WHAT INFORMATION IS PROVIDED BY MARGINAL TAX RATES?

John R. Cooper
California State University, Los Angeles

Dong-Woo Lee
California State University, Los Angeles

SUMMARY: This paper explores what information is provided by marginal tax rates. We find evidence suggesting that the marginal tax rate signals one-year-ahead earnings and firm value. We also employ statistical subgroup regression analysis to find that the marginal tax rate provides information about one-year-ahead earnings for both high and low marginal tax rate firms. High marginal tax rate firms are associated with more robust earnings persistence than low marginal tax rate firms. Our work contributes to the understanding of earnings persistence and firm value through investigation of the predictive value of the marginal tax rate.

Introduction

This paper investigates the role of marginal tax rates (MTR) in indicating the persistence of one-year-ahead earnings and firm value. MTR is defined as the tax cost associated with the next dollar of earnings, adjusted to present value (Graham and Kim, 2009). One-year-ahead earnings is calculated as pre-tax book earnings scaled by average total assets for the following fiscal year. Firm value is calculated as stock price per share divided by the book value per share at the end of the fiscal year. We find that the marginal tax rate does indeed signal one-year-ahead earnings persistence and the investor's perception of the firm in the form of stock pricing (Firm Value).

We employ statistical subgroup regression to provide additional information regarding the implications of low versus high marginal tax rate firm-years as well as profitable versus unprofitable firm-years. The subgroup analysis reveals that the marginal tax rate is correlated with one-year-ahead earnings for both high and low MTR subgroups. However, when we evaluate positive versus negative income firm-year subgroups, we find that only the positive income subgroup exhibits a significant relationship with one-year-ahead earnings. Our subgroup evaluation of MTR with firm value reveals that high MTR firm-years are significantly and positively associated with stock pricing in the positive income subgroup and that low MTR firm-years in the negative pre-tax subgroup are inversely related to firm value. The underlying theory of our analysis suggests that marginal tax rates play an important role in predicting earnings persistence and firm value.

Taxes have long been recognized as an important consideration in firm operations and in firm value. Taxes represent a true reduction in cash flow necessitating consideration in nearly all business decisions. The complex interplay of financial accounting reporting with taxation has implications which also influence investors' perception of firm value. Governments, through changes in tax policy, anticipate tax laws will incentivize, or possibly provide a disincentive, for

various activities and investments (Hanlon and Heitzman, 2010). Understanding just how changes in tax rates will affect economic conditions is important to policy makers, researchers, and to practitioners.

We focus our attention on marginal tax rates (MTR) as a predictor of one-year-ahead earnings and on firm value in this analysis. MTR is important for several reasons. First, the effective or average tax rate is often viewed as providing retrospective information. In contrast, deferred taxes and the marginal tax rate are generally thought of as potential indicators of prospective information for investor decision-making (Callihan, 1994; Hanlon, 2005). For example, Plesko (2003) found that average tax rate measures provide little forward-looking information, as they are not highly correlated with statutory tax burdens as shown on the tax returns. In contrast, simulated marginal tax rates perform much better and provide more reliable information for estimating current year tax rates (Plesko, 2003).

While the calculation of MTR may seem straightforward, it is complicated by the credit and operating loss carryback and carryforward rules. For example, an extra dollar of income in a loss year will mean one less dollar of loss to carryback (or forward) resulting in a tax incurred in a different year. Therefore, assessment of the current cost of this extra dollar of income necessitates a present value calculation. However, despite this additional complexity, focus on the next dollar of income is what makes the MTR forward looking, as opposed to effective or average tax rates which are often used to estimate tax equity and efficiency (Callihan, 1994) and capital structure (Fazzari *et al.,* 1988).

Estimating corporate MTR from GAAP-based financial reporting information has long been a focus of researchers. Shevlin (1990) advanced an estimation method referred to as the random walk with a drift (RW) approach which was further refined by Graham (1996a). This method provides an estimate of MTR through analysis of the volatility of a firm's prior years' earnings to project future earnings. The projected future earnings are then used to estimate MTR. Prior to 2018, corporations could carryback and carryforward losses and credits requiring MTR estimation to consider more than just current period income or loss. Accordingly, each forecasted year must include the potential for carryforward or carryback credits or losses (Graham, 1996a). Although the Shevlin/Graham calculation was tedious in that it required a 22 year-ahead estimate of taxable income, the approach to MTR estimation found substantial support in the literature (Plesko, 2003; Pattenden, 2002).

