability, tax status and asset type.

An alternative to tradeoff approach as an explanation for the firm's financing behavior is the pecking-order theory, according to which changes in debt ratios would result from the imbalance between internal cash flows, net of dividends, and real investment opportunities. The pecking order model by Myers and Majluf (1984) proposes that there is no optimal debt ratio and that firms' financing policies follow a hierarchy, with a preference for internal over external financing and for debt over equity. Changes in the debt ratios are driven by the need for external funds, not by any attempt to reach an optimal capital structure. Inherent in the pecking order propositions is an assumption of information asymmetry and signaling problems associated with external funding. Concurrently, if highly profitable firms with limited investment opportunities follow pecking order, there would be a downward revision in their debt ratios overtime. However, as theorized by Hovakimian *et al.* (2001), firms may follow the pecking order theory in the short run and then make their financial choices to maintain the target debt ratio in the long run.

Despite the above convincing arguments, a plausible question that arises is whether either of these two explanations applies to firms that are in financial distress. Asquith *et al.* (1994) address this issue and show that when companies are in financial distress, they try to avoid bankruptcy by restructuring their assets and liabilities and by turnaround strategies. Further, they present a probable response to distress: asset sales, mergers, capital expenditure reductions, write-off on the asset side, and debt restructurings.

Shyam-Sunder and Myers (1999) present arguments that if the costs of financial distress are heavy, the less optimistic manager will consider issuing equity to finance real investment

or pay down the debt. But, the manager is likely to forgo the equity issuance if managers' information is sufficiently favorable and the issue price is too low. Thus, according to their analysis, a broader pecking order hypothesis would accommodate some equity issues, but at high debt levels (financial distress), it will be difficult to distinguish between pecking order theory and static tradeoff predictions. However, Shyam-Sunder and Myers (1999) did not examine the financial policies of firms in high debt levels.

Financial distress-related debt restructurings have been explored by other researchers, for example, restructurings of bank claims (Gilson, 1990), debt restructurings versus bankruptcy (Gilson *et al.*, 1990), public debt restructurings versus bank debt restructurings (Brown *et al.*, 1994), asset sales (Brown *et al.*, 1994), and the Chapter 11 reorganizations under the US bankruptcy code (Franks and Torus, 1989; and Hotchkiss, 1995). These studies have analyzed the different responses of financially distressed firms but were unable to provide evidence about the capital structure decisions of those firms as regards the target-adjustment model or the pecking order model.

One study that examined the capital structure implications for firms in distress is by Gilson (1997), in which he developed transaction cost arguments in rationalizing capital structure effects of financially distressed firms. According to him, high transaction and restructuring costs prevent financially distressed firms to readjust their capital structures back to what was previously 'optimal'. The firms in distress simply negotiate new payment terms with creditors, but their leverage ratios continue to be high and 'sticky'. Gilson examined firms that filed for bankruptcy and found that firms in financial distress do not follow the optimal capital structure. He also found that the leverage ratios tend to be most sticky when debt is restructured out of court and least sticky when debt is restructured under Chapter 11 bankruptcy reorganization. Gilson's study has provided interesting insights into why financially distressed firms deviate from optimal capital structure, but it has not explored whether such firms follow pecking order, an alternative approach to the tradeoff models espoused in capital structure literature. Further, Gilson's findings, which are based on firms that have already undergone restructuring or Chapter 11 bankruptcy process, may not be applicable to the firms that are in earlier stages of financial distress, i.e., firms that have cash flow constraints to meet debt-related obligations but not yet undergone debt restructuring or Chapter 11 proceedings.

Barclay and Smith (2005) summarized the capital structure puzzle in the theoretical models and empirical studies. They pointed out that corporate managers make corporate financing choices by trading off the tax shields of greater debt against costs of financial distress (bankruptcy). The extent to which a company can benefit from using debt as interest tax shields depends on its other tax shields (for example, investment credits or tax loss carry-forwards). This study argues that a company under the financial distress situation should use less debt financing due to lower value of debt-related tax shields. Further, following Barclay and Smith (2005), it expects that highly leveraged firms in financial distress are more likely to pass up the investment projects (underinvestment) or reduce debt usage.

