

FAccT Center Working Paper Series

Firm Valuation and the Uncertainty of Future Tax Avoidance

Martin Jacob, WHU – Otto Beisheim School of Management

Harm H. Schütt, LMU -- Munich School of Management

FAccT Center Working Paper Nr. 13/2013

FAccT Center - WHU Financial Accounting & Tax Center
WHU – Otto Beisheim School of Management
Campus Vallendar, Burgplatz 2, 56179 Vallendar, Germany

Phone: +49 261 6509-231

E-Mail: FAccT@whu.edu

Internet: whu-facct.de

Firm Valuation and the Uncertainty of Future Tax Avoidance*

Martin Jacob[†]

Harm H. Schütt[‡]

January 19, 2015

Abstract

The paper studies the effect of uncertainty in firm-specific tax avoidance on firm value. We first show in a clean surplus valuation model that expectations about future profitability interact with corporate tax avoidance. Two dimensions of corporate tax avoidance strategies matter for valuation: uncertainty and level of expected future tax rates. We confirm the importance of level and uncertainty of tax avoidance for forecasts of future tax rates using a small sample of analyst tax rate forecasts. Consistent with the model and the implications from analyst forecasts, we derive a tax signal-to-noise ratio based on historical tax information. In our sample of 2,820 firms, we show empirically that this tax signal-to-noise ratio amplifies the effect of pre-tax earnings on firm value. Pre-tax earnings have a stronger effect on firm value for firms with effective and persistent tax avoidance. Firms with volatile effective tax rates receive a discount on their earnings.

Keywords: Firm valuation, tax avoidance, tax uncertainty

JEL Classification: M41, G12, H25

* We thank Igor Goncharov, Jochen Hundsdoerfer, Ed Maydew, Maximilian Müller, John Robinson, Leslie Robinson, Martin Ruf, and seminar participants at the WHU – Otto Beisheim School of Management, the Eberhard Karls University of Tuebingen, the X Workshop on Empirical Research in Financial Accounting in A Coruña, Spain, and the 37th Annual Congress of the European Accounting Association for helpful comments and suggestions.

[†] WHU – Otto Beisheim School of Management, Burgplatz 2, 56179 Vallendar, Germany. Tel: +49 261 6509 350; fax: +49 261 6509 359; E-mail address: martin.jacob@whu.edu.

[‡] LMU – Munich School of Management, Ludwigstraße 28, 80539 Munich, Germany. Tel: +49 89 2180 6326; fax: +49 261 6509 359; E-mail address: harm.schuettt@bwl.lmu.de.

1 Introduction

While there is a large body of research on the determinants of corporate tax avoidance (e.g., Mills, 1998; Dyreng, Hanlon, and Maydew, 2008, 2010), the firm value implications of tax avoidance have only recently attracted academic interest (Desai and Dharmapala, 2009; Wang, 2010; De Simone, Mills, and Stomberg, 2013; Inger, 2013). At the same time, there is a renewed public and political debate about corporate tax avoidance (OECD, 2013). Apart from the obvious cash savings of a reduced tax rate, tax avoidance activity is costly and can induce costs in the form of managerial rent extraction (Desai and Dharmapala, 2006), reputational costs (Gallemore, Maydew, and Thornock, 2014), or consumer and taxpayer backlash (Hanlon and Slemrod, 2009). We abstract from these costs and study the more basic question of how current tax avoidance affects firm valuation via its impact on the level and perceived uncertainty of *expected future* tax rates.

The theoretical literature on firm valuation (e.g. Feltham and Ohlson, 1995; Ohlson, 1995) and their empirical applications (e.g. Barth, Elliott, and Finn, 1999; Dechow, Hutton, and Sloan, 1999; Kothari, 2001; Dong, Hirshleifer, Richardson, and Teoh, 2006; Dong, Hirshleifer, and Teoh, 2012; Loh and Mian, 2006; So, 2013; Bris, Koskinen, and Nilsson, 2009) typically do not explicitly address any firm value implications of corporate tax avoidance, and focuses on after-tax earnings instead.¹ We contribute to this stream of the literature as well as the literature on tax avoidance by providing evidence on the link between historical tax avoidance and the level and perceived uncertainty of expected future tax rates and the resulting firm value implications.

