Tests of the Pecking Order Theory and the Tradeoff Theory of Optimal Capital Structure

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Abstract

We investigate implications of the tradeoff theory and the pecking order theory. The results suggest that firms adjust their debt levels according to target debt ratios as well as the pecking order. Firms are slower in adjusting and less responsive to their financial needs when it is to increase the debt level. The pecking order is found to be much more binding force for small firms and non-dividend paying firms, supporting the hypothesis that small firms are more likely to follow the pecking order because of the difficulty in accessing external financing sources. We also find that small firms are significantly slower when the adjustment requires an increase in debt level according to the target adjustment model.

Introduction

The existence of debt financing generates agency costs of debt under informational asymmetry: the stockholders' incentive to take sub-optimal risky projects which transfer wealth from bondholders to stockholders (Jensen and Meckling, 1976) and to abandon profitable projects in some future states (Myers, 1977). If debt is used as a valid signal of a more productive firm (Ross 1977), an increase in the amount of debt may reduce the agency costs associated with informational asymmetry. The tradeoff theory views a manager as trading off the benefits from debt financing against the various costs of debt. The marginal agency cost of debt is regarded as an increasing function of debt in a capital structure. Therefore, a manager, acting as a shareholder value maximizer, should borrow up to the point where the marginal value of the benefits from debt financing including interest tax shields is equal to the marginal cost of debt including agency and financial distress costs. Barnea, Haugen and Senbet (1981) argue that a firm reaches an optimal capital structure when the costs associated with agency problems are balanced by the benefits associated with different financial contracts in terms of their inherent ability to resolve agency problems and tax exposure.

Another idea is that informational asymmetries between insiders and outsiders introduce incentive problems in financial relationship, making financing and investing dependent upon each other. The pecking order theory states that firms prefer internal financing and if external financing is required, they issue the safest security first. Managers will choose to issue debt when investors undervalue the firm and issue equity when they overvalue the firm. Recognizing this policy of managers, investors will perceive an equity issue as bad news, making the cost of issuing equity higher. If the firm can use internal financing sources or issue low-risk debt, then the cost of asymmetric information can be minimized. If the manager has better information than investors, it is better to issue debt than equity (Myers and Majluf, 1984). That is, firms issue debt first, then possibly hybrid securities such as convertible bonds, then equity as a last resort.

Previous studies provide mixed empirical evidence for the two theories. Evidence in favor of the tradeoff theory includes industry effects of optimal ratios, the negative relation of leverage ratios to intangible assets proxied by research and development expenditures, and mean reversion in debt ratios. Bradley, Jarrel and Kim (1984) find that firms' optimal leverage is inversely related to the expected costs of financial distress and to the amount of non-debt tax shields. They also find the highly significant inverse relation between firm leverage and earnings volatility. Mackie-Mason (1990) provides evidence that firms issue less debt when they have tax loss carry forwards.

According to Myers (1993), the most telling evidence against the tradeoff theory is the inverse correlation between profitability and financial leverage. Titman and Wessels (1988) find a significant negative relationship between profitability and debt ratios.[1] However, the tradeoff theory predicts the opposite relationship unless profitable firms incur more agency costs than less profitable firms as the debt ratio increases. Titman and Wessels (1988) find no relationship between debt ratios and a firm's expected growth, non-debt tax shields, volatility, or the collateral value of its assets. The pecking order theory suggests that there is no well-defined optimal capital structure, instead the debt ratio is the result of hierarchical financing over time (Myers, 1984). Kester (1986), in his study of debt policy in U.S. and Japanese manufacturing corporations, finds that the return on assets is the most significant explanatory variable for actual debt ratios. MacKie-Mason (1990) asks the question; "Do firms care who provides their financing?" His result suggests that the importance of asymmetric information gives a reason for firms to care about who provides the funds (e.g., between public and private debt) because different fund providers have different access to information about the firm and different ability to monitor firm behavior. This is consistent with the pecking order theory implied by Myers and Majluf (1984) since private debt will require better information about the firm than public debt.