In a 2010 paper, Blouin, Core, and Guay developed a non-parametric ("NP") simulation approach to estimating future taxable income and MTRs. The approach was developed in response to a perceived weakness in the RW MTR calculation, which tended to underestimate the future volatility of income across all prospective estimations (Blouin *et al*., 2010). Underestimation of volatility arose in the RW calculations because a firm's future income volatility was based on its past volatility. However, as firms grew in size, the volatility of earlier years, when the firm was relatively smaller, failed to adequately represent the future volatility of what often is a much larger firm. Blouin, et al., (2010) avoided this pitfall by projecting a firm's future income through forecasts from groupings of firms of similar size and profitability. The NP approach was found to improve MTR estimation and is widely used in the literature (Anantharaman, Fang, & Gong 2014; Hanlon and Heitzman 2010; McGuire, Wang, and Wilson 2014) and is used in this analysis to explore what information MTR provides.

This paper contributes to the research in several ways. First, an important contribution of our research is to demonstrate that MTR provides information beyond optimization of capital structure. Since use of MTR as a predictor of financial operations and firm value is relatively

unexplored in the literature, our paper suggests additional applications for this operating metric that are of interest to researchers, practitioners, and managers. Second, we extend the literature that seeks to understand and predict one-year-ahead earnings persistence. Although MTR has generally not been used as a predictor of earnings persistence, we find important new evidence that MTR does indeed provide predictive information. Third, we contribute to the research that evaluates investors' use of earnings persistence information in valuation of firms. Our findings suggest that MTR is associated with one-year-ahead earnings persistence and, in turn, firm value.

The rest of this paper proceeds as follows. The next section provides a review of relevant literature including development of our hypotheses. The third section discusses sample selection and descriptive statistics. The fourth section presents our research design and empirical results. The last section summarizes and concludes.

Literature Review and Hypotheses Development

Prior research has addressed the role of taxes on financial operations, investment decisions, and firm value. Hanlon and Heitzman (2010) reviewed tax research with the objective of integrating theoretical and empirical tax research in accounting, economics, and finance. They addressed four areas of research: the informational role of income tax expense reported for financial accounting; corporate tax avoidance; corporate decision-making including investment, capital structure, and organizational form; and taxes and asset pricing. The authors found that taxes affect many financial decisions, but the weight accorded taxation in these decision-making processes is still unclear.

The effective tax rate (ETR), or average tax rate, has often been used in the literature. ETR is the total tax expense divided by the pre-tax accounting income (Ilaboya *et al.*, 2016). ETR has been found to be inversely related to return on assets (Noor *et al.,* 2008; Adhikari *et al.*, 2006). Noor, *et al*. (2008) also found lower ETRs to be associated with higher investment in fixed assets and in foreign operations. These findings suggest that profitable companies are likely to have lower tax burdens due to increased access to tax incentives. Lower ETRs have also been associated with higher firm value measured by stock pricing (Swenson, 1999; Abarbanell and Bushee, 1997). Gupta and Newberry (1997) found firms with higher ETRs tended to rely on higher levels of debt financing. This finding suggests that firms with higher ETRs are more likely to take advantage of the increased value of the interest deduction associated with higher levels of debt.

While ETR has been used extensively in the research, much less attention has been accorded the information provided by MTR. Yet, MTR is central to forward-looking analysis (Callihan, 1994). A fundamental decision rule for investment is that the marginal benefits should be greater than the marginal costs (Hanlon and Heitzman, 2010). This research gap is possibly due to the inability to accurately estimate MTR prior to the work done by Graham (1996) and later improved by Blouin *et al.* (2010).

MTR represents the percentage of each next dollar of income that goes to income taxes. Because of this, MTR provides business organizations with a signal of the tax cost associated with future operating results. Accordingly, MTR is an important consideration for researchers, managers, and practitioners interested in forward-looking information.