First, we build on the valuation model of Feltham and Ohlson (1995) and Ohlson (1995) by decomposing it into expected tax rates and pre-tax numbers. The decomposition illustrates that the level of expected tax avoidance works through an interaction channel with expected pre-tax profitability. That is, tax avoidance does not affect firm value directly but through the interaction with pre-tax earnings (see, also, Thomas and Zhang, 2014). The uncertainty embedded in the

¹ Based on the valuation model of Feltham and Ohlson (1995) and Ohlson (1995), Collins and Kemsley (2000) and Harris and Kemsley (1999) test the capitalization of dividend, as well as capital gains taxes in equity prices. However, these results are found to be implausible (Shackelford and Shevlin, 2001; Dhaliwal, Erickson, Frank, and Banyai, 2003; Hanlon, Myers, and Shevlin, 2003; Hanlon and Heitzman, 2010). A recent exception is the paper by Thomas and Zhang (2014), who study the value relevance of current tax expenses.

expectations about future tax avoidance enters our valuation model via the investor’s certainty equivalent of the expected level of future tax avoidance. In other words, investors adjust the effective tax rate expectation upwards in case of high tax uncertainty.

Second, we construct a measure of past tax avoidance information that captures the level of tax avoidance and the variation in tax rates to study the link between past tax avoidance and expected future rates as well as realized future tax rates. As future tax avoidance is not a direct consequence of future firm conditions, it is largely influenced by managerial tax expertise (Dyreng, Hanlon, and Maydew, 2010) and the future political situation.² This makes the task of forming expectations about future tax rates quite distinct from forecasting other expenses such as production costs. Historic tax avoidance seems a likely and readily available candidate as a main input to shape expectations about future tax rates. We collect data on analyst forecasts and document two empirical stylized facts. First, historic effective tax rates are highly correlated with analyst expectations of future tax rates. Second, and in line with our theoretical considerations, analysts appear to adjust the level of expected future tax rates upwards in case of high variation in historical tax rates. We view the results as tentative evidence that historical tax avoidance activities and the variation in outcomes are important input for investors to form expectations about future tax avoidance outcomes.

Accordingly, our proxy for future tax avoidance—the tax planning score (TPS)—is defined as the historic ratio of the level to the variation in tax avoidance. The level of tax avoidance is defined as the after-tax income of USD 1, where past tax payments are proxied by the 10-year long-term cash effective tax rate (Dyreng, Hanlon, and Maydew, 2008). The variation of tax avoidance is defined as the standard deviation of annual cash effective tax rates over 10 years. Using data from Compustat and CRSP over the 1996–2011 period, we show empirically that the historic effective tax rate is a noisy signal of future cash flows from tax avoidance strategies. The TPS has an incremental effect on predicting future tax avoidance. We further show empirically that higher

² For example, the Obama administration announces to “to begin reforming the international tax system” in the 2015 budget proposal. This quote is from p. 22 of the Fiscal Year 2015 Budget of the U.S. Government, <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2015/assets/budget.pdf> (last accessed July 2, 2014.)

TPS are associated with higher serial correlation coefficients of long-term cash effective tax rates. Conversely, low tax planning scores suggest a weaker association between historical and future tax avoidance. Taken together, the level and variation in historic tax rates, as summarized in TPS, appear to be a main input to shape expectations about future tax rates.