Shyam-Sunder and Myers (1999) report evidence in favor of the pecking order theory. They show that firms follow the pecking order in their financing decisions. Unlike the models in Shyam-Sunder and Myers (1999), our model allows different adjustment costs for increasing and decreasing the debt level. We also consider not only long-term debt levels but total debt levels. We find evidence that firms adjust their debt levels according to target debt ratios. The pecking order theory also explains a considerable portion of the variation in debt levels. Both theories are not distinguishable in explaining firms capital structure decisions. Firms are generally slower in adjusting the debt level when it is required an increase in the debt level. The pecking order is found to be much more binding force for small firms and non-dividend paying firms, supporting the hypothesis that small firms are more likely to follow the pecking order because of the difficulty in accessing external financing sources. We also find that small firms are significantly slower when the adjustment requires an increase in debt level according to the target adjustment model.

The rest of the paper proceeds as follows. In Section 2 we discuss the study of Shyam-Sunder and Myers (1999) and extend their model to accommodate different adjustment costs for debt increase and decrease and to mitigate some problems in the previous study. In Section 3, the data and estimation procedures are discussed and estimation results are reported with their implications. Concluding remarks are in Section 4.

Static Capital Structure Choice Models

Shyam-Sunder and Myers (1999) estimate two separate models to test the pecking order theory and the tradeoff theory. They estimate the pecking order model as follows:

$$\Delta LD_{it} = \alpha_1 + \alpha_2 DEF1_{it} + \varepsilon_{it} \qquad (1)$$

where

ΔLD_{it} = Changes in long-term debt outstanding for firm i from time $t-1$ to t,

[1] Rajan and Zingales (1995) also report some evidence of a negative correlation between profitability and leverage among G7 countries. The negative effect of earnings on leverage is more significant for larger firms.

$DEF1_{it} = DIV_{it} + X_{it} + \Delta W_{it} - C_{it}$,[2]

DIV_{it} = Dividend payments of firm i at time t,

X_{it} = Net capital expenditures of firm i at time t,

ΔW_{it} = Net changes in working capital for firm i from time $t-1$ to t,

C_{it} = Operating cash flows after interest and taxes for firm i at time t.

The pecking order theory predicts that firms with a positive financial deficit, $DEF1$, are more likely to issue debt. Therefore the hypothesis to be tested is $\alpha_1 = 0$ and $\alpha_2 > 0$.

The target adjustment model is specified as:

$$\Delta LD_{it} = \beta_1 + \beta_2 LDE_{it} + \varepsilon_{it} \tag{2}$$

where $LDE_{it} = LD^*_{it} - LD_{it-1}$, LD^*_{it} is the target long-term debt level and LD_{it-1} is long-term debt outstanding at time $t-1$ for firm i. The tradeoff theory suggests that when a firm's debt level deviates from its target, it will adjust gradually back to its target. The hypothesis in Shyam-Sunder and Myers (1999) is $0 < \beta_2 < 1$, indicating partial adjustment towards the target, but implying positive adjustment costs. A commonly used instrument for the target is the historical mean of the debt ratio (long-term debt to capital) multiplied by total capital at time t for each firm.

Even though they cannot reject either theory from independent tests of the above models, Shyam-Sunder and Myers (1999) show some evidence in favor of the pecking order theory; the pecking order theory gives a better fit in terms of R-square and more power in various experimental designs. They also show that when they nest the two models in the same regression, the coefficient and significance of the target adjustment variable are reduced.