As stated earlier, this study's focus is on examining the capital structure decisions of financially distressed firms, and not those under the legal bankruptcy procedure. Specifically,

it intends to verify if financially distressed firms would adjust their debt ratios to fit the tradeoff model (target debt ratio) or the pecking order model by testing two hypotheses. The first hypothesis, following Gilson (1997), is that financially distressed firms would not follow target debt ratios. The second hypothesis, following Barclay and Smith (2005), is that financially distressed firms would follow pecking order theory by issuing common equity. If the fit is consistent with the pecking order theory, the evidence would be indicative of high transaction costs and the distressed firms' inability to revise their debt ratios according to the tradeoff model. Also, debt issuance would convey the signal to investors about good prospects of the firms, in addition to imposing discipline on the management of financially distressed firms. Such a finding would also be consistent with the theoretical agency models of Grossman and Hart (1982), Jensen (1986), Stulz (1990), and Barclay and Smith (2005).

Methodology

We start with the criteria for classifying firms as financially distressed taking guidance from the approaches employed in prior studies. Asquith *et al.* (1994) classified a firm as financially distressed if in any two consecutive years the firm's Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) is less than 80% of its interest expense. Chatterjee *et al.* (1996) measured the level of economic distress as revealed by the ratio of EBITD to sales and total assets for the year prior to the filing or announcement of a workout. Andrade and Kaplan (1998) defined financially distressed firms as "pure financial distress by operating positive margins exceeding the industry median." They argued that this way can purify the costs of financial distress, which mainly come from high leverage and not economical distress. Ghoul (2004) identified the financially distressed firms according to the level of Interest Coverage Ratio (ICR), the ratio of EBIT over interest expenses. Ghoul assumed that a given firm is financially distressed if its ICR is less than 1 for the year $t=0$ (i.e., current cash flows are not sufficient to pay interest charges) and greater than 1 for years $t-1$ and $t-2$.

This study uses the measures employed by Asquith *et al.* (1994) and Ghoul (2004). As shown in Table 1, a firm is classified as financially distressed if: (1) during the two consecutive years ($t-1$ and $t=0$), the firm's EBITDA is less than 80% of its interest expense and larger than 80% of its interest expense during the years $t-2$ and $t-3$; or (2) if during any two consecutive years ($t-1$ and $t=0$), the firm's ICR is less than 1 and greater than 1 during the years $t-2$ and $t-3$. These criteria are more stringent than those set in previous studies for improving the accuracy of classifying firms as financially distressed. By imposing the condition requiring EBITDA >= 80% of interest expense or ICR >= 1 during the years $t-2$ and $t-3$, we can reasonably assume that the firm was 'financially sound' during that period and was probably pursuing a policy of either optimal capital structure or pecking order as per the managerial preferences. The two-consecutive-year requirement ($t-1$ and $t=0$) for EBITDA < 80% of interest expense or ICR < 1 increases the likelihood that the firm is experiencing financial distress. Since capital structure adjustments are not likely to be instantaneous, we intend to analyze the financing behavior of the sample firms over a period of three years, i.e., $t-2$, $t-1$ and $t=0$ (Table 1).

Table 1: Time Frame			
$t-3$	$t-2$	$t-1$	$t=0$
$ICR_{t-1}>1$	$ICR_{t=0}>1$	$ICR_{t+1}<1$	$ICR_{t+2}<1$
$EBITDA_{t-1}>80\%$	$EBITDA_{t=0}>80\%$	$EBITDA_{t+1}<80\%$	$EBITDA_{t+2}<80\%$
Financial Flexible Period		Financially Distressed Period	

For empirical analysis, we adopt the estimation methods employed in Shyam-Sunder and Myers (1999) and examine if the financially distressed firms follow the target adjustment policy or the pecking order approach. Briefly, the structure of the empirical models is as follows:

The Tradeoff Model

The target adjustment model envisaged by Shyam-Sunder and Myers (1999) states that changes in the debt ratio are explained by deviations of the current level from the target. The regression specification is as follows:

$$\Delta D_{Adjust} = \alpha + b_{TA}\left(D^{*}{}_{i} - D_{Adjust-1}\right) + e_{Adjust} \quad \ldots(1)$$

where D^{*}_{i} is the target debt ratio for firm i at time t, ΔD_{Adjust} is the amount of debt issued or retired, and $D_{Adjust-1}$ is the lagged debt ratio. We take b_{TA}, the target-adjustment coefficient, as a sample-wide constant. If $b_{TA} > 0$, it is indicative of adjustment towards the target, and if $b_{TA} < 1$, it implies positive adjustment costs. The ΔD_{Adjust}, D^{*}_{i} and $D_{Adjust-1}$ are scaled by the total assets.

Pecking Order Model

The pecking order model for corporate financing, developed by Shyam-Sunder and Myers (1999), states that the firm would issue debt when its internal cash flows are inadequate for the real investment and dividend commitments. Equity is never issued, except under the circumstances involving issuance of junk debt and high costs of financial distress. The model is specified in two parts. First, the funds flow deficit is determined as:

$$DEF_{i,t} = DIV_{i,t} + X_{i,t} + \Delta W_{i,t} + R_{i,t} - C_{i,t} \quad \ldots(2)$$

where C_t = operating cash flows, after interest and taxes, DIV_t = dividend payments, X_t = capital expenditures, ΔW_t = net increase in working capital, R_t = current portion of long-term debt at the start of the period. All stock variables are measured at the end of period t. Second, the model for testing the pecking order hypothesis is stated as:

$$\Delta D_{i,t} = \alpha + b_{PO}\, DEF_{i,t} + e_{i,t} \quad \ldots(3)$$

where $\Delta D_{i,t}$ is the amount of debt issued or retired (if DEF_t is negative) by firm i. The $\Delta D_{i,t}$ and DEF are scaled by the total assets. The coefficient values $\alpha = 0$ and $b_{PO} = 1$ would be consistent with the prediction for the pecking order policy. $e_{i,t}$ is the random error term.

Hypotheses

Our first hypothesis, following Gilson, is that financially distressed firms would not follow target debt ratios.

H_1: *Financially distressed firms would not follow the target debt ratio, i.e.,* $b_{TA} < 0$ *in estimations using Equation (1).*

Our second hypothesis, following Barclay and Smith (2005), is that financially distressed firms would follow pecking order theory, based on the agency cost considerations.

H_2: *Financially distressed firms would follow the pecking order theory, i.e.,* $\alpha = 0$ *and* $b_{PO} = 1$ *in estimations using Equation 3.*

Sample and Data

The data is obtained from Compustat database for the US firms for the fiscal years from 1990 to 2004. The industry and economic codes assigned by Standard & Poor's are used for the broad industry groups included in this study. Each economic sector encompasses a number of industry index groups. Under this system, all stocks within the S&P 500, the Mid-Cap 400 and the Small-Cap 600 are classified into ten economic sectors. First, we excluded firms in the following sectors: telecommunication services, energy, financial, information technology, and utilities, as they are either regulated or heavily influenced by industry-specific factors in their debt-equity choices. We then drew our sample from five economic sectors: materials, industrials, consumer discretionary, consumer staples, and healthcare.

The first selection criterion of ICR, using the EBIT divided by interest expense, yielded a total of 63 firms for classification as financially distressed. The second selection criterion using EBITDA resulted in 38 firms being classified as financially distressed. Then, upon omitting outliers and duplicate firms (three in ICR criterion, two in EBITDA criterion, and two duplicated firms), a total of 94 firms comprised our final sample.