Third, we test the implications of our model and the tax planning score using the market-to-book framework used in prior studies (Desai and Dharmapala, 2009; Wang, 2010; De Simone, Mills, and Stomberg, 2013; Inger, 2013). Our results show that the tax planning score has a positive effect on the relation between pre-tax earnings and the market-to-book value. This effect is unlikely to be driven by TPS picking up non-tax related operating effects since we include other firm-level variables such as stock return volatility, gross margin, and operating cash flow volatility to control for operational volatility. The effect of the tax planning score remains significant and does not interact with operating uncertainty itself. The combined impact of tax planning on the effect of pre-tax profitability on firm value is substantial and economically significant. If a firm goes from the 25th to the 75th percentile of TPS, the effect of pre-tax profitability on the market-to-book ratio increases by about 16%.

We test the robustness of our results in several ways. First, we replicate prior results and use the level of long-term effective tax rates as a measure of tax avoidance (Desai and Dharmapala, 2009; Wang, 2010; De Simone, Mills, and Stomberg, 2013; Inger, 2013). When controlling for tax uncertainty and operational uncertainty, the level of the tax rate is insignificant while volatility in tax rates has a significant effect. Overall, the tax planning score explains more of the variation of market-to-book ratios. Second, our results are robust to the inclusion of firm-level determinants of tax avoidance such as size, leverage, foreign operations, or profitability. Third, we test alternative definitions of our tax planning score. Our results hold when defining the tax planning score based on GAAP number or when using variation in GAAP effective tax rates as a measure for volatility. Finally, we show that our results are robust when we include firm fixed effects to control for unobserved firm characteristics.

In summary, this paper contributes to the literature in four ways. First, it proposes a theoretical valuation set-up, focusing on expectations about future tax avoidance, to provide a structure for the fledgling empirical literature on tax avoidance implications (e.g., Desai and Dharmapala, 2009; Hanlon and Heitzman, 2010). One implication of our theoretical valuation set-up is that level and variation in tax rates enter the empirical model as a ratio and not as additive terms. Second, the tax planning score captures two important valuation dimensions in one simple signal-to-noise ratio involving the historical level and volatility of tax avoidance. Thus, our paper also contributes to the literature on measuring tax avoidance (e.g., Dyreng, Hanlon, and Maydew, 2008). Third, we document empirically that it is common practice by analysts to extrapolate annual past effective tax rates to the future, providing evidence of a strong link between historic tax avoidance and expectations about future tax avoidance outcomes. Finally, our results point toward the importance of controlling for the variation in tax rates (driven by tax avoidance activities or otherwise). Prior studies show that tax avoidance has positive firm valuation implications (e.g. Wang, 2010; De Simone, Mills, and Stomberg, 2013; Goh, Lee, Lim, and Shevlin, 2013; Inger, 2013). However, our results indicate that this result becomes insignificant when controlling for variation in effective tax rates. The explanatory power of the model increases when we use the tax planning score instead of long-term effective tax rate measures.

2 Model of Firm Valuation and Tax Avoidance

Prior literature documents a linear relation between effective tax rates (ETR) and the market-to-book ratio (e.g., Desai and Dharmapala, 2009; De Simone, Mills, and Stomberg, 2013). If we sort firms according to the long-term cash effective tax rate ($CashETR$) of Dyreng, Hanlon, and Maydew (2008) and calculate the average market-to-book ratio for 25 bins of the $CashETR$ distribution, we obtain a negative relation (see Figure 1). That is, the higher the effective tax rate, the lower the market-to-book ratio. However, apparently, the linear relation does not perfectly explain the relation between market-to-book ratios and tax avoidance indicated by the dotted line.

From this very simple graphical approach, we conclude that a theoretical framework that illustrates how tax avoidance affects the market-to-book ratio—beyond a linear relation—is required.