If the adjustment cost of increasing a debt level is higher than that of decreasing a debt level, however, it may not be surprising to see low R-squares and a lack of power in the linear target adjustment models. There may be omitted variables or other specification problems. There is also a problem in using only long-term debt. As mentioned in the introduction, the existence of debt financing generates various agency costs. Unprofitable firms with high long-term debt levels may be reluctant to issue equity because the wealth transfer from shareholders to bondholders may exceed the increased value associated with improving the capital structure. These agency costs are mitigated if the firm issues short-term debt rather than long-term debt (Barnea, Haugen and Senbet, 1980). The firm may also rely on short-term debt to finance the retirement of its long-term debt because of the low agency costs of short-term debt.[3] The firm may deviate from the average long-term debt level but not from the target ratio; that is, it is possible that the long-term debt alone does not reflect the firm's real decision on its capital structure. Thus using only long-term debt may bias the results against the target adjustment model. Rajan and Zingales (1995)

[2] In their definition of $DEF1$, Shyam-Sunder and Myers (1999) include a current portion of long-term debt from the previous period which is due over the current period, but in our definition, this is already included in the current liabilities item, thereby in the working capital measure.

[3] For example, the commercial paper (CP) market is a large source of corporate short-term funds. Nayar and Rozeff (1994) report that there were $525 billion CP outstanding in 1991. They also provides evidence that the announcements of CP ratings influence stock returns.

also suggest that the effects of past financing decisions are best represented by the ratio of total debt to capital.

Recognizing the above problems, we develop the target adjustment model as follows:

$$\Delta TD_{it} = \beta_1 + \beta_2 TDE_{it} + \beta_3 TDE_{it} M_{it} + \varepsilon_{it} \tag{3}$$

where

$TDE_{it} = TD^*_{it} - TD_{it-1}$,

TD^*_{it} = Target total debt (including short-term as well as long-term) for firm i at time t,

TD_{it-1} = Total debt for firm i at time $t-1$,

ΔTD_{it} = Changes in total debt for firm i from time $t-1$ to t, and

M_{it} = Dummy variable equal to one if $TDE_{it} \geq 0$, zero otherwise,

where TDE represents the deviation of the total debt level from its target.[4] Note that unlike the specification in Shyam-Sunder and Myers (1999), equation (3) allows different adjustment costs for increasing and decreasing the debt level. If the adjustment costs are higher when the firm increases its debt level than when the firm decreases it, we may expect a negative β_3.

Similarly, the pecking order model is given by

$$\Delta TD_{it} = \alpha_1 + \alpha_2 DEF2_{it} + \alpha_3 DEF2_{it} Q_{it} + \varepsilon_{it} \tag{4}$$

where Q_{it} is a dummy variable which equals one for positive $DEF2_{it}$ and zero otherwise.[5] We include the interaction term to compare with the trade-off theory. The motivation for the interaction term is not as clear for this model as it is for the target adjustment model. However, Shyam-Sunder and Myers (1999) maintain that that the pecking order theory predicts that the firm will only issue or retire equity as a last resort.

Empirical Analysis

A. Data

The time period analyzed in this study is 1981 through 2000. Our primary data source consists of the Annual Industrial COMPUSTAT files. Financial firms and regulated utilities are excluded from the sample because these firms have very different capital structures and the financing decisions of these firms may not convey the same information as for non-financial and non-regulated firms.[6] For example, a relatively high leverage ratio is normal for financial firms, but the same high leverage ratio for non-financial firms may indicate a possibility of financial distress. We also require firms to have at least \$3 million of assets to be included in our sample. This requirement may bias our sample toward large firms. However, large firms should have relatively easy access to the debt market and our sample can mitigate the concern about the liquidity constraints

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[4] One may consider using total liabilities in defining the debt ratio which can be viewed as a proxy for what is left for shareholders in case of liquidation. However, as pointed out by Rajan and Zingales (1995), total liabilities include items like accounts payable which are used for transactions purposes rather than for financing and overstate the amount of leverage.

[5] Here $DEF2$ is defined the same as in equation (1) except that short-term debt is excluded when we calculate the net changes in working capital.

[6] Financial firms are represented by SIC codes 6000-6799 and utilities are in SIC codes 4800-4999. Accordingly we exclude these industries in our sample.

on real investment due to asymmetric information problems, as we assume real investment is exogenously given. Calomiris and Hubbard (1990) show that the allocation of new funds across classes of borrowers can ration funds away from some classes of borrowers who would receive credit in the absence of asymmetric information. Hence, the terms under which intermediary credit is available are key determinants of investment especially for firms lacking easy access to direct credit (Bernanke, 1983). We will further discuss the effect of firm size on the capital structure decision in the next section. Finally, we include only firms that have a complete record over at least 11 years of the variables considered in our analysis. In this way, we identify 1,236 firms.