Fazzari *et al.* (1988) distinguished MTR as an important forward-looking indicator for management decision making. MTR is relevant for investment decisions because it affects future cash flows. Where the cost of internal financing differs substantially from external financing, investment decisions depend more on cash flow, including the amount of cash flow lost to taxes.

The Fazzari study compared firms that faced essentially no cost disadvantage for external financing to firms that paid a premium to raise funds from external financing. The authors found strong evidence that MTR matters for investment decisions, and that the effective tax rate was not useful for this purpose.

Manzon (1994) examined the role of taxes in capital structure decisions using a parsimonious model to estimate marginal tax rates of firms with operating loss carryovers. This estimation method was similar to that developed by Shevlin (1990), but easier to calculate and, therefore, more accessible to researchers. MTR was an important consideration in this study that evaluated a firm's motivation to retire debt early. High MTR firms placed great value on the interest shield; however, high MTR firms with operating loss carryforwards were not receiving any benefit from the debt service payments. Following this theory, Manzon (1990) reported that high MTR firms were more likely to retire debt early than were low MTR firms. Although not addressed in the Manzon (1994) paper, high MTR firms would presumably be in a more favorable cash flow position that would provide the opportunity to more easily retire debt that was providing no tax benefit. Accordingly, the association of high MTR to early debt retirement is more likely a result of profitable firms with tax-sheltered income using available cash flow to engage in early retirement of debt that was providing no tax benefit.

Graham (2000) extended Shevlin's random walk with a drift (RW) method MTR estimation method to incorporate the effect of increased interest deductions that drive corporate taxable income down through lower MTRs. Referred to as "the entire tax benefit function," Graham theorized that the tax benefit of debt is maximized when MTR begins to decline. Graham referred to the point where an increase in debt produced a decrease in the tax benefit as "kink analysis." While MTR was central to Graham's analysis, the improvement was a fluid representation of the MTR calculation rather than the static approach typically used in earlier papers. Results indicated that less than half of the 87,643 firm-years in the study were optimizing the use of debt in the capital structure. Graham's analysis emphasized the forward-looking characteristics of MTR.

Blouin *et al*. (2010) re-examined the optimum allocation between debt and equity using a non-parametric (NP) MTR simulation technique. The NP approach resulted in increased accuracy in MTR estimation by reducing the unreliable volatility noise inherent in the RW MTR estimation method. The resulting revised MTR estimates were used to provide evidence that debt produces lower tax benefits than previously thought suggesting that corporations were not as under-leveraged as previous literature implied.

With the understanding that MTR plays an important role in forward-looking financial operations, we theorize that MTR provides incremental information regarding one-year-ahead earnings with the following hypothesis.

H1: Marginal Tax Rates provide incremental information about one-year-ahead earnings after controlling for current period earnings, cash flow, and revenues.

Additionally, we expect that firms with higher than the sample median MTRs will have higher levels of earnings persistence resulting in our second hypothesis.

H2: Earnings persistence is higher for firms with higher marginal tax rates than for other firms.

We also expect that high MTRs will be positively correlated with firm value, measured as the ratio of share price to book value. Accordingly, our third hypothesis is:

H3: Stock market investors reflect the incremental information provided by marginal tax rates in the valuation of a firm's stock.

Data and Sample

The firm-years included in the sample were selected from the COMPUSTAT North American Fundamentals Annual dataset. The COMPUSTAT data file is accessed from the Wharton Research Data Services (WRDS) web site. Sample firms were selected using the current ISO country code of incorporation as USA and the current ISO currency code as USD. Additional sample selection criteria included the industry and fiscal year. Firms in the financial services industries, identified as the primary SIC codes from 6,000 to 6,999, were excluded from the sample. Fiscal years included in the sample are from 1991 through 2016.

Marginal tax rates of the sample firms were provided by the Marginal Tax Rates database created by Blouin *et al.*, (2010) and made available by the Wharton Research Data Services (WRDS).

For fiscal years 1991 through 2016, 142,343 firm-years were initially included in the sample. From this sample, 35,891 firm-years were excluded due to missing value(s) for at least one of the variables used in the test models. Additionally, 6,299 firm-years that reported extreme values for at least one of the variables were trimmed from the sample. Extreme values were defined as those in the first percentile or in the 99th percentile. For statistical analyses, the resulting 100,153 firm-years were included in the final sample.