Measurement of Variables

Diffavg10	=	Proxy for D*, 10-year historical mean of debt ratio for each firm (from *t*–1 to *t*–10) (data79 + data80 + data81 + data82 + data83)
GD_{it}	=	The gross issue amount of debt issued at year *t* (data111/data6)
ND_{it}	=	The net amount (of debt issued – debt retired) at year *t* [(data111 – data114)/data6]
DEF	=	The amount of fund flow deficit
C_t	=	Operating Income Before Depreciation + Amortization of Intangibles – Interest Expense – Income taxes (data13 + data65 – data15 – data16)
DIV_t	=	Dividend (data21)
X_t	=	Capital Expenditure (data128)
ΔW_t	=	Working capital at year *t* – Working capital at year *t*–1 (data121)
R_t	=	Debt – Due in one year (data44)
D_t	=	Convertible + Subordinated + Notes + Debentures + Other long-term debt (data79 + data80 + data81 + data82 + data83)

A_t = Asset – Current Liabilities (data6 – data5)

(Note: The Compustat data item numbers are indicated in parentheses.

D_t = long-term debt outstanding, A_t = net book assets)

Results

Results are presented in two ways: first, summary statistics; second, multivariate results from regression analysis. Table 2 contains summary statistics of the variables, while Table 3 contains the correlations among the variables.

Table 2: Sample Statistics

Sample firms according to ICR and EBITDA Criteria (n = 94)

Variable	Mean	Std. Dev.	Minimum	Maximum
Year: *t*–2				
DEF	0.02170	0.10862	–0.18890	0.48935
Diffavg10	0.00440	0.14292	–0.37477	0.46601
Gross Issue (GD)	0.06772	0.11396	0.00000	0.54232
Net Issue (ND)	0.01132	0.07750	–0.26953	0.42223
Year: *t*–1				
DEF	0.04530	0.23243	–0.49798	0.67937
Diffavg10	0.00619	0.14686	–0.41105	0.49903
Gross Issue (GD)	0.07230	0.11244	0.00000	0.53812
Net Issue (ND)	0.02971	0.10227	–0.25236	0.44410
Year: *t*=0				
DEF	–0.000627	0.12891	–0.27488	0.25858
Diffavg10	–0.00235	0.17828	–0.34290	0.36189
Gross Issue (GD)	0.07962	0.17464	0.00000	1.33602
Net Issue (ND)	0.00268	0.18046	–0.29193	1.33602

Note: $Diffavg10_{it}$: $(D^*_i - D_{Adjust-1})$, changes in debt ratio by deviations of the current ratio from the target at year *t*–2, *t*–1, and *t*=0. Proxy for D* is 10-year historical mean of debt ratio for each firm (from *t*–3 to *t*–12); Gross Issue $_{it}$: The gross issue amount of debt issued at year *t*–2, *t*–1, and *t* = 0; Net Issue $_{it}$: The net amount of (debt issued – debt retired) at year *t*–2, *t*–1, and *t*=0; and DEF_{it}: The amount of fund flow deficit at year *t*–2, *t*–1, and *t*=0.

Summary Statistics and Univariate Results

The mean of the *Diffavg10* (deviation from the 10-year historical average debt ratio proxied for the optimal debt ratio) variable is negative at year *t*. This means that financially distressed firms are not able to adjust their debt ratios to their optimal levels owing to high transaction cost as argued by Gilson (1997). The *DEF* variable [cash outflows minus the operating cash flow as defined in Equation (2)] is positive in year

t–2 and t–1, but slightly negative in year t=0. It means that during t–2 and t–1, the firms in financial distress have cash flow constraints which diminish by the year t=0. The mean values of both variables, gross and net issuance of debt, are positive in all the three years, t–2, t–1, and t=0, suggesting the possibility that some adjustment towards optimal debt ratio takes place. However, from the negative *Diffavg10* value for the year (t=0) we may infer that debt issuance is less than what is needed for full adjustment towards the optimum, again conforming to Gilson's transaction cost arguments.

It can be observed from Table 3 that correlation between *DEF* (the funds deficit variable) and net issue (*ND*) variables is positive and statistically significant during the years t–1 and t=0. The correlation between *DEF* and gross issue (*GD*) is also positive during the year t–1. The positive correlation between *DEF* and the debt issuance variables implies that firms adopt pecking order for raising capital even under financially distressed conditions. The weak negative correlations between *Diffavg10* and variables reflecting gross and net issuance of debt (*GD* and *ND*) are indicative of non-adherence to the optimal debt ratio under distressed situations, may be from the standpoint of high transaction costs or bankruptcy costs.