In measuring the target debt ratio, we use the historical mean of debt ratio (total debt / total assets) times total assets as the instrument for the target debt ratio.[7] Even though Shyam-Sunder and Myers (1999) and Myers (1984) argue that there are rational reasons for managers to specify debt targets in terms of book values, Titman and Wessels (1988) incline to the use of debt level measured at market value. Accordingly, we also estimate the same models using total debt over total debt plus the market value of equity as a debt ratio. We also consider both total debt and long-term debt in measuring debt ratios. Without a theory to guide whether the capital structure decision should be based on book value or market value and whether total debt or long-term debt, any capital structure study implicitly takes a position by choosing one method against another. By considering alternative estimation approaches and examining the robustness of the results, this study can lead to confident conclusions in the investigation of the target adjustment theory and the pecking order theory.

Table I presents summary statistics on the book value of assets, the market value of equity, long-term debt ratio and total debt ratio for the sample for the years 1981, 1990 and 2000 as well as the full sample of 18,236 firm-year observations. Overall the average total debt to asset ratio is .2587 and the average long-term debt to asset ratio is .1977.

$\boxed{\text{Table I}}$

B. Estimation and Results

Common problems found in panel data are detected in this sample; the ordinary least square (OLS) assumption of independent errors is unlikely to be satisfied. The most serious problem of OLS estimation comes from the dependence of the residuals. Residuals show the presence of autocorrelation and homoskedasticity.[8] The coefficients of skewness are significantly negative and the coefficients of excess kurtosis are unduly large, indicating the distribution of residuals is negatively skewed and has much higher peak and fat tails than a normal distribution.[9]

To see if there are outliers in the data, we calculate the diagonal values of the hat matrix, DFFITS and DFBETAS as described in

[7] Shyam-Sunder and Myers (1999) use this definition but they only include firms with full 20-year data. Accordingly, their sample size is only 157 firms. We also use the 10-year moving average; that is, for a given year, the target debt level is the average of past 10-year debt ratios times total assets. However, the results are identical and not reported.

[8] The Breusch-Pagan tests for homoskedasticity are rejected for all regressions at 5 percent significance level. The White test also indicates the presence of significant heteroskedasticity.

[9] Chi-square goodness of fit tests and Jarque-Bera (1980) Lagrange Multiplier tests for nomality of the OLS residuals are rejected for all regressions.

Belsley, Kuh and Welsch (1980). All the diagonal values of the hat matrix are less than .05 and all the DFBETAS are less than .35 in their absolute values.[10] The OLS regressions with outlier exclusion produce almost identical results. The problem of dependent errors seems to be more important with this data set than that of outliers.

To address the error-dependence problem associated with the panel data, it is necessary to use a special estimation procedure. The mixed effects model described in Goldstein (1995) and Venables and Ripley (1999) employs a set of assumptions on the disturbance covariance matrix that gives a cross-sectionally heteroskedastic and timewise autoregressive model. The estimation procedure first estimates the variance structure by maximizing the marginal likelihood of the residuals from a least-squares fit of the linear model, and then the fixed effects are estimated by maximum likelihood assuming that the variance structure is known, which amounts to fitting by the generalized least square (GLS).

Table II reports the OLS and mixed effects GLS estimation results for the target adjustment and pecking order models. As a precaution against heteroskedasticity, we scaled all the variables by total assets.

