THE INTERNATIONAL EVIDENCE OF PECKING ORDER AND TRADE-OFF PREDICTIONS

Nuttawat Visaltanachoti, Robin Luo**, Cai Wei****

Abstract

This paper investigates the pecking order and trade-off hypotheses of corporate financing decisions for a sample of 74 countries from 1993 to 2003. Overall, the results confirm predictions shared by the trade-off and pecking order models in that the payout ratio is positively related to profitability and negatively related to investment opportunities, target leverage and volatility. The present study also provides favorable evidence to the pecking order model in that more profitable firms are less levered. Firms with more investments have lower long-term dividend payouts, but dividends do not vary to accommodate short-term variation in investment.

Keywords: trade-off, pecking-order, target dividend, leverage

**Department of Commerce, Massey University, New Zealand*
***School of Economics and Finance, La Trobe University, Australia*
****Department of Commerce, Massey University, New Zealand*

1. Introduction

In the four decades since the publication of Modigliani and Miller (1963), a vast academic literature has emerged on the pecking order and trade-off hypotheses of corporate financing decisions. This literature offers two broad competing models: trade-off theory and pecking order theory. Harris and Raviv (1991) provided a comprehensive overview of these models and their implications. The trade-off theory holds when firms set their target debt ratio by weighing benefits of debt tax shields and costs of bankruptcy.[1] A value-maximizing firm will pursue an optimal capital structure by trading off the marginal costs and benefits of each additional unit of financing.[2] The pecking order hypothesis is based on the argument that there is no target capital structure of the firm and the change of debt ratio attributes to the imbalance of internal capital and the firm's aggregate capital demand. The asymmetric information – management's superior information – creates a hierarchy of costs in the use of external financing which is broadly common to all firms. New investments are financed first with retained earnings, then with safe debt, followed by riskier debt like convertibles, and equities only as a last resort. As a result, variation in a firm's leverage is driven not by the trade-off model's costs and benefits of debt, but rather by the firm's net cash flows, that is, cash earnings minus investment outlays.

The empirical study on the two theories so far has been concentrated in the individual countries. Baskin (1989) concluded that the accumulated evidence in favor of the pecking order hypothesis is now substantial and the alternative theory of static optimal capital structure appears to have little power in explaining corporate behavior. Pinegar and Wilbricht (1989) compared the static trade-off model with the pecking order model based on a survey. Their results showed that corporate managers are more likely to follow a financing hierarchy than to maintain a target debt-equity ratio. Shyam-Sunder and Myers(1999) addressed the response of debt to short-term variation in investment and earnings using a small sample of 157 firms that survive the 1971-1989 period. They suggested greater confidence in the pecking order than in the target adjustment model. Fama and French (2002) tested the dividend predictions and the leverage predictions of the trade-off and pecking order model using the data of more than 3000 U.S. firms from year 1965 to 1999. Their empirical results confirmed the pecking order model but contradicted the trade-off model, more profitable firms and firms with fewer investments have higher dividend payouts and less market leverage. They also noted that firms' debt ratios adjust slowly toward their targets. Other studies of the determinants of target leverage usually estimated a single cross-section regression and did not actually examine the mean

[1] Following up the debate on the Modigliani-Miller theorem, Myers (1977) claimed that the obvious offsetting cost of debt is bankruptcy.

[2] Static trade-off theory is Myers (1977)'s original version. A firm is said to follow the static trade-off theory if the firm's leverage is determined by a single period trade-off between the tax benefits of debt and the deadweight costs of bankruptcy. Modern versions, based on target adjustment behavior and trade-offs among agency costs, are examined by Frank and Goyal (2003) and Graham (1996), respectively.

reverting behavior.[3] A few articles that test for mean reversion used small samples.[4] A recent study by Lemmon et al. (2008) illustrated the presence of adjustment costs has significant implications for corporate financial policy and the interpretation of previous empirical results. They found that firms actively rebalance their leverage to stay within an optimal range.

Graham and Harvey (2001) found evidence consistent with both theories based on a survey of U.S. Chief Financial Officers, although there is little evidence that asymmetric information being a factor in financial decisions. They also observed that the most empirical research on corporate capital structure is concerned with the major industrial countries, and that there has been relatively little work on developing countries. Developing economies differ from industrial economies in many perspectives, including less developed capital market, loose accounting and auditing standards and different corporate strategies. Singh (1995) argued that firms in developing economies rely more heavily on equity than on debt to finance growth than do their counterparts in the industrial economies. However, Cobham and Subramaniam (1998) disagreed with Singh (1995)'s results and concluded that large Indian and British firms exhibited similar patterns of debt ratios during 1980s. Booth *et al.* (2001) argued that it is difficult to distinguish between trade and pecking order models because many determining variables are relevant in both models. They also observed that the determinants of capital structure in their sample of developing economies are broadly comparable to those in the industrial countries.[5]

The present study examines how long-term leverage and the dividend payout ratio vary across firms with the main driving variables which are proposed by two competing models - profitability and investment opportunities. This paper also tests the response of financing decisions to short-term variation in earnings and investment in the pecking order model and the mean reversion feature in the trade-off model. We confirm predictions shared by the trade-off and pecking order models on that the payout ratio is positively related to profitability and negatively related to investment opportunities, target leverage and volatility. The pecking order model rather than the trade-off model is confirmed by observing more profitable firms are less levered. Firms with more investments have lower long-term dividend payouts, but dividends do not vary to accommodate short-term variation in investment. The paper is organized as follows. Section 2 describes the data and methodology. Section 3 develops hypotheses and presents empirical results. Section 4 provides a robustness check and Section 5 concludes.

2. Data and Methodology

We use the Compustat Global Vantage database to obtain annually accounting data and monthly stock prices of nearly 20,000 listed companies across 74 countries from 1993 to 2003. An attracting feature of this paper is that it concentrates on non-financial corporations and ignores the regulated utilities and financial companies. Eliminating the regulated utilities is to avoid the criticism that their financing decisions are a by-product of regulations because minimum capital requirement will give direct and indirect effects to companies' capital structure. The financial companies such as banks and insurance companies are excluded from the study because their leverage is strongly affected by explicit or implicit investor's insurance schemes. And their debt-like liabilities are not strictly comparable to the debt issued by non-financial companies. This restriction removes nearly 1,000 outliners and leaves 19,315 companies in our sample. The number of samples in each country is reported in Table 1.

(INSERT TABLE 1 ABOUT HERE)

We refine the raw data by the following steps to make them suitable for our study. Firstly, we treat the variables as non-available if the observations include negative value or zero value for one of the indicator variables that are scaled by total assets (AT) or common stock earning (Y). Secondly, we hold the stock price and number for the relatively common issue compared to the other issues and delete the others' in the same list corporations according to "Issue Description" in order to match to the equal number of firms. The definitions of variables employed in the present study are summarized in Table 2.