Firm-years in the sample were divided into two groups based on the magnitude of the marginal tax rate for the firm-year. The low marginal tax rate group was defined as those firm-years that reported marginal tax rates lower than the median value of the sample. The high marginal tax rate group included firm-years where the marginal tax rates were greater than or equal to the median value of the sample. The low marginal tax rate subsample includes 50,076 firm-years, while 50,077 firm-years are included in the high marginal tax rate subsample. The difference in the mean MTR of each statistical subgroup was statistically significant.

Research Design and Results

To examine our first research question, whether MTR provides information regarding one-year-ahead earnings, Model 1 was applied to all firms in the sample. The results are presented in Table 1. As shown in Table 1, all coefficients are highly significant.

Model 1: Information content of marginal tax rate in the prediction of one-year-ahead earnings

$$PTBI_{t+1} = \beta_0 + \beta_1 PTBI_t + \beta_2 CFO_t + \beta_3 REV_t + \beta_4 MTR_t + \varepsilon_{t+1} \quad (1)$$

Where,

$PTBI_{t+1}$ is pre-tax book earnings scaled by average total assets for the period t+1
PTBI is pre-tax book earnings scaled by average total assets for the period
CFO is cash flow from operating activities scaled by average total assets for the period
REV is annual revenue scaled by average total assets for the period
MTR is marginal tax rate after interest expense as calculated by Blouin, Core, & Guay (2010)

Model 1 (Table 1) examines whether the current period marginal tax rates provide relevant information about one-year-ahead earnings. The coefficient of MTR_t in the Model 1 regression is positive and significantly different from zero; therefore, test results support Hypothesis 1.

Table 1
MTR in Prediction of One-Year-Ahead Earnings

Model 1: $PTBI_{t+1} = \beta_0 + \beta_1 PTBI_t + \beta_2 CFO_t + \beta_3 REV_t + \beta_4 MTR_t + \varepsilon_{t+1}$

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	-0.1149	0.0031	-37.23***	<.0001
$PTBI_t$	0.5678	0.0039	144.85***	<.0001
CFO_t	0.4999	0.0067	75.18***	<.0001
REV_t	0.0183	0.0014	13.29***	<.0001
MTR_t	0.1916	0.0108	17.70***	<.0001

Adjusted R^2 = 0.581
F-statistic = 34,731***
Number of Firm-Years = 100,153
*, **, *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 2 reflects application of Model 1 to the low and high MTR subsample groups. The coefficients for each subgroup are reported in Table 2, Columns 1 and 2. Column 3 provides the difference between the subgroups. Table 2 indicates that MTR is associated with one-year-ahead earnings for both subgroups and that the difference between the MTR measurements is not significant.

Table 2
High/Low MTR Firm-Year Comparison

Model 1: $PTBI_{t+1} = \beta_0 + \beta_1 PTBI_t + \beta_2 CFO_t + \beta_3 REV_t + \beta_4 MTR_t + \varepsilon_{t+1}$

	(1) Low MTR Firm-Years		(2) High MTR Firm-Years		(3) = (2) - (1) Diff. in Coefficients [(a)]	
Variables	Coeff.	T-stat.	Coeff.	T-stat.	Diff.	P-value
Intercept	-0.124***	-23.18	-0.078***	-10.75	0.046*	0.0531
$PTBI_t$	0.558***	99.21	0.595***	108.72	0.037**	0.0394
CFO_t	0.523***	53.41	0.251***	39.80	-0.272**	<.0001
REV_t	0.027***	10.45	0.007***	10.40	-0.020***	<.0001
MTR_t	0.195***	6.53	0.191***	8.71	-0.004	0.9549
N	50,076		50,077			
Adj. R^2	0.5357		0.3440			

[a] Differences in coefficients are measured by applying Model 2:
$PTBI_{t+1} = \beta_0 + \beta_1 HMTR_t + \beta_2 PTBI_t + \beta_3 PTBI_t*HMTR_t + \beta_4 CFO_t + \beta_5 CFO_t*HMTR_t + \beta_6 REV_t + \beta_7 REV_t*HMTR_t + \beta_8 MTR_t + \beta_9 MTR_t*HMTR_t + \varepsilon_{t+1}$
In Model 2, β_1, β_3, β_5, β_7 and β_9 reports the difference in each coefficient between the low and high marginal tax rate firms.