Panel A shows the estimates of OLS and GLS regressions of changes in total debt level on various combinations of explanatory variables. Compared with the results from the OLS estimation, the magnitude and significance of the GLS-estimated target adjustment coefficients are considerably increased (from .4392 to .5835 in row A1). The coefficient estimate of the target adjustment interaction dummy variable remains significantly different from zero (−.1869 for the OLS and −.1764 for the GLS in row A1), suggesting that the adjustment costs are indeed different between increasing and decreasing the total debt level. On the other hand, the estimates of pecking order coefficients remain the same (.8054 for the OLS and .8071 for the GLS in row A2). The pecking order model indicates even a greater difference between the coefficient estimates of the positive financial deficit interaction dummy variable (−.6282) and the financial deficit variable (.8071). This result suggests that firms use up their financial surplus to pay back outstanding debt but they are much less sensitive in increasing the debt level facing the financing needs.

Table II

We also report estimation results including the target adjustment coefficient and the pecking order coefficient in the same equation (row A3). The magnitude and significance of the pecking order coefficient estimates and the counterparts of the target adjustment coefficients show little change. This result is contrary to the finding of Shyam-Sunder and Myers (1999). In their results, the magnitude and significance of the coefficients of the target adjustment model are significantly reduced while those of the pecking order coefficients change little when the two models are nested.

For a comparison with the results in Shyam-Sunder and Myers (1999), we also estimate the models using long-term debt ratios. The results are provided in Panel B. We do not find the same evidence against the target adjustment model as in Shyam-Sunder and Myers (1999). Allowing different adjustment costs between increasing and decreas-

[10] However there are some significant DFFITS values. We estimate the OLS regressions after deleting the observations of which DFFITS are greater than .34 in their absolute values. This procedure is rather arbitrary. However, Maddala (1992) suggests an estimation procedure which uses smaller weights for observations with absolute values of DFFITS greater than .34 (See pp. 487–490 in Maddala (1992).).

ing debt level appears to contribute to the different results. The explanatory power of the target adjustment model is indistinguishable from that of the pecking order model in terms of R-squares. One thing to note is that the estimated coefficient of the target adjustment interaction dummy variable becomes insignificant in both magnitude and significance. On the other hand, the coefficient estimate of the financial deficit interaction dummy variable remains significantly negative even when the two models are nested. The two models are very similar in all other respects.

We further estimate the models using total debt plus the market value of equity as a denominator in calculating the debt ratio in Table III. We also scale all the explanatory variables by total debt plus the market value of equity. Since the results from the OLS and the GLS are indistinguishable, we report only the GLS estimation results. The market value based debt ratios produce larger adjustment coefficient estimates for the target adjustment model in row A1. In row A2, the estimated coefficient of the financial deficit interaction dummy variable is –1.4072, greater, in its absolute value, than the coefficient estimate of financial deficit, 1.0245. The magnitudes of these coefficient estimates remain unchanged in the presence of the target adjustment variables in row A3. The pecking order seems working only in reducing debt ratios when there is financial surplus. We also estimate the same model with long-term debt only and do not find any significantly different results compared to the results in Table II.

Table III

Overall, both the target adjustment model and the pecking order model explain considerable variation in firms' debt financing. Consistent with our conjecture that adjustment costs are higher for debt increasing than for debt decreasing, firms are much slower in increasing debt ratio. Firms also use up financial surplus more easily to pay back outstanding debt than they use debt to finance financial deficit.

C. Financing decisions and the Roles of Dividend and Firm Size

In this section we investigate whether the financing decisions are different between small and large firms, and between dividend-paying firms and non-paying firms. The cost of issuing debt or equity is much higher for small firms than large firms (Titman and Wissels, 1988). Small firms are subject to severe asymmetric information problem but less agency problems. Also, small firms have less access to external funds than do large firms (Bernanke, 1983). This suggests that the adjustment speed can be different between small and large firms. Specifically, we hypothesize that the pecking order model is more profound description of the financing decisions of small firms. Also, the adjustment speed differential between increasing and decreasing the debt level is likely to be greater for small firms than for large firms.

In our analysis we take dividend as predetermined. In our sample, 682 out of 1236 firms (55 percent) did not pay any dividend during our sample period. Fazzari and Peterson (1993) argue that low-dividend firms are the most likely to face financial constraints and show that non-dividend paying firms rarely make use of new equity financing. Also, Barclay and Smith (1995) provide evidence that firms' debt levels are related dividend yields.