[Insert Figure 1 about here]

The following model serves to illustrate the basic link between firm valuation, *expected* tax avoidance, and *current* tax avoidance on a basic \$ for \$ level. Intuitively, if two companies are equal except for their managements' tax avoidance capabilities, the company that manages to consistently pay lower taxes will retain more cash from operations than the other company. The company with more retained cash reinvests higher amounts, has a higher growth rate at the same rate of return, and therefore has a higher firm value as the other company. Starting from the dividend discount model, one can readily derive a valuation model that is based on earnings and book values.³ The only requirement is clean surplus accounting, which is basically the requirement that all non-dividend changes in equity must go through the income statement (formally, $B_t = B_{t-1} + E_t - D_t$). If this is the case, we obtain the residual income model

$$M_t = B_t + \mathbb{E}_t \left(\sum_{i=0}^{\infty} \frac{RI_{i+1}}{(1+r)^i} \right) \quad (1)$$

where M_t is the price at time t ; B_t is the book value of equity; RI_t is residual income, defined as $\Delta RI_{i+1} = \Delta E_t - r \cdot \Delta B_{t-1}$; E_t is net income (after tax); and r is the cost of equity capital. Since we are interested in the effect of a firm's past tax avoidance history on expectation of future tax avoidance, the next steps serve to derive empirically testable implications and to illustrate the influence of the effective tax rate on the market-to-book ratio. Assuming a constant expected

³ While a staple framework in the accounting literature (e.g. Barth, Elliott, and Finn, 1999; Dechow, Hutton, and Sloan, 1999; Kothari, 2001), the residual income model has also been applied in the financial literature. For example, Lee, Myers, and Swaminathan (1999), Dong, Hirshleifer, Richardson, and Teoh (2006), and Dong, Hirshleifer, and Teoh (2012) have used the residual income model to compute measures of mis-valuation (V/M) where M is the firm's market value and V the firm value implied by the residual income model. Similarly, Loh and Mian (2006) and So (2013) use the residual income model to judge analyst forecast accuracy and Bris, Koskinen, and Nilsson (2009) applies it to infer a firm's cost of capital (a common approach in the accounting literature, e.g., Easton, Taylor, Shroff, and Sougiannis, 2002). We use an earnings-based valuation model to illustrate the interaction effect between pre-tax earnings and expected tax rates and to be consistent with Modigliani and Miller (1985), who use retained earnings. However, the logic still holds using a discounted cash flow model.

return on equity (RoE), equation (1) can be rearranged to express the market-to-book ratio as a function of (after-tax) expectations on return on equity (RoE), the cost of equity capital (r), and the expected growth rate in residual income (g), where $\mathbb{E}_t(\cdot)$ denotes expectations at time t :

$$\frac{M_t}{B_t} = 1 + \mathbb{E}_t \left(\frac{RoE_{t+1} - r}{r - g} \right) \quad (2)$$

We focus on the market-to-book ratio because it is commonly used in the growing literature on the valuation implications of tax avoidance to proxy for Tobin's Q. Define $\delta_t = (1 - \tau_t)$, with τ_t the effective tax rate in period t . Then RoE_{t+1} can be rewritten as $\delta_{t+1} \cdot RoE_{t+1}^{pretax}$. The effect of expected future tax avoidance will then be captured by expected future pre-tax earnings multiplied by δ_{t+1} . That is, we assume constant expectations about future tax avoidance and about future pre-tax earnings. Rewriting the market-to-book ratio to incorporate δ_{t+1} yields

$$\frac{M_t}{B_t} = 1 + \mathbb{E}_t \left(\frac{\delta_{t+1} \cdot RoE_{t+1}^{pretax} - r}{r - g[\delta_{t+1}]} \right) \quad (3)$$

Intuitively, a lower effective tax rate, that is, a higher δ , will cause the firm to be more profitable after taxes. Equation (3) serves to highlight that the effect of expected future tax avoidance is an interaction effect, working through two channels. First, it depends on the level of expected pre-tax profitability. Second, the expected long-term growth rate is also a function of future tax avoidance activity ($g = g[\delta]$). Since lower taxes will retain more cash in the firm—instead of paying cash out in the form of taxes—this cash can be reinvested, thereby increasing growth.⁴ To see this more formally, note that in the case of constant expected future profitability, g can be rewritten as a

⁴ Of course, this assumes that the additional cash retained is reinvested in the company. As, for instance, Desai and Dharmapala (2009) note, depending on the agency conflicts inside the firm, managers could also use the obfuscatory nature of tax avoidance activities to expropriate funds.