Table 3: Correlation Matrix

Year: t–2				
Variable	***DEF***	***Diffavg10***	**Gross Issue (GD)**	**Net Issue (ND)**
DEF	1	–	–	–
Diffavg10	0.17359	1	–	–
Gross Issue (GD)	0.03128	–0.05599	1	–
Net Issue (ND)	0.02142	0.02852	0.59326***	1
Year: t–1				
Variable	***DEF***	***Diffavg10***	**Gross Issue (GD)**	**Net Issue (ND)**
DEF	1	–	–	–
Diffavg10	–0.20567	1	–	–
Gross Issue (GD)	0.47570**	–0.07400	1	–
Net Issue (ND)	0.48519**	–0.18615	0.81815***	1
Year: t=0				
Variable	***DEF***	***Diffavg10***	**Gross Issue (GD)**	**Net Issue (ND)**
DEF	1	–	–	–
Diffavg10	0.00821	1	–	–
Gross Issue (GD)	–0.08835	0.02947	1	–
Net Issue (ND)	0.67652***	0.09879	0.79695***	1

Note: 1. Statistical significance: * at 10% significant level, ** at 5% significant level, and *** at 1% significant level; and

2. For explanation of variables see Table 2.

Multivariate Results

Testing for Tradeoff Model Implications

We estimate the regression model in Equation (1) to test whether the firms in financial distress adjust their debt ratios toward what was previously considered optimal. The dependent variable is debt issuance and the independent variable is *Diffavg10*. For each year, $t-2$, $t-1$, and $t=0$, we run two separate regressions using the Gross Debt (GD) and Net Debt (ND) issuance of debt as the dependent variables. We examine the regression coefficient, b_{TA}, to assess if the firms make adjustments towards target debt ratio.

We present the regression results in Table 4. For $t-2$, the year just prior to being financially distressed, the coefficient b_{TA} is not statistically significant. It means that there is no adjustment toward target debt ratio for firms that are not in financial distress. For $t-1$, the first year in financial distress, the coefficient for *Diffavg10* (b_{TA}) is still negative and insignificant. It means that the adjustment towards target debt ratio takes place concurrently as the firm goes into financial distress. Further, the negative sign suggests that the firms in distress would push towards a lower optimal debt ratio by reducing their debt level in response to the substantial increase in bankruptcy costs as a result of financial distress. For $t=0$, the second year in financial distress, the coefficient b_{TA} is positive and not statistically significant. It implies that the revision towards the lower optimal level of debt has probably taken place in the first year itself. Alternatively, it may be that owing to high transaction costs the firms could not continue with any more adjustment towards the target debt ratio. It is also possible that the firms have switched to a pecking order approach for revising their capital structure or began a process of debt restructuring.

Table 4: Target Adjustment Model (Combined Sample)

With 10-year historical mean of debt ratio (*Diffavg10*)

Year	$t-2$		$t-1$		$t=0$	
Dependent Variable	Gross/ Assets	Net/ Assets	Gross/ Assets	Net/ Assets	Gross/ Assets	Net/ Assets
No. of observations	57	56	60	58	58	58
Constant	0.06***	0.02**	0.08***	0.03**	0.08***	0.00
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)
Diffavg10 (b_{TA})	–0.05	0.00	–0.06	–0.12	0.03	0.11
	(0.11)	(0.07)	(0.10)	(0.09)	(0.14)	(0.15)
Adjusted R^2	–0.02	–0.02	–0.01	0.02	–0.02	–0.00

Note: See 'Note' in Table 3.

Testing for Pecking Order Model Implications

We run the regression model in Equation (3) to test whether the firms in financial distress adjust their debt ratios according to the pecking order model. As before, the dependent variable is debt issuance (gross or net) and the independent variable is *DEF*

(the funds deficit). For each year, t–2, t–1, and t=0, we run two separate regressions using the GD and ND issuance as the dependent variables. We examine the regression coefficient b_{PO} to assess if the firms in distress follow pecking order.