To address these issues, we estimate the pecking order model and the tradeoff target adjustment model by dividing firms into small and large firms based on the median of total assets, and by splitting the sample into non-dividend and positive-dividend paying groups.

Table IV

In Table IV we compare the target adjustment and pecking order models between small and large firms. All the estimation results are based on book value debt ratios. Clearly the estimates of the adjustment coefficients are significantly greater for small firms than for large firms. Also, the negative interaction terms are much more profound for small firms than large firms. Whether we use total debt or long-term debt in defining the debt ratio, the results are almost identical. The results confirm our hypothesis that small firms are more likely to follow the pecking order because of difficult in accessing external financing sources. The results also provide evidence that small firms are significantly slower when the adjustment requires an increase in debt level. We further estimate the same groups of firms with market value debt ratios. The results are qualitatively the same and not reported here.

Table V

Table V reports the comparison of the target adjustment and pecking order models between dividend-paying and non-dividend paying firms. The estimated pecking order coefficients are greater for non-dividend paying firms than for dividend paying firms. However, the difference is not clear for the target adjustment coefficients. The pecking order seems to be a binding force for non-dividend paying firms as it does for small firms.

Conclusion

The paper investigates implications of the tradeoff theory and the pecking order theory. We find that the difference between the target debt ratio and actual debt ratio is an important determinant of the change in debt level. The results suggest that firms adjust their debt levels according to target debt ratios but the upward adjustment of the debt ratio is much less sensitive to the deviation from the target ratio, reflecting higher adjustment costs for debt increasing than decreasing.

The pecking order model also captures a significant portion of variations in debt ratio. When we allow different slopes for positive and negative financial deficit, the results suggest that firms use financial surplus to pay back their outstanding debt but the change in debt level is much less responsive to their financing needs. Firms appear to consider both long-term and total debt levels in marking their optimal capital structure decisions.

We also compare the pecking order model and the tradeoff target adjustment model between small and large firms and also between non-dividend and positive-dividend paying firms. The pecking order is found to be much more binding force for small firms and non-dividend paying firms, supporting the hypothesis that small firms are more likely to follow the pecking order because of the difficulty in accessing external financing sources. We also find evidence that small firms are significantly slower when the adjustment requires an increase in debt level according to the target adjustment model.

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Table I
Summary Statistics for Selected Variables

The sample consists of 18,236 firm-year observations and the time period is 1981 through 2000. Our primary data source consists of the Annual Industrial COMPUSTAT files. The sample includes only firms that have at least $3 million of assets as of 2000 and a complete record over at least 11 years of the variables considered.

	Mean	Minimum	Maximum	Standard Deviation
Book value of total assets				
1981	410	4.828	6961	1101
1990	1100	3.013	77734	3729
2000	2599	3.239	87495	6695
1981-2000	1352	3.001	92473	4238
Market value of equity				
1981	279	2.387	6267	763
1990	986	2.097	54093	3328
2000	4947	2.094	274428	20143
1981-2000	1622	2.005	274428	7956
Total debt / total assets				
1981	0.2076	0.009	0.7230	0.1348
1990	0.2790	0	0.9153	0.1828
2000	0.2832	0	0.9547	0.1838
1981-2000	0.2587	0	0.9992	0.1754
Long-term debt / total assets				
1981	0.1508	0	0.7045	0.1196
1990	0.2087	0	0.9140	0.1657
2000	0.2215	0	0.9084	0.1723
1981-2000	0.1977	0	0.9873	0.1596

Table II
Estimation Results of the Target Adjustment and Pecking Order Models Based on Book Value

The sample consists of 1236 firms with relevant Compustat data for 1981 to 2000, 18,236 total observations. The target debt level is based on the historical mean of debt to total asset ratio and all the explanatory variables are scaled by the total assets (*A*). In panel B, the target debt level is based on the historical mean of debt to total debt plus market value of equity ratio and all the explanatory variables are scaled by the total debt plus market value of equity (S). *TDE(LDE)* represents the deviation of the total (long-term) debt level from its target and *DEF* the financial deficit. *M* is a dummy variable equal to one if *TDE(LDE)* is positive, and zero otherwise. *Q* is equal to one if *DEF* is positive and zero otherwise. Numbers in parentheses are t-values. *Not different from zero at the significance level of 1%.