*, **, *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Model 2 was used to evaluate the differences in the subgroups.

Model 2: Comparison of the subgroups of firms with higher or lower than the median marginal tax rate of the sample:

$$PTBI_{t+1} = \beta_0 + \beta_1 HMTR + \beta_2 PTBI_t + \beta_3 PTBI_t*HMTR + \beta_4 CFO_t + \beta_5 CFO_t*HMTR + \beta_6 REV_t + \beta_7 REV_t*HMTR + \beta_8 MTR_t + \beta_9 MTR_t*HMTR + \varepsilon_{t+1} \quad (2)$$

Where,

HMTR is an indicator variable equal to 1 if MTR is greater than or equal to the median MTR of the sample and 0, otherwise

Table 3 uses Model 2 to examine whether earnings persistence, as measured by the coefficient of PTBIt*HMTR, is higher for firm-years at or above the median marginal tax rates of the sample than those firm-years below the median MTR. The coefficient of PTBIt*HMTR is positive and significantly different from zero; therefore, our test results are consistent with Hypothesis 2: Earnings persistence is higher for firms in the high MTR subgroup than for firms in the low MTR subgroup.

Table 3
High/Low MTR Firm-Year Comparison with Interactions

Model 2: $PTBI_{t+1} = \beta_0 + \beta_1 HMTR_t + \beta_2 PTBI_t + \beta_3 PTBI_t*HMTR_t + \beta_4 CFO_t + \beta_5 CFO_t*HMTR_t + \beta_6 REV_t + \beta_7 REV_t*HMTR_t + \beta_8 MTR_t + \beta_9 MTR_t*HMTR_t + \varepsilon_{t+1}$

Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	-0.1236	0.0039	-31.96***	<.0001
$HMTR_t$	0.0454	0.0235	1.93*	0.0531
$PTBI_t$	0.5579	0.0041	136.81***	<.0001
$PTBI_t$*HMTR$_t$	0.0368	0.0179	2.06**	0.0394
CFO_t	0.5234	0.0071	73.64***	<.0001
CFO_t*HMTR$_t$	-0.2719	0.0213	-12.74***	<.0001
REV_t	0.0272	0.0019	14.41***	<.0001
REV_t*HMTR$_t$	-0.0206	0.0028	-7.40***	<.0001
MTR_t	0.1953	0.0217	9.00***	<.0001
MTR_t*HMTR$_t$	-0.0041	0.0732	-0.06	0.9549

Adjusted R^2 = 0.5822 F-Statistic = 15,504*** Number of Firm-Years = 100,153
*, **, *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Model 3 examines whether the information provided by marginal tax rates is reflected in the valuation of a firm's stock. If the coefficient of MTR_t is significantly different from zero, investors reflect the information provided by marginal tax rates in the valuation of the firm's stock.

Model 3: Price to Book (PB) ratio as dependent variable:

$$PB_t = \beta_0 + \beta_1 PTBI_t + \beta_2 CFO_t + \beta_3 REV_t + \beta_4 MTR_t + \varepsilon_{t+1} \quad (3)$$

Model 4 is used to determine whether the valuation of a firm's stock is different for firm-years with positive pre-tax income as compared to negative pre-tax income firm-years. The coefficient of MTRt*HMTR in Model 4 measures difference between the firm-years with higher or lower than the median marginal tax rate.