function of growth in book value:

$$\begin{aligned}
g_{t+i} &= \frac{\Delta RI_{t+i}}{RI_{t+i-1}} \\
&= \frac{(RoE - r)B_{t+i-1} - (RoE - r)B_{t+i-2}}{(RoE - r)B_{t+i-2}} \\
&= \frac{B_{t+i-1}}{B_{t+i-2}} - 1
\end{aligned} \tag{4}$$

The book value itself can be viewed as a function of past book value and the sum of retained earnings that have not yet been distributed. If one assumes a constant dividend payout policy as a percentage of earnings, then one can rewrite changes in the book value $\Delta B_{t+1} = B_{t+1} - B_t = E_{t+1} - Div_{t+1} = \delta_{t+1} \cdot E_{t+1}^{pretax} - \alpha \cdot E_{t+1}$, where α is the dividend payout ratio. Then the book value at any time $t + i$ is

$$B_{t+i} = B_t + \sum_{k=1}^i \delta_{t+k} \cdot (1 - \alpha) \cdot E_{t+k}^{pretax} \tag{5}$$

Consistent with our intuition, some straightforward algebra confirms that the derivative of $\frac{B_{t+i}}{B_{t+i-1}}$ is positive and decreasing in δ : $\frac{\partial \frac{B_{t+i}}{B_{t+i-1}}}{\partial \delta} \geq 0$. A detailed derivation can be found in the Appendix.

As long as the book value of equity is growing, that is, expected pre-tax earnings are positive, tax avoidance has a positive effect on the expected growth rate.⁵ The positive effect on growth is again due to the multiplicative effect of expected future tax avoidance with pre-tax earnings. Hence, the main driver in our model is a multiple of tax on pre-tax earnings.

Using the preceding discussion as a framework, we now discuss expectations about future tax avoidance. We assert that there are two main dimensions to investors' beliefs about future tax rates. The first is the level of expected future tax avoidance δ_{t+1} . The second is investor's conviction behind their expectations. For instance, if risk-averse investors judge their expectations about future tax avoidance (high δ_{t+1}) with considerable uncertainty, they would discount such

⁵ In this simple model, valuation is a function purely of pre-tax operating profitability, past book value, and future tax rates, since external funding is not modelled. However, the rationale still applies if one extends the model to allow for external funding.

an expectation accordingly. To keep the model specification parsimonious, we chose to incorporate these two valuation dimensions via a certainty equivalent approach, rather than interacting expectations about future cash flows, as well as interacting discount rates.⁶

Let δ^* be a representative investor’s certainty equivalent of the expected future tax rate $\mathbb{E}_t(\delta_{t+1})$. Stated more formally, $u(\delta^*) = \mathbb{E}_t(u(\delta_{t+1}))$, where $u(\cdot)$ is the representative investor’s utility function. The certainty equivalent of a random variable is the guaranteed amount that leaves the investor indifferent between the sure amount and the outcome of the random variable.

Stated more parsimoniously, $\delta^* = \mathbb{E}_t(\delta_{t+1})/a$, where a is the discount that is a function of the investor’s uncertainty. If investors are risk averse, the certainty equivalent is smaller than the expected value of an uncertain variable and a increases with uncertainty. Conversely, if investors are risk seeking, the certainty equivalent is higher than the expected value and a decreases with uncertainty. Including δ^* in equation (3) yields⁷

$$\frac{M_t}{B_t} = 1 + \mathbb{E}_t \left(\frac{\delta^* \cdot RoE^{pretax} - r}{r - g[\delta^*]} \right) \quad (6)$$

To transform equation (6) into a reduced-form, empirically testable model, we need to find a valid proxy for δ^* . We use our measure of past tax avoidance—the tax planning score (*TPS*)—to proxy for the certainty equivalent about future tax avoidance. Following the approach of Lipe (1990) for earnings shocks, we assert a link between past tax avoidance and expectations about future tax rates. Lipe (1990) demonstrates an empirical link between the magnitude of stock market reactions to earnings news and historical earnings predictability which is measured by the volatility of earnings shocks.