(INSERT TABLE 2 ABOUT HERE)

The trade-off and pecking order model predictions are investigated from three perspectives -- profitability, investment opportunities, and volatility.

Three variables in Panel B are the proxies of the expected profitability of assets in place. $BTET_t/AT_t$ can measure the profitability for tax effects in the trade-off model because the numerator represents the income that could be sheltered from corporate taxes by interest deductions. Four proxies are used to test the effect of expected investment opportunities. The ratio of R&D to total assets, XRD_t/AT_t, is employed because research and development expenditures generate future investment. The ratio of depreciation

[3] See, for example, Bradley *et al.* (1984); Long and Malitz (1985); Titman and Wessels (1988); and Rajan and Zingales (1995).

[4] See, for example, 108 firms in Jalivand and Harris (1984); 143 firms in Auerbach (1985); and 157 firms in Shyam-Sunder and Myers (1999).

[5] A few studies on other developing economies include: Wiwattanakantang (1999) on Thailand; Prasad *et al.* (2001) on Malaysia and Thailand; Colomob (2001) on Hungary; and Tong and Green (2005) on China.

costs to total assets, DP_t/AT_t, measures not only the future investment, but also the non-debt tax shields. The growth of total assets is used if investment is persistent. The ratio of market value to book value, MT_t/AT_t, not only represents current profitability, but also indicates the future investment opportunities. The natural logarithm of total book assets, $\ln(AT_t)$, is employed as a delegate for the firms' size to test volatility. This proxy can also represent the firm's age and flexibility of access to capital market.

Two endogenous variables in the trade-off and pecking order models are target dividend payout ratio (TP) and target leverage (TL). They have a strong correlation. Both of them are closely related to "profitability" and "investment opportunities" in the trade-off and Pecking order models. Therefore, TP and TL are the core variables for the testing. They are estimated with a two-stage OLS.

3. Hypotheses and Empirical Results

3.1 Dividend analysis

The dividend predictions of the trade-off and pecking order models are based on Allen and Michaely (1995) and Fama and French (2002). The model shows that a long-term target payout of a firm, TP, mainly depends on the relationship between its target dividend for year t+1, $TDVC_{t+1}$, and common stock earnings, Y_{t+1}.

$$TDVC_{t+1} = TP \times Y_{t+1} \quad (1)$$

Having considered the adjustment cost, the firm moves partly towards its target payout in year t+1,

$$DVC_{t+1} - DVC_t = SA(TDVC_{t+1} - DVC_t) + e_{t+1} \quad (2)$$

$$DVC_{t+1} - DVC_t = \alpha_1 Y_{t+1} + \alpha_2 DVC_t + e_{t+1} \quad (3)$$

SA denotes the speed of adjustment, which equals $-\alpha_2$ and is less than 1.0. Our purpose is to estimate how the target payout, TP in equation (1), varies across firms as a function of investment opportunities, profitability, target leverage, and other driving forces. We test equation (4) using the regression of dividends on common stock earnings, both are scaled by assets.

$$DVC_{t+1}/AT_{t+1} = \alpha_0 + (\alpha_1 + \alpha_2 MT_t/AT_t + \alpha_3 ATET_t/AT_t + \alpha_4 dAT_t/AT_t + \alpha_5 XRDD_t + \alpha_6 XRD_t/AT_t + \alpha_7 \ln(AT_t) + \alpha_8 TL_{t+1}) \times (Y_{t+1}/AT_{t+1}) + e_{t+1} \quad (4)$$

The exogenous interaction variables in (4) include the proxies for investment opportunities (MT_t/AT_t, dAT_t/AT_t, XRD_t/AT_t) and the profitability of assets in place ($ATET_t/AT_t$, MT_t/AT_t). The log of firm size, $\ln(AT_t)$, stands for volatility and other exogenous effects. XRDDt is a dummy that is 1.0 for firms with zero or no reported R&D. In our data set, nearly 70% of companies report zero R&D or don't report R&D. The interaction (α_0) is predetermined to deal with any remaining problems. The first hypothesis we are testing is described as follow:

> ***Hypothesis*** H_1 ***:*** *Both the pecking order and trade-off model are supported if certain slopes of MT_t/AT_t dAT_t/AT_t and XRD_t/AT_t are negative, or if certain slopes of $BTET_{(t)}/AT_{(t)}$, $ATET_{(t)}/AT_{(t)}$, and $MT_{(t)}/AT_{(t)}$ are positive, or if certain slope of $\ln(AT_t)$ is negative, or if certain slope of TL_{t+1} is negative.*

Table 3 summarizes the estimates of regression of DVC_{t+1}/AT_{t+1} on Y_{t+1}/AT_{t+1}. The annual estimates of the target payout from regressions are close, range from 0.15 to 0.18. However, the regression on market target leverage shows the slope is 0.43. This result is comparable to the estimates of the aggregate payout reported in Fama and French (2002). Both trade-off and pecking order models predict that investment opportunity of a firm negatively relates to its target dividend payout having controlled for other factors. In a complete estimation of equation (4), the slope of MT_t/AT_t is very close to zero but insignificant. It suggests nonlinearity between investment opportunity and the target payout. However, the average dAT_t/AT_t slopes in Table 3 are all significantly negative to support the prediction. And the negative XRD_t/AT_t slope is as high as -0.95. It also supports the prediction.

(INSERT TABLE 3 ABOUT HERE)

Both trade-off and pecking order modesl predict that more profitable firms have higher dividend payouts after controlling for other factors. The positive average $ATET_t/AT_t$ slopes support this prediction. But their t-statistics, 1.78 and 1.64, fall below the 2.0 standard error hurdle for reliability in the complete version of equation (4). The MT_t/AT_t slopes are nearly zero, which lend little support to the prediction that more profitable firms choose higher target payouts. The results provide somewhat mixed evidence to the prediction of both pecking order and trade-off models.

In the trade-off model, more volatile earnings push firms toward less leverage and lower dividend payout because of lower expected tax rates and higher expected bankruptcy costs; while in the complex pecking order model, more volatile net cash flows push firms toward lower dividend payout and less leverage by raising the chance that low-risk debt capacity will not be available for future investments. Thus, the volatility of firm value negatively relates to the dividend payout. We use the firm size to measure the volatility of firm value. Smallest firm has the highest volatility, and vice versa. When target book leverage is used as an explanatory variable, positive $\ln(AT_t)$ slope observed supports the prediction that more volatile firms have lower dividend payouts.

When target market leverage is used as an explanatory variable, the average MT_t/AT_t slope in (4) is below zero and insignificant, which runs counter to the predicted negative relation between volatility and the target payout.