Model 4: Measuring the differences in coefficients between high and low MTR firms:

$$PB_t = \beta_0 + \beta_1 HMTR_t + \beta_2 PTBI_t + \beta_3 PTBI_t{*}HMTR_t + \beta_4 CFO_t + \beta_5 CFO_t{*}HMTR_t + \beta_6 REV_t + \beta_7 REV_t{*}HMTR_t + \beta_8 MTR_t + \beta_9 MTR_t{*}HMTR_t + \varepsilon_{t+1} \quad (4)$$

Where,

PB is the stock price per share divided by the book value per share at the end of the period

Test of Hypothesis 1

Table 1 presents the results of regression Model 1 of predicting one-year-ahead pre-tax earnings. The result supports that the marginal tax rate provides incremental information about future pre-tax earnings after controlling for the effects of current earnings, cash flows and revenues. The coefficient of the marginal tax rate (MTRt), 0.1916, is positive and significantly different from zero. When Model 1 is applied to the pooled sample of 100,153 firm-years over a period from 1991 to 2016, the current period marginal tax rate provides information about a firm's ability to generate pre-tax earnings in the following year. The information provided by marginal tax rate is different from the information provided by other current period accounting variables, such as pre-tax income, cash flows and revenues. Thus, the results presented in Table 3 support Hypothesis 1.

Test of Hypothesis 2

To test whether firms with high MTR report increased one-year-ahead earnings when compared to low MTR firms, two subsamples of firm-years were created based on the marginal tax rate. Firm-years at or above the median marginal tax rate of the sample (High MTR Firm-Years) and firm-years with marginal tax rates below the median (Low MTR Firm-Years).

Table 2 presents the Model 1 regression results of the two subsamples, Low and High MTR Firm-Years. The coefficient of current period pre-tax earnings (PTBIt) for the High MTR Firm-Years subsample is 0.595, which is higher than 0.558 for the Low MTR Firm-Years subsample. The difference in coefficients between Low and High MTR Firm-Year subsamples is significant. Therefore, the results presented in Table 2 support Hypothesis 2 that predict higher earnings persistence for high marginal tax rate firms.

While the coefficient of current period pre-tax income is higher for high marginal tax rate firms, it is noted that the coefficient of current period cash flows is higher for low marginal tax

rate firms. The contrasting results for pre-tax income and cash flows suggest that the ability to generate excess cash flows is more important for the Low MTR Firms than for the High MTR Firms. In reviewing the sample, we noted that the mean cash flow from operating activities was lower for Low MTR Firms than for High MTR Firms. Because the ability to generate cash flow is lower for the firms with lower marginal tax rates, such an ability is more positively associated with a firm's future pre-tax income level.

While the coefficients of the other accounting variables (Table 2) are significantly different for the two-subsample groups, the coefficients of marginal tax rate (MTRt) were not significantly different for the two groups. The results presented in Table 2 are consistent with Hypothesis 1 for all firm-years in each of the subsample groups. Table 3 reports the results of applying Test Model 2 that includes an indicator variable that measures the differences in coefficients between high and low MTR firm-years. The coefficient of PTBIt*HMTR is positive and significantly different from zero.

In Table 4, Model 1 test results are presented in two panels based on pre-tax income: Panel A for firms with positive pre-tax income and Panel B for firms with negative pre-tax income. Panel A of Table 4 shows that the results presented in Table 2 are consistent with the firms with positive pre-tax income. However, for the firms with negative pre-tax income, the role of marginal tax rate is either less significant with a smaller coefficient for low MTR firms, or not significantly different from zero for high MTR firms. The results for negative pre-tax income firms are contrasted with those for positive pre-tax income firms. A comparison of Panels A and B of Table 4 provides evidence that the marginal tax rate is more significant for positive income firms than for negative income firms.

Table 4
Groupings by Sign of Pre-Tax Income

Model 1: $PTBI_{t+1} = \beta_0 + \beta_1 PTBI_t + \beta_2 CFO_t + \beta_3 REV_t + \beta_4 MTR_t + \varepsilon_{t+1}$

Panel A: Firm-Years with Positive Pre-Tax Income

	(1) Low MTR Firm-Years		(2) High MTR Firm-Years		(3) = (2) - (1) Diff. in Coefficients [a]	
Variables	Coeff.	T-stat.	Coeff.	T-stat.	Diff.	P-value
Intercept	-0.094***	-22.42	-0.095***	-13.34	-0.001	0.9094
$PTBI_t$	0.245***	11.63	0.650***	91.80	0.405***	<.0001
CFO_t	0.379***	29.04	0.199***	31.21	-0.180***	<.0001
REV_t	0.013***	7.49	0.006***	9.52	-0.007***	<.0001
MTR_t	0.286***	16.23	0.243***	11.21	-0.043	0.1540
N	16,570		44,382			
Adj. R^2	0.0922		0.2913			