Panel A. The Dependent Variable is Changes in Total Debt Scaled by Book Value of Total Assets *(A).*

		Constant	*TDE/A*	*(TDE/A).M*	*DEF/A*	*(DEF/A).Q*	R^2
(A1)	OLS	.0187	.4392	-.1869			.1266
		(12.95)	(35.61)	(-7.307)			
	GLS	.0184	.5835	-.1764			.1493
		(12.71)	(39.11)	(-6.86)			
(A2)	OLS	.0248			.8054	-.6310	.1883
		(20.94)			(57.09)	(-33.35)	
	GLS	.0243			.8071	-.6282	.1907
		(20.12)			(57.13)	(-33.09)	
(A3)	OLS	.0302	.4639	-.1649	.7440	-.5841	.2381
		(21.51)	(34.29)	(-7.02)	(55.78)	(-32.49)	
	GLS	.0285	.5115	-.1501	.7452	-.5780	.3070
		(20.06)	(37.83)	(-6.35)	(56.45)	(-32.36)	

(Table II Continued)

Panel B. The Dependent Variable is Changes in Long-Term Debt Scaled by Book Value of Total Assets *(A).*

		Constant	*LDE/A*	*(LDE/A).M*	*DEF/A*	*(DEF/A).Q*	R^2
(B1)	OLS	.0010 (8.28)	.4410 (32.95)	-.0119* (-.5070)			.1381
	GLS	.0095 (7.80)	.5038 (37.23)	-.0046* (-.1963)			.1567
(B2)	OLS	.0192 (19.14)			.6087 (50.32)	-.4506 (-29.33)	.1622
	GLS	.0187 (18.18)			.6113 (50.44)	-.4492 (-29.14)	.1663
(B3)	OLS	.0188 (15.87)	.3707 (29.55)	.0136* (.6124)	.5552 (48.36)	-.4318 (-29.44)	.2632
	GLS	.0173 (14.37)	.4266 (33.67)	.0202* (.9068)	.5569 (48.98)	-.4302 (-29.51)	.2874

Table III
Estimation Results of the Target Adjustment and Pecking Order Models Based on Market Value

The sample consists of 1236 firms with relevant Compustat data for 1981 to 2000, 18,236 total observations. The target debt level is based on the historical mean of debt to total debt plus market value of equity ratio, and all the explanatory variables are scaled by the total debt plus market value of equity (S). *TDE(LDE)* represents the deviation of the total (long-term) debt level from its target and *DEF* the financial deficit. *M* is a dummy variable equal to one if *TDE(LDE)* is positive, and zero otherwise. *Q* is equal to one if *DEF* is positive and zero otherwise. Numbers in parentheses are t-values.

Panel A. The Dependent Variable is Changes in Total Debt Scaled by Market Value of Total Assets *(S).*

		Constant	*TDE/S*	*(TDE/S).M*	*DEF/S*	*(DEF/S).Q*	R^2
(A1)	GLS	.0238 (8.617)	.7026 (30.09)	-.4749 (-11.71)			.1586
(A2)	GLS	.0521 (27.03)			1.0245 (62.78)	-1.4072 (-62.92)	.1939
(A3)	GLS	.0554 (21.53)	.4528 (21.03)	-.1222 (-3.282)	0.9448 (58.49)	-1.3440 (-60.82)	.2373

Panel B. The Dependent Variable is Changes in Long-Term Debt Scaled by Market Value of Total Assets *(S).*