Both the trade-off and the pecking order models predict that the marginal relation between the target dividend payout and target leverage is negative. This prediction receives strong support from the significant estimate on target book leverage. But the slope on target market leverage is insignificant and positive, contrary to the prediction. We then summarize that the regression on equation (4) gives mild support to the predictions of both trade-off and pecking order models in that the payout ratio is positively related to profitability and negatively related to investment opportunities, volatility and leverage.

3.2 Dividend and Investment

In this section we follow Fama and French (2002)'s partial adjustment equation to test whether firms vary dividends away from their targets to accommodate short-term variation in investment. Firstly, we select the normal variation in dividends in equation (3) to measure the movement toward the target payout by ignoring the variation across firms. A constant is added to equation (3). It is scaled by total assets to measure how dividends respond to short-term variation in investment, t. Equation (3) becomes the following equation (5):

$$(DVC_{t+1} - DVC_t)/AT_{t+1} = \alpha_0 + \alpha_1 Y_{t+1}/AT_{t+1} + \alpha_2 DVC_t/AT_{t+1} + \alpha_3 dAT_{t+1}/AT_{t+1} + e_{t+1} \quad (5)$$

We then examine how TP and SOA vary across firms by expanding equation (5) to include more interaction terms as a function of investment opportunities, profitability, target leverage, and other driving forces. Since the target payout in the Fama and French (2002) model is determined by two factors, Y_{t+1}/AT_{t+1} and DVC_t/AT_{t+1}, both are allowed to vary with the same interaction variables. We use the same proxy variables in equation (6) as those in equation (4). Our main purpose in testing equation (6) is to find out how the dAT_{t+1}/AT_{t+1} slope reflect the short-term response of dividends to investment rather than the interaction variables reporting the target payout and speed of adjustment. Based on this discussion, hypothesis H_2 can be articulated as follows:

> ***Hypothesis*** H_2 ***:*** *Only the pecking order is supported if certain slope of* Y_{t+1}/AT_{t+1} *is positive and close to 1, or if certain slope of* dAT_{t+1}/AT_{t+1} *is negative.*

$$\begin{aligned}(DVC_{t+1} - DVC_t)/AT_{t+1} &= \alpha_0 + (\alpha_{11} + \alpha_{12}\, ATET_t/AT_t + \alpha_{14}\, dAT_t/AT_t + \alpha_{15} XRDD_t \\ &+ \alpha_{16}\, XRD_t/AT_t + \alpha_{17} \ln(AT_t) + \alpha_{18} TL_{t+1}) \times (Y_{t+1}/AT_{t+1}) + (\alpha_{21} + \alpha_{22}\, MT_t/AT_t + \alpha_{23}\, ATET_t/AT_t \\ &+ \alpha_{24}\, dAT_t/AT_t + \alpha_{25} XRDD_t + \alpha_{26}\, XRD_t/AT_t + \alpha_{27} \ln(AT_t) + \alpha_{28} TL_{t+1}) \times (DVC_t/AT_{t+1}) + \alpha_3\, dAT_{t+1}/AT_{t+1} \\ &+ e_{t+1}\end{aligned} \quad (6)$$

The estimate of average slopes in both equations (5) and (6) are in reported Table 4. In the regression of equation (5), the positive slope on Y_{t+1}/AT_{t+1} is significant and the estimated speed of adjustment, the negative of the slope on $DVC_t/AT_{t+1,}$ is also significant and higher than the results of Lintner model in the recent literature (Choe, 1990; Dewenter and Warther, 1998; Fama and French, 2002). But the target payout estimates, 0.126, is much lower than the average aggregate payout ratio in Fama and French (2001), 0.45 and Fama and French (2002), 0.33.

(INSERT TABLE 4 ABOUT HERE)

The estimated result in equation (6) produces a high average SA, 0.55and 0.78, depending on whether the target leverage variable is book or market, similar to that in equation (5). The estimates are pretty high compared to low SAs reported in the previous time-series tests of the Lintner model. When target book leverage is used as an explanatory variable, the target payout estimate is 0.29, which is close to Fama and French's (2001, 2002) results. When target market leverage is used as an explanatory variable, the target payout estimate is 0.45, which is also consistent with the aggregate payout in Fama and French (2002). The average R^2 from equation (6) regression is 0.52 in panel B and 0.44 in panel C, versus 0.31 in panel A. Allowing for variation across firms in the SA and TP substantially enhances the explanatory power of the regression.

We find that the slopes in both equations (5) and (6) are quite low based on the estimation of the dAT_{t+1}/AT_{t+1} slope reflecting the short-term response of dividends to investment. The average dAT_{t+1}/AT_{t+1}slope coefficients in panels A and B are insignificant while the coefficient in panel C is significant, but are small in all three panels. This means the change in dividends absorbs only about one or two percent of the change in assets, and only when target market leverage is used as an explanatory variable the regression is able to identify meaningful variation in dividends in response to investment. The pecking order model predicts that firms adjust dividends to absorb short-term variation in investment. But the estimates of equation (4) suggest that, as predicted by the model, firms with more investments choose lower target payouts. If the negative relation between investment and long-term payouts leaves dividend payers with enough retained earnings and low risk debt capacity to absorb variation in investment, the insensitivity of dividends to investment does not violate the pecking order.

Previous studies on the US market acknowledge that dividends are insensitive to short-term variation in investment (Myers, 1984; Shyam-Sunder and Myers, 1999). Surprisingly the present study gives a different result. We attribute the inconsistency to the international data set used in this study. This international data set provides us a unique opportunity

to undertake a detailed analysis of the pecking order and trade-off models on the firms across more than 70 countries around the world. Different economic and financial backgrounds in these countries have great impact on firms' capital structures and financing decisions.

3.3 Leverage Analysis

In order to test the behavior of leverage, we examine a standard partial adjustment model (7) in which the change in book leverage partially absorbs the difference between target leverage, TL_{t+1}, and lagged leverage, LT_t/AT_t,

$$LT_{t+1}/AT_{t+1} - LT_t/AT_t = \alpha_0 + \alpha_1(TL_{t+1} - LT_t/AT_t) + \alpha_2 Z + e_{t+1} \quad (7)$$

While Z is a vector of current and lagged investment and earnings, which is used to test whether these variables produce temporary movement in leverage away from its target. Thereafter, $dAT_{t+1}/AT_{t+1} = (AT_{t+1}\text{-}AT_t)/AT_{t+1}$ and $dAT_t/AT_{t+1} = (AT_t\text{-}AT_{t-1})/AT_{t+1}$, and changes in after-tax earnings, $dATET_{t+1}/AT_{t+1} = (ATET_{t+1}\text{-}ATET_t)/AT_{t+1}$ and $dATET_t/AT_{t+1} = (ATET_t\text{-}ATET_{t-1})/AT_{t+1}$. Panel C is used to measure the dollar response of debt to earnings and investment. $dLT_{t+1}/AT_{t+1} = (LT_{t+1}\text{-}LT_t)/AT_{t+1}$ shows then scaled change in debt.