[a] Differences in coefficients are measured by applying Model 2:
$PTBI_{t+1} = \beta_0 + \beta_1 HMTR_t + \beta_2 PTBI_t + \beta_3 PTBI_t*HMTR_t + \beta_4 CFO_t + \beta_5 CFO_t*HMTR_t + \beta_6 REV_t + \beta_7 REV_t*HMTR_t + \beta_8 MTR_t + \beta_9 MTR_t*HMTR_t + \varepsilon_{t+1}$
In Model 2, β_1, β_3, β_5, β_7 and β_9 reports the difference in each coefficient between the low and high marginal tax rate firms.

*, **, *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel B: Firm-Years with Negative Pre-Tax Income

	(1) Low MTR Firm-Years		(2) High MTR Firm-Years		(3) = (2) - (1) Diff. in Coefficients [(a)]	
Variables	Coeff.	T-stat.	Coeff.	T-stat.	Diff.	P-value
Intercept	-0.126***	-16.30	0.006	0.23	0.132	0.1348
PTBI$_t$	0.559***	80.51	0.493***	25.98	-0.066	0.2638
CFO$_t$	0.531***	43.15	0.445***	19.53	-0.086	0.2316
REV$_t$	0.040***	10.03	0.005*	1.76	-0.035***	0.0007
MTR$_t$	0.181***	3.50	-0.099	-1.16	-0.280	0.2997
N	33,485		5,693			
Adj. R^2	0.5005		0.2377			

[(a)] Differences in coefficients are measured by applying Model 2:
$PTBI_{t+1} = \beta_0 + \beta_1 HMTR_t + \beta_2 PTBI_t + \beta_3 PTBI_t*HMTR_t + \beta_4 CFO_t + \beta_5 CFO_t*HMTR_t + \beta_6 REV_t + \beta_7 REV_t*HMTR_t + \beta_8 MTR_t + \beta_9 MTR_t*HMTR_t + \varepsilon_{t+1}$
In Model 2, β_1, β_3, β_5, β_7 and β_9 reports the difference in each coefficient between the low and high marginal tax rate firms.

*, **, *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Test of Hypothesis 3

Table 5 presents the results of applying Model 3, which measures the role of current accounting variables (PTBI, CFO, REV, and MTR) on the valuation of a firm's stock using the Price to Book (PB) ratio as the dependent variable. Panel A of Table 5 presents the results from the sample of firm-years with positive pre-tax income. Our results suggest that investors reflect the information provided by a firm's marginal tax rate in the value of stock for the firms with high marginal tax rates only. The coefficient of MTR for High MTR firm-years is 10.041, which is significantly different from zero at the <.0001 p-value level. The results support Hypothesis 3 that predicted the value relevance of marginal tax rate information on stock prices.

Table 5
Price to Book Ratio (PB) as Dependent Variable

Model 3: $PB_t = \beta_0 + \beta_1 PTBI_t + \beta_2 CFO_t + \beta_3 REV_t + \beta_4 MTR_t + \varepsilon_{t+1}$

Panel A: Firm-Years with Positive Pre-Tax Income

	(1) Low MTR Firm-Years		(2) High MTR Firm-Years		(3) = (2) - (1) Diff. in Coefficients [(a)]	
Variables	Coeff.	T-stat.	Coeff.	T-stat.	Diff.	P-value
Intercept	2.006***	17.77	-1.931***	-7.79	-3.937***	<.0001
PTBI$_t$	7.770***	13.71	11.262***	45.79	3.492***	<.0001
CFO$_t$	-0.032	-0.09	3.633***	16.44	3.665***	<.0001
REV$_t$	-0.038	-0.85	-0.147***	-6.89	-0.109**	0.0113
MTR$_t$	-0.983	-2.07	10.041***	13.33	11.024***	<.0001
N	16,570		44,382			
Adj. R^2	0.0119		0.0953			