		Constant	*LDE/S*	*(LDE/S).M*	*DEF/S*	*(DEF/S).Q*	R^2
(B1)	GLS	.0081 (4.223)	.5041 (27.97)	-.1249 (-3.916)			.0866
(B2)	GLS	.0317 (22.59)			.6110 (43.94)	-.7954 (-49.75)	.1198
(B3)	GLS	.0243 (13.27)	.3579 (20.44)	.1318 (4.255)	.5365 (39.45)	-.7448 (-47.69)	.1909

Table IV

Comparison of the Target Adjustment and Pecking Order Models between Small and Large Firms

The sample consists of 1236 firms with relevant Compustat data for 1981 to 2000, 18,236 total observations. The target debt level is based on the historical mean of debt to total asset ratio and all the explanatory variables are scaled by the total assets (*A*). *TDE(LDE)* represents the deviation of the total (long-term) debt level from its target and *DEF* the financial deficit. *M* is a dummy variable equal to one if *TDE(LDE)* is positive, and zero otherwise. *Q* is equal to one if *DEF* is positive and zero otherwise. Numbers in parentheses are t-values.

Panel A. The Dependent Variable is Changes in Total Debt Scaled by Book Value of Total Assets *(A)*

	Constant	*TDE/A*	*(TDE/A)M*	*DEF/A*	*(DEF/A)Q*
Small	.0140 (5.69)	.6279 (27.50)	-.1990 (-5.05)		
Large	.0208 (13.08)	.4927 (26.65)	-.1035 (-3.24)		
Small	.0274 (14.28)			.9322 (48.97)	-.8164 (-32.05)
Large	.0113 (7.69)			.4263 (19.30)	-.0300 (-.9876)

(Table VI Continued)

Panel B. The Dependent Variable is Changes in Long-Term Debt Scaled by Book Value of Total Assets *(A).*

	Constant	*LDE/A*	*(LDE/A)M*	*DEF/A*	*(DEF/A)Q*
Small	.0134 (2.60)	.5381 (27.05)	-.1134 (- 6.38)		
Large	.0123 (8.71)	.4250 (23.48)	.0309 (1.83)		
Small	.0205 (12.93)			.7286 (44.84)	-.6126 (-30.18)
Large	.0089 (6.963)			.3015 (16.11)	-.0392 (1.54)

Table V

Comparison of the Target Adjustment and Pecking Order Models between Dividend-Paying and Non-Dividend-Paying Firms

The sample consists of 1236 firms with relevant Compustat data for 1981 to 2000, 18,236 total observations. The target debt level is based on the historical mean of debt to total asset ratio and all the explanatory variables are scaled by the total assets (*A*). *TDE(LDE)* represents the deviation of the total (long-term) debt level from its target and *DEF* the financial deficit. *M* is a dummy variable equal to one if *TDE(LDE)* is positive, and zero otherwise. *Q* is equal to one if *DEF* is positive and zero otherwise. Numbers in parentheses are t-values.

Panel A. The Dependent Variable is Changes in Total Debt Scaled by Book Value of Total Assets *(A).*

	Constant	*TDE/A*	*(TDE/A)M*	*DEF/A*	*(DEF/A)Q*
Dividend	.0162 (10.44)	.6878 (34.86)	-.1683 (-5.10)		
No Dividend	.0122 (4.19)	.6025 (20.46)	-.0626 (-1.25)		
Dividend	.0185 (12.86)			.4913 (30.52)	-.2172 (- 9.81)
No Dividend	.0206 (7.80)			.5451 (39.44)	-.3945 (-13.49)

(Table V Continued)

Panel B. The Dependent Variable is Changes in Long-Term Debt Scaled by Book Value of Total Assets *(A).*

	Constant	*LDE/A*	*(LDE/A)M*	*DEF/A*	*(DEF/A)Q*
Dividend	.0071 (5.18)	.6019 (32.39)	-.0582 (- 1.88)		
No Dividend	.0051 (2.07)	.5432 (21.59)	.0263 (.577)		
Dividend	.0160 (12.33)			.4014 (41.35)	-.1735 (- 8.71)
No Dividend	.0183 (7.77)			.4891 (25.14)	-.3738 (-14.09)