We use a two-step cross-section regression approach to estimate (7). On each year t+1, we regress book leverage LT_{t+1}/AT_{t+1}on the variables assumed to determine target leverage as in equation (8). The fitted value in equation (8) is then employed as the proxy for TL_{t+1} in the estimate of (7). In the market leverage model, this paper substitutes market leverage variables (LT_{t+1}/MT_{t+1}) for the book leverage variables (LT_{t+1}/AT_{t+1}) in (7) and (8).

$$LT_{t+1}/AT_{t+1} = b_0 + b_1 MT_t/AT_t + b_2 DP_t/A_t + b_4 XRDD_t + b_5 XRD_t/AT_t + b_6 \ln(AT_t) + b_7 TP_{t+1} + e_{t+1} \quad (8)$$

Table 5 shows estimation result of regression (8). Since the pecking order model suggests that the relation between leverage and investment may differ for dividend payers and non-payers, separate regressions are shown in the panels in Table 5. We intend to test the following hypotheses based the panel regressions.

Hypothesis H_3 ***:*** *The pecking order is supported if certain slopes of $BTET_{(t)}/AT_{(t)}$, $ATET_{(t)}/AT_{(t)}$, and $MT_{(t)}/AT_{(t)}$ are negative, or certain slopes of MT_t/AT_t,dAT_t/AT_t and XRD_t/AT_t are positive, or certain slopes of $dATET_{t+1}/AT_{t+1}$ and $dATET_t/AT_{t+1}$ are negative, or certain slopes of dAT_{t+1}/AT_{t+1} and dAT_t/AT_{t+1} are positive.*

Hypothesis H_4 ***:*** *The trade-off model is supported if certain slopes of $BTET_{(t)}/AT_{(t)}$, $ATET_{(t)}/AT_{(t)}$, and $MT_{(t)}/AT_{(t)}$ are positive, or certain slopes of XRD_t/AT_t and DP_t/AT_t are negative, or certain slope of TL_{t+1} is mean-reverting.*

Hypothesis H_5 ***:*** *The complex pecking order and trade-off model are supported if certain slopes of MT_t/AT_t,dAT_t/AT_t and XRD_t/AT_t are negative, or certain slope of $ln(AT_t)$ is positive, or certain slope of TP_{t+1} is negative.*

In the trade-off model, more profitable firms contribute to higher book leverage because of agency costs, taxes, and bankruptcy costs. However, in the pecking order model, the relationship is negative. The empirical results in Table 5 support the latter one, i.e. profitability prediction of the pecking order. The estimates of equation (8) produce negative average slopes on profitability for book and market leverage and dividend payers and non-payers. $BTET_t/AT_t$ coefficient is significant while the MT_t/AT_t coefficient is close to zero and insignificant.

(INSERT TABLE 5 ABOUT HERE)

Table 5 also illustrates mixed results on the relation between leverage and investment opportunities. When book leverage is chosen as explanatory variable, the coefficients of XRD_t/AT_t are all negative and significant. That suggests the existence of negative relationship between investment opportunities and book leverage. The relation between dividend payers and non-payers are contradict in panels A and B. The coefficients are small and significant, which might suggest nonlinearity in the relation between leverage and XRD_t/AT_t. We argue that firms with dividend payers tend to have higher negative relation between investment and leverage than that with non-payers. The coefficients of MT_t/AT_t in the estimation of the complete version of (8) are close to zero and insignificant, which shows little relationship between book leverage and investment opportunities. The empirical results lend support to the prediction of trade-off model and the complex version of pecking order model. Our result with a negative relation between leverage and R&D is in line with the literature (Bradley *et al.*, 1984; Long and Malitz, 1985; Titman and Wessels, 1988). Rajan and Zingales (1995) also found a negative relation between market leverage and investment opportunities, proxied by the market-to-book ratio.

The trade-off model predicts that the more non-debt tax shields firms have caused by lower expected tax rates, the less book leverage they have. The regressions in Table 5 provide some support for this prediction. The coefficient of XRD_t/AT_t in the book leverage regressions is significantly negative. The coefficient of $XRDD_t$ for non-payer is positive and

significant, while the book leverage regression for dividend payout is negative and insignificant. In the book leverage estimates of the full regression (8) for dividend payers, the average depreciation slope (DP_t/AT_t) is significantly negative. Basically the estimates match the prediction of trade-off model between non-debt tax shields and book leverage. The trade-off model also predicts that firms with less variable earnings have more leverage. Similarly, the complex pecking order model predicts a negative relation between the volatility of net cash flows and leverage. And it is widely known that larger firms have less volatile earnings and net cash flows. Consistent with the predictions of the models, the coefficient of $\ln(AT_t)$ in Table 5 is positive and significant, except slope of book leverage for non-payer. This result provides support to previous work (Harris and Raviv, 1991).

Both the trade-off and pecking order models predict that there exists the negative relation between leverage and the target dividend payout. The coefficient of TP_{t+1} on book leverage is positive and marginally significant, while the TP_{t+1} slope in the market leverage version of (8) is negative and insignificant. The problem may attribute to the co-linearity between TP_{t+1}, and pre-tax profitability, $BTET_t/AT_t$. When $BTET_t/AT_t$ is dropped from (8), the coefficients on TP_{t+1} on market leverage become significantly negative. The $BTET_t/AT_t$ coefficients are, however, significantly negative regardless of whether TP_{t+1} is in the regression. There is little evidence for the negative relation between the target payout and leverage.

Table 6 interprets the equation (7) in detail. Panel A and Panel B summarize estimates of equation (7) for book and market leverage to test whether leverage is men-reverting or not in the trade-off model. The coefficient of $BTET_t/AT_t$ in equation (8) measures the short-term variation in leverage rather than the long-term relation between target leverage and payout. This is not consistent with the strong offsetting response of leverage to changes in earnings shown in equation (7). However, the pecking order model predicts that earnings indeed generate negative variation in leverage in the short-term as well as in the long-term. So we only treat the coefficient of $BTET_t/AT_t$ as a test of trade-off predictions about target leverage. Our results are consistent with the previous literature. For example, Titman and Wessels (1988) and Rajan and Zingales (1995) reported that more profitable firms have less market leverage. Long and Malitz (1985) and Rajan and Zingales (1995) confirmed that more profitable firms have less book leverage.