[a] Differences in coefficients are measured by applying Model 4:
$PB_t = \beta_0 + \beta_1 HMTR_t + \beta_2 PTBI_t + \beta_3 PTBI_t*HMTR_t + \beta_4 CFO_t + \beta_5 CFO_t*HMTR_t + \beta_6 REV_t + \beta_7 REV_t*HMTR_t + \beta_8 MTR_t + \beta_9 MTR_t*HMTR_t + \varepsilon_{t+1}$
In Model 4, β_1, β_3, β_5, β_7 and β_9 reports the difference in each coefficient between the low and high marginal tax rate firm-years.
*, **, *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel B: Firm-Years with Negative Pre-Tax Income

	(1) Low MTR Firm-Years		(2) High MTR Firm-Years		(3) = (2) - (1) Diff. in Coefficients [a]	
Variables	Coeff.	T-stat.	Coeff.	T-stat.	Diff.	P-value
Intercept	3.862***	33.44	1.774***	3.13	-2.088	0.1167
$PTBI_t$	1.974***	19.05	-1.473***	-3.89	-3.447***	0.0001
CFO_t	-2.619***	-14.27	-0.883*	-1.94	1.736	0.1069
REV_t	-0.768***	-12.92	-0.133**	-2.18	0.635***	<.0001
MTR_t	-1.518**	-1.97	0.204	0.12	1.721	0.6707
N	33,485		5,693			
Adj. R^2	0.0166		0.0055			

[a] Differences in coefficients are measured by applying Model 4:
$PB_t = \beta_0 + \beta_1 HMTR_t + \beta_2 PTBI_t + \beta_3 PTBI_t*HMTR_t + \beta_4 CFO_t + \beta_5 CFO_t*HMTR_t + \beta_6 REV_t + \beta_7 REV_t*HMTR_t + \beta_8 MTR_t + \beta_9 MTR_t*HMTR_t + \varepsilon_{t+1}$
In Model 4, β_1, β_3, β_5, β_7 and β_9 reports the difference in each coefficient between the low and high marginal tax rate firm-years.
*, **, *** indicate two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5 reports the results of applying Model 4 that measures the differences in coefficients between high and low MTR firm-years with the positive and negative pre-tax income subgroups. Table 5 also shows that the coefficient of MTR for Low MTR firm-years with positive pre-tax income (Panel A) is not significantly different from zero. Investors consider the information provided by MTR in firm valuation only when such MTR is higher than the median of the sample.

The results in Panel B of Table 5 do not support that high MTR is value relevant for loss firms. For the high MTR firms with negative pre-tax income, the coefficient of MTR is not significantly different from zero. However, for Low MTR firm-years with negative pre-tax income, the MTR coefficient, -1.518, is negative and significant at the 5% p-value level.

Summary and Conclusion

In this study, we explore the relationship between MTR and one-year-ahead earnings persistence and firm value as measured by price to book value. We also use statistical subgroup analysis to evaluate differences in high and low MTR firm-years as well as positive and negative pre-tax book income on earnings persistence and firm value. Our findings suggest an important correlation of MTR and earnings persistence that exists with both high and low MTR subgroups. However, when positive pre-tax income versus negative pre-tax income subgroups are examined,

only the positive pre-tax income subgroup exhibits a significant relationship with one-year-ahead earnings. When we examine the association of MTR with firm value, we find that high MTR firm-years are significantly and positively associated with stock pricing in the positive income subgroup and that low MTR firm years in the negative pre-tax subgroup are inversely related to firm value.

Our findings add to the body of research exploring earnings persistence and firm value in a unique way. First, use of MTR as a factor in this context is relatively unexplored in the literature. However, with improved and more accurate MTR estimation methods now available, researchers have the opportunity to apply this new information to understanding the drivers of earnings persistence and firm value.

Second, our statistical subgroup regression analysis provides additional insight into the nuances of the MTR relationship with earnings persistence and firm value. Parsing the sample into high and low MTR subgroups and evaluating those subgroups across positive and negative income firm-years reveals additional information that leads to an improved understanding of the value of MTR as a predictor of earnings persistence and of firm value.

In summary, our results show that MTR is an important signal of both one-year-ahead earnings persistence and of firm value. Subgroup analysis provides additional information that is important to researchers, managers, and practitioners.

Corresponding author: Dr. Dong-Woo Lee, dwlee@calstatela.edu.

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