⁶ If one wanted to follow the latter path, the uncertainty in tax avoidance forecasts would affect valuation via a cost of capital channel. One such channel can be illustrated via the model of Lambert, Leuz, and Verrecchia (2007). If one assumes historical tax avoidance to be a signal with measurement error about future tax cash outflows, then a decrease in the measurement error component will decrease the assessed covariance between a firm’s cash flows and other firms’ cash flows (Proposition 2 of Lambert, Leuz, and Verrecchia, 2007). The expected return is thereby lowered.

⁷ It should be pointed out, again, that by modeling uncertainty about future tax rates via a certainty equivalent, we effectively take tax considerations out of the cost of capital.

The critical link is thus between current tax rates δ_t and expected future tax rates $\mathbb{E}_t(\delta_{t+1})$. This link is likely to be different than the link between current and expected operating expenses. Expectations about ordinary expenses, such as cost of goods sold or selling, general and administrative expenses, can be built by forecasting operations with reference to production technologies of the firm and the competitive landscape. For instance, cost of goods sold reflect the pricing power of the firm and as such are a direct output of expected future market conditions. Expected future tax rates are to a large degree not only a consequence of future firm conditions but of the firm's tax strategy and the regulatory environment. They are a function of managerial tax expertise (Dyreng, Hanlon, and Maydew, 2010) and the future political situation. As analysts seem to rely heavily on past realized effective tax rates to forecast future tax rates (see Section 3.1), investors have few hints other than past tax avoidance to forecast future tax avoidance.⁸ Therefore, for the objective of this study, we feel confident to assume that expectations about future tax are largely contingent on δ_t . In our empirical tests, we also control for the possibility that δ_t captures non-tax related expectations.

The resulting reduced-form empirical model that we derive from Equation (6) necessarily involves interaction terms to account for the multiplicative nature of δ^* and pre-tax profitability. Apart from that, the market-to-book ratio is a function of the cost of capital r , expectations about (pre-tax) return on equity (RoE^{pretax}), and the expected growth rate in residual income ($g[\delta^*]$), which is also a function of future tax avoidance.⁹ Thus, we need proxies for all three expectations, as well as the firm's cost of capital, to operationalize equation (6). Note that our model does not provide any prediction about the direct effect of tax avoidance outcomes on the market-to-book ratio.

In accordance with prior literature, we assume that investors extrapolate future growth rates from currently observed growth rates (Barth, Elliott, and Finn, 1999). This admittedly simple

⁸ See also Plumlee (2003), who provides evidence that analysts even fail to incorporate tax rates changes driven by more complex tax law changes.

⁹ We address potential concerns that pre-tax earnings and tax avoidance are correlated in Section 5.4.2 where we first regress tax avoidance on potential determinants including pre-tax earnings. We then use the residual, which is among others orthogonal to pre-tax earnings, as our tax measure. Further, we include a proxy for the volatility in stock returns to control for a potential correlation of the variation in earnings and tax avoidance.

assumption serves to keep the focus of the paper on corporate tax avoidance in a valuation framework. We then use past pre-tax return on equity (RoE^{pretax}) to control for the expected future pre-tax return on equity. The cost-of-equity capital is computed using a two-factor Fama–French model over rolling 24-month windows (CoC) as in the Market-to-Book study by McNichols, Rajan, and Reichelstein (2014). Next, we proxy for expected future growth using the annualized sales growth over the last five years (SGr).¹⁰ Last, we include three measures of operating volatility to test and control whether the level and variation in past tax rates, as captured by TPS , is correlated with operating volatility. In other words, we test whether the link between TPS , RoE^{pretax} , and $M-to-B_{i,t}$ is driven by operating effects rather than expectations about future tax avoidance outcomes ($\mathbb{E}_t (RoE_{t+1}^{pretax} | \delta_t) \neq \mathbb{E}_t (RoE_{t+1}^{pretax})$). Specifically, we include gross margin ($Gmargin$), operating cash volatility ($CFVol$), and stock return volatility ($Volatility$). Finally, we also interact RoE^{pretax} with $Gmargin$, $CFVol$, and $Volatility$ to make sure that the interaction effect of TPS with RoE^{pretax} is not due to either of the operating volatility proxies. We further include industry fixed effects (α_{ind}) and year fixed effects (α_t). Our statistical inference is based on robust standard errors clustered at the firm level and by years. Table 1 summarizes information about the variables. In sum, the implications from our theoretical model result in the following regression:

$$\begin{aligned}
M\text{-to-}B_{i,t} = & \alpha_1 + \beta_1 \cdot RoE_{i,t}^{pretax} + \beta_2 \cdot RoE_{i,t}^{pretax} \cdot TPS_{i,t} + \beta_3 \cdot TPS_{i,t} + \beta_4 \cdot SGr_{i,t} \\
& + \beta_5 \cdot SGr_{i,t} \cdot TPS_{i,t} + \beta_6 \cdot CoC_{i,t} + \beta_7 \cdot Gmargin_{i,t} + \beta_8 \cdot Gmargin_{i,t} \cdot TPS_{i,t} \\
& + \beta_9 \cdot CFVol_{i,t} + \beta_{10} \cdot CFVol_{i,t} \cdot TPS_{i,t} + \beta_{11} \cdot Volatility_{i,t} + \beta_{12} \cdot Volatility_{i,t} \cdot TPS_{i,t} \\
& + \beta_{13} \cdot RoE_{i,t}^{pretax} \cdot CFVol_{i,t} + \beta_{14} \cdot RoE_{i,t}^{pretax} \cdot Volatility_{i,t} + \alpha_{ind} + \alpha_t + \epsilon_{i,t}
\end{aligned} \tag{7}$$

Our main expectation is that β_2 is positive. A high tax planning scope will increase the effect of return on equity on the market-to-book ratio. From our model, we also expect β_5 to be positive. As discussed, the net effect of a lower expected tax rate (higher δ) on value will be positive as

¹⁰ The more obvious choice would be to use the annualized five-year growth in the book value of equity. However, growth in equity is negatively correlated with the market-to-book ratio. One explanation for this puzzling find is that extreme growth in equity is usually a sign of significant share issuances. For example, firms with seasoned equity offerings yield lower returns than comparable firms without equity issuances (Loughran and Ritter, 1995). Untabulated results show that the results are qualitatively similar when earnings growth is used. We pick sales growth to be consistent with prior literature. Results are available upon request.

long as a firm’s RoE is greater than its cost of capital. While it is possible that firms are expected to destroy value in the long term by consistently having a long-term return on equity below the cost of capital, this should not be true, on average, in the cross section. We also expect β_{13} and β_{14} to be negative if a more volatile RoE^{pretax} is discounted by the market. We do not expect the interaction effects of TPS and the three measures of operating volatility ($Gmargin$, $CFVol$, $Volatility$) to be significant.

3 The Association between Historic Tax Avoidance and Level and Uncertainty of Future Tax Avoidance

3.1 Analyst Forecasting of Effective Tax Rates

Forecasting future tax rates is a challenging task for analysts and investors. As corporate tax payments reduce the after-tax cash flows of companies, they have firm value implications and, consequently, analysts as well as investors need to formulate expectations about future tax rates. Very little is known empirically of how analysts forecast future effective tax rates (ETR). The few studies, explicitly looking at tax rate forecasts find evidence of limited anticipation of future changes. For example, Plumlee (2003) finds evidence that analyst fail to incorporate complex regulatory tax rate changes. To shed some light on common practices in forecasting taxes of analysts, we obtain analyst forecasts of 468 U.S. companies from *ValueLine*. We handcollected this data in 2014 and obtained data on realized ETRs in 2012 and 2013 as well as on forecasted ETRs for 2014 and 2015.