(INSERT TABLE 6 ABOUT HERE)

The trade-off model predicts that leverage is mean reverting, that is, the slopes on target and lagged leverage in each regression are close in absolute value. Panels A and B of Table 4 summarize estimates of model (7) for book and market leverage. Only when regression of book leverage for non-payer is insignificantly negative, TL_{t+1} (market or book) coefficients are positive and significant. The coefficients on lagged leverage, LT_t/AT_t or LT_t/MT_t, are mixed. Taking out meaningless values (slopes for non-payer), the slopes of lagged leverage for dividend payer are positive and significant, which is consistent to the prediction of the partial adjustment model. Compared with target leverage, the slopes on lagged leverage in each regression for dividend payer are somewhat close to those target leverage on in absolute value, the mean reversion of leverage is 3 to 7 percent per year in book leverage and 9 to 10 percent in market leverage.

In a pecking order world in which firms do not have leverage targets, Shyam-Sunder and Myers (1999) argued that can generate a false appearance that leverage is slowly mean-reverting simply because of autocorrelated variation in net cash flows. Graham and Harvey (2001) also found that most firms claim to have leverage targets but achieving the target is not of prime importance. Our result is similar to that in Fama and French (2002) though ours is less significant.

The pecking order model says that dividends are sticky and leverage clearly varies to absorb changes in earnings. In Panels A and B of Table 4, the coefficients of $dATET_t/AT_t$ for dividend payers in model (7) are negative and significant. There is an additional lagged response of leverage to earnings reflected by the significant coefficient of $dATET_t/AT_{t+1}$. In contrast, the slopes on $dATET_{t+1}/AT_{t+1}$ and $dATET_t/AT_{t+1}$ of regressions for non-payers are statistically and economically tiny. The tests of variation of investment in leverage lend little support of the prediction. The coefficients of dAT_{t+1}/AT_{t+1} in Table 6 are either negative (book leverage) or positive (market leverage) and significant, which provides a contradict result. The coefficients of dAT_t/AT_{t+1} in the book leverage regressions are negative significant. At least for book leverage, reversion to the long-term capital structure begins quickly, which is shown by estimates on dAT_t/AT_{t+1}.

Panel C of Table 6 shows estimates of model (7) that explain the scaled change in debt. Controlling for changes in earnings, in the regressions for the change in debt, dividend payers finance 69 percent of current investment with debt, with a three percent reversal in the following year. Non-payers finance 64 percent of investment with debt, but with an insignificant three percent reversal in the following year. The short-term variation in investment, at least for dividend payers, is mostly absorbed by debt is consistent with the pecking order model. Table 4 reports that, controlling for investment, the coefficients on current and lagged earnings changes are -0.45 and -0.30 for dividend payers, respectively, and -0.33 and -0.07 for non-payers, respectively. That means a $1 increase in earnings produces combined concurrent and lagged declines in debt of $0.75 for dividend payers and $0.40 for non-payers. Contrast to Fama and French's

(2002) result, variation in investment produces a bigger change in debt for dividend payers than for non-payers. It indeed strengthens the prediction of pecking order model, that much of the short-term variation in earnings is absorbed by debt.

4. Robustness Check

In this section, we describe the results of a robustness test designed to investigate the prediction of the trade-off and pecking order models by categorizing the sample into five groups from the highest to the lowest leverage. Each quintile is treated as a big firm. Table 5 shows averages of various ratios for each of the five portfolios. Each company ratio is weighted by its assets. The estimates of this approach lend support of the prediction of the trade-off model. As reported in Table 3, this paper confirms the prediction of the pecking order model. Based on the coefficients of MT_t/AT_t, XRD_t/AT_t, and dAT_t/AT_t, we can say that less leverage non-payers have better investment, and the gap between investment (dAT_t/AT_t) and earnings ($ATET_t/AT_t$) is higher. However, the positive relation between leverage and investment of the simple pecking order may dominate the negative relation predicted by the complex pecking order model. Because of the more complex sample than that of Fama and French (2002), it is difficult to find out the relation between other variables and leverage. For example, Myers (1977) says that less levered non-payers issue lots of stock because their investments do not generate the kind of fixed tangible assets efficiently financed with debt. Table 7 shows that the ratio of depreciation to assets, DP_t/AT_t, does not vary much across leverage quintiles.

(INSERT TABLE 7 ABOUT HERE)

5. Conclusions

This study re-examines the predictions of trade-off and pecking order models based on an international data set. We find that the payout ratio is positively related to profitability and negatively related to investment opportunities, target leverage and volatility, which is consistent with predictions shared by the trade-off and pecking order models; The marginal relationship between target payout and target leverage is negative; Firms with more investments have lower long-term dividend payouts, but dividends do not vary to accommodate short-term variation in investment; In the pecking order model, dividends are sticky, long term dividend policy conforms to the Lintner model; In the complex pecking order model, firms with more investments have less book leverage and less market leverage. But our result doesn't support the positive relationship between investment and leverage in the trade-off model; Positive relationship between leverage and firm size, and between dividend payout and size; Controlling for investment, variation in investment produces a bigger change in debt for dividend payers than for non-payers. This is not consistent with Fama and French's (2002) result; In the pecking order model, net new issues of common stock are trivial for dividend payers. We also find results on the speed of adjustment and TP contrary to the previous literature.

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Appendices

Table 1. Countries and Number of Samples

Country	Code	Number of Samples	Country	Code	Number of Samples
Argentina	ARG	38	Jordan	JOR	2
Australia	AUS	497	Japan	JPN	3650
Austria	AUT	134	Kenya	KEN	1
Belgium	BEL	182	Korea	KOR	247
Bangladesh	BGD	1	Kuwait	KWT	1
Bahrain	BHR	1	Sri Lanka	LKA	4
Belize	BLZ	1	Lithuania	LTU	2
Bermuda	BMU	13	Luxembourg	LUX	33
Brazil	BRA	295	Morocco	MAR	5
Canada	CAN	646	Monaco	MCO	2
Switzerland	CHE	337	Mexico	MEX	175
Chile	CHL	113	Mauritius	MUS	1
China	CHN	270	Malaysia	MYS	750
Colombia	COL	22	Namibia	NAM	1
Cayman Islands	CYM	3	Netherlands	NLD	247
Cyprus	CYP	2	Norway	NOR	222
Czech Republic	CZE	32	New Zealand	NZL	85
Germany	DEU	885	Pakistan	PAK	49
Denmark	DNK	198	Peru	PER	42
Egypt	EGY	8	Philippines	PHL	186
Spain	ESP	181	Papua New Guinea	PNG	5
Estonia	EST	1	Poland	POL	44
Finland	FIN	173	Portugal	PRT	67
France	FRA	859	Romania	ROM	3
Gabon	GAB	1	Russia	RUS	25
Great Britain	GBR	1896	Singapore	SGP	447
Ghana	GHA	4	Slovakia	SVK	7
Greece	GRC	93	Slovenia	SVN	9
Hong Kong	HKG	771	Sweden	SWE	393