Table 5 presents the regression results. For t–2, the year just prior to being financially distressed, the coefficient b_{PO} is not statistically significant. It means that firms did not follow pecking order by issuing debt. For t–1, the first year in financial distress, the coefficients (b_{PO}) are positive and statistically significant. It means that the firms experiencing funding deficits as a result of financial distress issued debt, thereby attesting to the pecking order approach to capital structure adjustments. For t=0, the second year in financial distress, the coefficient (b_{PO}) continues to be positive and statistically significant for the equation with ND issue as the dependent variable. Further, the coefficient has more than doubled in magnitude, which suggests the continued use of pecking order approach to fill the deficit with debt financing. In contrast to the findings in Table 4, where we noted that firms may not be following the target debt ratio model in year t=0, the results for year t=0 in Table 5 lend a convincing support in favor of pecking order model.

Table 5: Pecking Order Model (Combined Sample)

Year	$t-2$		$t-1$		$t=0$	
Dependent Variable	Gross/ Assets	Net/ Assets	Gross/ Assets	Net/ Assets	Gross/ Assets	Net/ Assets
No. of observations	39	38	25	24	31	30
Constant	0.06***	0.01	0.06***	0.03*	0.06***	–0.01
	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
DEF (b_{PO})	0.03	0.01	0.15**	0.16***	–0.06	0.39***
	(0.16)	(0.07)	(0.06)	(0.06)	(0.13)	(0.08)
Adjusted R^2	–0.03	–0.03	0.19	0.20	–0.03	0.44

Note: 1. For explanation of variables see Table 2.

2. For statistical significance see Table 3.

Robust Checks

In the earlier regressions, there was no empirical support for the target adjustment model. The pecking order hypothesis held well in three estimations, particularly with 'net issues' as the dependent variable. Now, we conduct further analysis using alternate specification of the empirical models to assess the validity of the original models when subjected to certain variations.

First, we compute the optimal debt ratio based on the average over a 5-year period (*Diffavg5*), instead of the 10-year period (*Diffavg10*) used earlier. The findings from these estimations are about the same as the previous findings reported in Table 4 and hence are not reported here. These results, however, lend support to the argument of Shyam-Sunder and Myers (1999) that optimal debt ratios have a tendency for mean-reversion.

It may be recalled here that we used two different criteria for classifying the firms as financially distressed: those with the ICR less than 1 and those with EBITDA less than 80% of the interest expense. We ran the previous regressions on the combined sample. Now, as a robust check, we analyze the data separately according to the above two criteria. The firms classified as financially distressed by the EBITDA criterion are obviously constrained more severely than those classified according to the ICR criterion. For this reason, the firms falling into financial distress from weakness at the EBITDA level itself are less likely to adjust their debt ratios to the optimal level than those that fall into financial distress according to the ICR criterion. The results relating to the target model are reported in Table 6. In Panel A, we report results by the ICR criterion, while in Panel B, we report results by the EBITDA criterion. In both cases, the results are essentially the same in that there is some empirical support for making a downward adjustment to the debt ratio by the firms in financial distress.

Table 6: Target Adjustment Model
(Sample Separated by ICR and EBITDA Criteria)

With 10-year historical mean of debt ratio (*Diffavg10*)

Year	$t-2$		$t-1$		$t=0$	
Panel A: ICR Criterion						
Dependent Variable	**Gross/ Assets**	**Net/ Assets**	**Gross/ Assets**	**Net/ Assets**	**Gross/ Assets**	**Net/ Assets**
No. of observations	33	32	37	35	38	36
Constant	0.06***	0.01*	0.08***	0.04***	0.06***	–0.03*
	0.02	0.01	0.02	0.01	0.02	0.01
Diffavg10 (b_{TA})	–0.05	–0.01	–0.00	0.08	–0.19**	–0.00
	0.10	0.96	0.11	0.09	0.09	0.08
Adjusted R^2	–0.02	–0.03	–0.03	–0.00	0.08	–0.03
Panel B: EBITDA Criterion						
Dependent Variable	**Gross/ Assets**	**Net/ Assets**	**Gross/ Assets**	**Net/ Assets**	**Gross/ Assets**	**Net/ Assets**
No. of observations	26	26	25	25	24	24
Constant	0.07**	0.04*	0.07**	0.03	0.09	0.04
	0.03	0.02	0.03	0.02	0.06	0.06
Diffavg10 (b_{TA})	–0.03	0.02	–0.10	–0.38**	0.31	0.21
Adjusted R^2	0.21	0.14	0.18	0.15	0.31	0.32
	–0.04	–0.04	–0.03	–0.19	–0.00	–0.03