Croatia	HRV	2	Thailand	THA	389
Hungary	HUN	32	Turkey	TUR	55
Indonesia	IDN	241	Taiwan	TWN	219
India	IND	289	United States	USA	3138
Ireland	IRL	108	Venezuela	VEN	18
Iceland	ISL	1	South Africa	ZAF	165
Israel	ISR	50	Zambia	ZMB	1
Italy	ITA	328	Zimbabwe	ZWE	7
Number of Countries: 74			Number of Samples: 19315		

Table 2. Summary of Definitions of Variables

This table summarizes the definitions of the variables in regression Equations 1 to 8 related to the testing of hypotheses H_1, H_2, H_3, H_4, and H_5. Column 1 shows the list of variables and their definitions are in column 2.	
Variables	Definitions
Panel A: General Variables	
AT	Total assets
LT	Liabilities
PRCCM	Stock price
CSHO	Shares outstanding
IB	Income before extraordinary items
FCF	Income before extraordinary items available for common
XINT	Interest expense
DP	Depreciation expense
TXT	Tax expense
DVC	Common stock dividends
PSTK	Preferred stock liquidating value
PSTKR	Preferred stock redemption value
PSTKN	Preferred stock carrying value
XRD	Research and Development expenditures
PRSTKC	Purchases and sales of common and preferred stocks
TP	Long-term target dividend payout ratio
TDVC	Target dividend
IM	Common stock earnings
TL	Target leverage
ME_t	Market equity = stock price (PRCCM) times shares outstanding (CSHO)
MT_t	Market value of firm = liabilities (LT) – balance sheet deferred taxes and investment tax credit + preferred stock + market equity
BE_t	Book equity = total asset (AT) – liabilities (LT) + balance sheet deferred taxes and investment tax credit – preferred stock
$ATET_t$	Earnings before interest = earnings before extraordinary items (IB) + interest expense (XINT)
$BTET_t$	Earnings before interest and taxes = earnings before interest ($ATET_t$) + tax expense (TXT)
NI_t	Net stock issues = sales of common and preferred stock – purchases of common and preferred stock (PRSTKC)
Preferred stock	= liquidating value (PSTK) if available; else redemption value (PSTKR) if available; else carrying value (PSTKN)
Panel B: Profitability Proxies	
$BTET_t / AT_t$	The ratio of annual preinterest, pretax earnings to the end-of-year total assets
$ATET_t / AT_t$	The ratio of annual preinterest, after tax earnings to the end-of-year total assets
MT_t / AT_t	The ratio of company's total market value to its total book value
Panel C: Investment Opportunities Proxies	
XRD_t / AT_t	The ratio of Research and Development to the end-of-year total assets
DP_t / AT_t	The ratio of depreciation costs to the end-of-year total assets
dAT_t / AT_t	The growth of total assets
Panel D: Volatility Proxy	
$\ln(AT_t)$	The natural logarithm of total book assets

Table 3. Estimates of regression (4)

					Y_{t+1}/AT_{t+1}*						
	In_t	Y_{t+1}/AT_{t+1}	MT_t/AT_t	$ATET_t/AT_t$	dAT_t/AT_t	$XRDD_t$	XRD_t/AT_t	$ln(AT_t)$	TL_{t+1}	R^2	TP
Panel A: Regressions without interaction terms and reduced form regressions											
Mean	0.02	0.18								0.04	0.18
t(Mn)	6.11	4.79								1.86	4.79
Mean	0.01	-0.05	0.00	0.54	-0.19	0.04	-0.29	0.03		0.21	0.17
t(Mn)	5.67	-0.73	1.25	6.79	-2.77	0.66	-1.37	4.58		2.05	6.92
Panel B: TL_{t+1} is target book leverage											
Mean	0.02	0.42	0.00	0.03	-0.18	0.08	-0.88	0.04	-0.83	0.20	0.16
t(Mn)	5.60	2.11	1.31	1.78	-2.71	1.15	-2.27	2.75	-2.13	2.04	4.94
Mean	0.02	0.32	0.00		-0.13	0.05	-0.95	0.05	-0.72	0.20	0.15
t(Mn)	0.02	0.44	0.00		-3.06	0.05	-2.56	0.03	-2.16	2.17	2.72
Panel C: TL_{t+1} is target market leverage											
Mean	0.01	0.89	0.00	0.80	-0.27	-0.10	-0.25	-0.41	0.44	0.22	0.43
t(Mn)	5.39	1.04	1.11	1.67	-3.76	-0.64	-0.39	-1.02	1.09	2.22	3.58
Mean	0.01	-0.04	0.00		-0.11	-0.08	-0.89	0.10	-0.69	0.21	0.04
t(Mn)	5.29	-0.05	-0.92		-3.14	-0.46	-2.10	0.30	-2.38	2.16	0.27

The dependent variable is DVCt+1/ATt+1, dividends for fiscal year t+1 divided by assets at the end of t+1. The regressions are for each year t+1 of the period of 1993-2003 (11 years). The table indicates means (across years) of the regression intercepts (Int) and slopes, and t-statistics for the means, t(Mn), defined as the mean divided by its standard error [the times-series standard deviation of the regression coefficient divided by (10)1/2]. The regressions require that firms pay dividends in year t-1. ATt, BEt, MEt, LTt=ATt-BEt, and MTt=LTt+MEt are aggregate assets, book common equity, market value of common equity, book liabilities, and total market value, at the end of fiscal year t. Yt and XRDt are after-tax earnings available for common stock and R&D expenditures for fiscal year t. XRDDt is a dummy that is 1.0 for firms that do not report R&D expenditures for t and zero otherwise. Investment, dATt, is ATt-ATt-1. Target leverage, TLt+1, is the fitted value of the reduced form (book or market) leverage regression in Table 3. The regression R2 is adjusted for degrees of freedom.

The target payout TP is the average across years of a0/Mn(Yt+1/ATt)+a1+a2Mn(MTt/ATt)+a3Mn(ATETt/ATt)+a4Mn(dATt/ATt)+a5Mn(XRDDt)+a6Mn(XRDt/ATt)+a7Mn(ln(ATt))+a8Mn(TLt+1), where Mn() is the cross-section mean of a variable for a year, and the a's are regression coefficients from (4).

Table 4. Linter model regressions to explain the change in dividends, $(DVC_{t+1}-DVC_t)/AT_t$

	lnt	Y_{t+1}/AT_t	DVC_t/AT_t	dAT_{t+1}/AT_t	R^2	SA	TP
Panel A: Estimates of Equation(5)							
Mean	0.01	0.07	-0.52	-0.01	0.31	0.52	0.13
t(Mn)	6.28	2.43	-3.35	-1.53	3.11		
Panel B: Estimates of Equation(6): TL_{t+1} is target book leverage							
Mean	-0.01	0.16	-0.55	-0.01	0.52	0.55	0.29
t(Mn)	-0.51	5.50	-2.37	-0.66	5.01		

Table 5. Panel C: Estimates of Equation(6): TL_{t+1} is target market leverage

Mean	0.01	0.35	-0.78	-0.02	0.44	0.78	0.45
t(Mn)	2.62	2.59	-2.63	-2.37	4.69		

The regressions are run for each year t+1 of the 1993-2003 period (11 years). Regression (5) estimates the augmented Lintner (1956) model with the same Yt+1/ATt+1, DVCt/ATt+1, and dATt/ATt+1 slopes for all firms in a given year. In regression (6), the slopes on Yt+1/ATt+1 and DVCt/ATt+1 vary with MTt/ATt, ATETt/ATt, dATt/ATt, XRDDt, XRDt/ATt, ln(ATt), and TLt+1. The table shows means (across years) of the regression intercepts (Int) and slopes, and t-statistics for the means, t(Mn), defined as the mean divided by its standard error [the times-series standard deviation of the regression coefficient divided by (10)1/2]. The regressions include only firms that pay dividends in year t-1. The slope on Yt+1/ATt+1 in the estimates of (6) is the average across years of a1 + a11Mn(MTt/ATt) + a12Mn(ATETt/ATt) + a13Mn(dATt/ATt) + a14Mn(XRDDt) + a15Mn(XRDt/ATt) + a16Mn(ln(ATt)) + a17Mn(TLt+1) where Mn( ) is the cross-section mean of a variable for a given year, and the a1's are regression coefficents from (6). The slope on DVCt/ATt+1 in the estimates of (6) is the average across years of a2 + a21Mn(MTt/ATt) + a22Mn(ATETt/ATt) + a23Mn(dATt/ATt) + a24Mn(XRDDt) + a25Mn(XRDt/ATt) + a26Mn(ln(ATt)) + a27Mn(TLt+1), where the a2's are regression coefficents from (6). ATt, BEt, MEt, LTt=ATt-BEt, and MTt=LTt+MEt are aggregate assets, book common equity, market value of common equity, book liabilities, and total market value, at the end of fiscal year t. Yt, XRDt, and DVCt, are after tax earnings available for common stock, R&D expenditures, and dividends for fiscal year t. XRDDt is a dummy that is 1.0 for firms that do not report R&D expenditures for t and zero otherwise. Investment, dATt, is ATt-ATt-1. Target leverage, TLt+1, is the fitted value of the reduced form (book or market) leverage regression in Table 3. The regression R2 is adjusted for degrees of freedom. The speed-of-adjustment, SA, is the negative of the average slope on DVCt/ATt. The target payout, TP, is the average slope on Yt+1/ATt divided by SA.

Regression to explain the level of book(LT_{t+1}/AT_{t+1}) and market(LT_{t+1}/MT_{t+1}) leverage

	lnt	MT_t/AT_t	$BTET_t/AT_t$	DP_t/AT_t	$XRDD_t$	XRD_t/AT_t	$\ln(AT_t)$	TP_{t+1}	R^2
Panel A: Book leverage(LT_{t+1}/AT_{t+1}) regressions for dividend payers									
Mean	0.47	0.00	-0.48	0.32	0.00	-0.46	0.02		0.09
t(Mn)	56.62	-0.96	-8.54	6.75	-0.51	-3.18	21.83		8.63
Mean	0.48	0.00	-0.46	0.40	0.00	-0.52	0.02	0.00	0.08
t(Mn)	50.72	1.15	-6.51	7.22	-0.09	-5.64	28.44	1.97	8.46
Mean	0.45	0.00		0.38	-0.01	-0.70	0.02	0.00	0.04
t(Mn)	54.94	1.27		8.26	-1.83	-7.01	24.59	1.95	7.46
Panel B: Book leverage(LT_{t+1}/AT_{t+1}) regressions for non-dividend payers									
Mean	0.63	0.00	-0.48	-0.54	0.11	-0.50	-0.01		0.10
t(Mn)	7.41	0.73	-4.56	-0.71	4.81	-2.63	-0.88		2.85
Mean	0.68	0.00		1.14	0.17	-0.05	-0.04		0.02
t(Mn)	7.47	-1.12		2.00	7.21	-2.31	-1.40		3.53
Panel C: Market leverage(LT_{t+1}/MT_{t+1}) regressions for dividend payers									
Mean	-0.29	0.00	-0.18	0.32	0.03	-0.21	0.10		0.39
t(Mn)	-16.87	-1.17	-2.91	12.45	3.23	-3.12	67.56		32.06
Mean	-0.33	0.00	-0.18	0.33	0.03	-0.30	0.12	0.00	0.40
t(Mn)	-14.68	-1.29	-2.51	10.04	3.30	-3.83	6.59	-0.94	31.14
Mean	-0.30	0.00		0.36	0.03	-0.17	0.11	0.00	0.39
t(Mn)	-33.81	-1.27		9.72	3.27	-3.43	20.61	-2.46	30.76
Panel D: Market leverage(LT_{t+1}/MT_{t+1}) regressions for non-dividend payers									
Mean	-0.19	0.00	-0.03	0.07	0.03	0.03	0.09		0.32
t(Mn)	-27.51	-1.51	-4.11	1.82	7.86	6.82	96.73		88.29
Mean	-0.19	0.00		0.10	0.04	0.06	0.09		0.31
t(Mn)	-25.64	-1.43		2.33	9.75	6.13	87.02		79.04

The regressions are run for each year t+1 of the 1993-2003 period (11 years). The table shows means (across years) of the regression intercepts (Int) and slopes, and t-statistics for the means, t(Mn), defined as the mean divided by its standard error [the times-series standard deviation of the regression coefficient divided by (10)1/2]. The regressions in Parts A and C require that firms pay dividends in year t-1. The regressions in Parts B and D are for firms that do not pay dividends in year t-1. ATt, BEt, MEt, LTt = ATt – BEt and MTt = LTt + MEt, and are assets, book common equity, market value of common equity, total liabilities, and total market value, at the end of fiscal year t. DVCt, BTETt, DPt, and XRDt are dividends, earnings before interest and taxes, depreciation expense, and R&D expenditures for fiscal year t. XRDDt-1 is a dummy variable that is 1.0 for firms that report no R&D. The target payout TPt+1 is a0/(Yt+1/ATt)+a1+a2MTt/ATt+a3ATETt/ATt+a4dATt/ATt+a5XRDDt+a6XRDt/ATt+a7ln(ATt), where the a's are regression coefficients from the reduced form estimates of the dividend regression (4) in Table 1. The regression R^2 is adjusted for degrees of freedom.