Note: 1. For explanation of variables see Table 2.

2. For statistical significance see Table 3.

The results relating to the testing of pecking order are reported in Table 7, (Panel A for the ICR criterion and Panel B for the EBITDA criterion). The results according to the ICR criterion show that the coefficient for *DEF* is positive and significant at 1% level for the years *t*–1 and *t*=0, similar to the findings reported in Table 5. Moreover, the adjusted R^2 has improved from 0.44 to 0.60 and the coefficient (b_{PO}) has increased in magnitude from 0.39 to 0.53 for *t*=0. This reaffirming finding is supportive of the hypothesis that firms follow pecking order, but with a lag. Contrary to this, the results for the EBITDA criterion show only a weak positive coefficient for the *DEF* variable at year *t*+1. The difference between the results for the ICR and EBITDA is quite interesting, as the firms that are more severely constrained at the EBITDA level itself are less likely to raise new debt than those with ICR less than 1.

Table 7: Pecking Order Model (Sample Separated by ICR and EBITDA Criteria)

Year	*t* – 2		*t* – 1		*t* = 0	
Panel A: ICR Criterion						
Dependent Variable	**Gross/ Assets**	**Net/ Assets**	**Gross/ Assets**	**Net/ Assets**	**Gross/ Assets**	**Net/ Assets**
No. of observations	16	15	17	16	23	22
Constant	0.07***	0.02***	0.07***	0.04**	0.08***	–0.00
	0.03	0.00	0.01	0.01	0.02	0.01
DEF (b_{PO})	–0.15	–0.08	0.64***	0.63**	0.04	0.53***
	0.13	0.06	0.16	0.18	0.16	0.09
Adjusted R^2	0.03	0.06	0.48	0.44	–0.04	0.60
Panel B: EBITDA Criterion						
Dependent Variable	**Gross/ Assets**	**Net/ Assets**	**Gross/ Assets**	**Net/ Assets**	**Gross/ Assets**	**Net/ Assets**
No. of observations	25	25	10	10	10	10
Constant	0.06	0.01	0.07**	0.03	0.03	–0.02
	0.02	0.01	0.03	0.03	0.03	0.01
DEF (b_{PO})	0.61	0.23	0.00	–0.00	–0.09	0.03
Adjusted R^2	0.37	0.17	0.00	0.00	0.07	0.05
	0.0644	0.03	–0.12	–0.12	0.07	–0.05

Note: 1. For explanation of variables see Table 2.

2. For statistical significance see Table 3.

Conclusion

This study examines the capital structure of financially distressed firms to ascertain if those firms follow a target debt ratio model or pecking order to adjust their debt ratios. The findings show a weak support for the target adjustment model. Specifically, the firms in financial distress are found to be making a downward adjustment to the debt ratios, apparently for the reasons of

potential increase in bankruptcy costs. Further, the results imply that transaction costs and bankruptcy costs could be hampering the speed of target adjustment towards the optimal debt ratio in firms experiencing financial distress. The results are supportive of the pecking order approach to capital structure adjustments by firms in financial distress. Specifically, the firms in financial distress are found to fill their funding gaps by issuance of debt. Future studies could examine if firms in financial distress, owing to excessive debt levels, follow the pecking order by issuing equity instead of debt, consistent with Shyam-Sunder and Myers (1999) that less optimistic managers will issue equity.

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Reference # 01J-2009-10-01-01