Table 6. Regressions to explain changes in book leverage, market leverage, and book debt

	Int	$TL_{(t+1)}$	$LT_{(t)}/AT_{(t)}$	$dATET_{(t+1)}/AT_{(t+1)}$	$dAT_{(t+1)}/AT_{(t+1)}$	$dATET_{(t)}/AT_{(t+1)}$	$dAT_{(t)}/AT_{(t+1)}$	R^2
Panel A: Dependent variable is the change in book leverage, $LT_{(t+1)}/AT_{(t+1)}$-$LT_{(t)}/AT_{(t)}$								
Dividend payers								
Mean	-0.02	0.07	-0.04	-0.34	0.03	-0.27	-0.01	0.27
t(Mn)	-0.78	2.79	3.98	-7.95	1.26	-3.58	-3.73	4.52
Nonpayers								
Mean	0.26	-0.37	-0.03	0.09	-0.14	0.02	-0.02	0.58
t(Mn)	1.16	-1.32	0.15	0.65	-3.28	0.10	-2.31	6.18
Panel B: Dependent variable is the change in market leverage, $LT_{(t+1)}/MT_{(t+1)}$-$LT_{(t)}/MT_{(t)}$								
Dividend payers								
Mean	-0.04	0.11	-0.09	-0.26	0.34	-0.06	0.02	0.20
t(Mn)	-4.66	2.65	2.90	-3.09	6.00	-4.48	0.49	2.71
Nonpayers								
Mean	-0.02	0.12	-0.05	-0.06	0.15	0.02	-0.02	0.14
t(Mn)	-5.48	2.35	0.48	-1.53	3.65	0.72	-1.65	2.77
Panel C: Dependent variable is the change in book debt, $LT_{(t+1)}$-$LT_{(t)}/AT_{(t+1)}$								
Dividend payers								
Mean	-0.07	0.11	0.00	-0.45	0.69	-0.30	-0.03	0.86
t(Mn)	-2.61	2.27	-0.41	-6.22	11.72	-2.89	-3.29	22.32
Nonpayers								
Mean	-0.32	0.61	0.09	-0.33	0.64	-0.08	-0.03	0.70
t(Mn)	-3.04	2.90	1.81	-3.18	11.77	-2.44	-0.72	7.90

The regressions are run for each year t+1 of the 1993-2003 period (11 years). The table shows means (across years) of the regression intercepts (Int) and slopes, and t-statistics for the means, t(Mn), defined as the mean divided by its standard error [the times-series standard deviation of the regression coefficient divided by (10)1/2]. The dividend payer regressions require that firms pay dividends in year t-1. The nonpayer regressions are for year t-1 non-payers. ATt, BEt, MEt, LTt = ATt-BEt and MTt = LTt+MEt, and are assets, book common equity, market value of common equity, total liabilities, and total market value, at the end of fiscal year t. DVCt, BTETt, ATETt, DPt, and XRDt are dividends, earnings before interest and taxes, earnings before interest but after taxes, depreciation expense, and R&D expenditures for fiscal year t. XRDDt-1 is a dummy variable that is 1.0 for firms that report no R&D. dATETt = ATETt-ATETt-1 and dATt = ATt-ATt-1. Target leverage TLt+1 is the fitted value from the regression of LTt+1/ATt+1 (or LTt+1/MTt+1) on MTt/ATt, BTETt/ATt, Dpt/ATt-1, XRDDt, XRDt/ATt, ln(At), and TPt+1. The target payout TPt+1 is a0/(Yt+1/ATt)+a1+a2MTt/ATt+a3ATETt/ATt+a4dATt/ATt+a5XRDDt+a6XRDt/ATt+a7ln(ATt), where the a's are regression coefficients from the reduced form estimates of the dividend regression (4) in Table 1. The regression R2 is adjusted for degrees of freedom.

Table 7. Book and market leverage sorts for dividend payers and nonpayers: 1993-2003

	D(t)/Y(t)	L(t)/A(t)	L(t)/V(t)	E(t)/A(t)	V(t)/A(t)	dA(t)/A(t)	RD(t)/A(t)	A(t)/C(t)	Dp(t)/A(t)	Prstkc(t)/A(t)
Sorts of dividend payers on book leverage, L(t)/A(t)										
Low	0.593	0.234	0.156	0.068	1.36	0.031	0.010	1.117	0.036	0.011
Q2	0.753	0.613	0.286	0.046	2.05	0.054	0.008	0.611	0.043	0.007
Q3	0.823	0.680	0.307	0.041	1.63	0.054	0.007	0.955	0.043	0.006
Q4	0.800	0.752	0.312	0.033	0.88	0.053	0.006	1.837	0.042	0.005
High	0.769	0.855	0.313	0.019	0.73	0.060	0.006	6.542	0.041	0.005
Sorts of dividend payers on market leverage, L(t)/V(t)										
Low	0.485	0.500	0.001	0.063	8.16	0.070	0.030	0.171	0.035	0.004
Q2	0.790	0.553	0.011	0.054	9.51	0.052	0.008	0.353	0.038	0.005
Q3	0.855	0.542	0.095	0.052	8.05	0.051	0.009	1.148	0.042	0.007
Q4	0.936	0.560	0.420	0.049	4.50	0.046	0.007	2.428	0.044	0.007
High	0.981	0.618	0.884	0.040	3.71	0.035	0.008	13.731	0.045	0.010
Sorts of dividend nonpayers on book leverage, L(t)/A(t)										
Low		0.199	0.173	0.050	7.36	0.163	0.073	1.297	0.045	0.015
Q2		0.423	0.306	0.045	6.82	0.069	0.036	3.459	0.055	0.010
Q3		0.560	0.355	0.038	5.48	0.045	0.021	5.610	0.053	0.007
Q4		0.685	0.391	0.027	3.94	0.038	0.015	4.827	0.051	0.005
High		1.264	0.362	0.018	1.99	0.020	0.001	6.229	0.058	0.006
Sorts of dividend nonpayers on market leverage, L(t)/V(t)										
Low		0.624	0.001	0.166	4.75	0.136	0.060	1.251	0.048	0.008
Q2		0.600	0.012	0.102	9.14	0.062	0.058	1.608	0.052	0.009
Q3		0.572	0.097	0.044	7.99	0.054	0.047	1.034	0.054	0.011
Q4		0.648	0.420	0.025	1.76	0.043	0.027	1.984	0.053	0.009
High		0.819	0.877	0.011	0.93	0.026	0.014	13.270	0.051	0.007

Each year t firms that pay dividends in t are sorted into quintiles on book or market leverage. The table shows averages, for 1993-2003, of the ratios of aggregates. Ct is the number of firms. ATt, BEt, MEt, LTt=ATt-BEt, and MTt=LTt+Met are assets, book common equity, market value of common equity, book liabilities, and total market value, at the end of fiscal year t. ATETt, Yt, XRDt, DVCt, Dpt, and NIt are earnings before interest but after taxes, after tax earnings to common stock, R&D expenditures, dividends, depreciation and net stock issues for fiscal year t. Investment, dATt, is ATt-ATt-1.