The first stylized fact we can derive from this data is that analysts appear to use historical ETRs to forecast future ETRs. Figure 2 presents the histogram of the difference in the forecasted ETR from 2015 (\widehat{ETR}_{2015}) and the observed ETR from 2013 (ETR_{2013}). There is one striking observation. In over 50% of the cases, the difference between historical and forecasted tax rate is within the [-1;1] percentage point range. In other words, in more than half of the cases, the current ETR serves as the forecast of the future ETR. Table 2 supports this view and presents regression

results from estimating forecasted ETR for 2014 and 2015, respectively (\widehat{ETR}_{2014} and \widehat{ETR}_{2015}) on observed ETRs from the past two years (ETR_{2012} and ETR_{2013}). As a benchmark, we estimate the same equation using the sample of Compustat firms (see Section 4).

The regression results indicate that current ETRs explain analyst forecasts for 2014 and 2015 ETRs very well. The R-squared amounts to about 72% in both regressions. In contrast, when using ETRs from Compustat and the same estimation equation, the R-squared in Column (3) falls to 45%. It further drops to 36% when using the two year lead as dependent variable. One explanation for the drop in the R-squared in the Compustat sample and for the constant R-squared in the analyst sample is depicted in Figure 3. Analysts use very similar forecasts for 2014 and 2015. In over 70% of all cases, the ETR forecasts are actually equal over the forecast period. In reality, there is more variation in ETRs over time (Panel B of Figure 3) than is modeled by analysts.

[Insert Figure 2 about here]

[Insert Figure 3 about here]

[Insert Table 2 about here]

The second fact relates to the right tail of the distribution in Figure 2. Why do some analysts revise the current ETR upwards and assume an ETR in the forecast period that exceeds the current ETR? To explain this further, we split the sample into three groups. The first group comprises 133 firms for which analysts assume a lower ETR in the future than they currently have ($\widehat{ETR}_{2015} < ETR_{2013}$). In the second group (100 firms), analysts use exactly the ETR from 2013 as their 2015 forecast ($\widehat{ETR}_{2015} = ETR_{2013}$). The third group comprises firms for which analysts assume a higher tax rate in the future ($\widehat{ETR}_{2015} > ETR_{2013}$). Table 3 shows the variance of the difference in past tax rates of 2012 and 2013 for each group. The results indicate that the variance of the difference in past tax rates is significantly higher in the group of firms for which analysts assume a higher rate in the future than these firms currently have. In other words, a higher standard deviation characterizes cases in which analyst forecasts of ETRs exceed current ETRs. Related to our model, a high variation in historical ETRs increases the ETR forecast and, thereby,

δ^* is reduced. Put differently, in case of high variation in ETRs, analysts appear to put a discount on δ^* .

[Insert Table 3 about here]

From the analysis of 468 analysts forecasts, we can summarize two stylized facts. First, analysts rely heavily on past effective tax rates as a predictor of future effective tax rates forecasts. Second, analysts are more likely to adjust effective tax rate forecasts upwards—or discount δ —when there has been a large variation in ETRs.

3.2 Measuring the Level and Uncertainty of Historic Tax Avoidance

Corporate tax avoidance is typically evaluated by the GAAP effective tax rate, which is the relation between tax expenses and pre-tax income in one year. Dyreng, Hanlon, and Maydew (2008) develop an alternative measure of tax avoidance that differs in two ways from the standard approach of measuring tax avoidance. First, they use cash taxes paid instead of tax expenses and they control for special items when assessing pre-tax income. Second and most important, they measure tax avoidance in a multi-period context instead of a single-period context. The resulting measure for the level of tax avoidance for firm i can be summarized as follows:

$$\text{CashETR}_i = \frac{\sum_{t=1}^N \text{Cash Taxes Paid}_{i,t}}{\sum_{t=1}^N (\text{Pretax Income}_{i,t} - \text{Special Items}_{i,t})} \quad (8)$$

Even though our valuation model is based on GAAP tax rates, the tax avoidance measure of Dyreng, Hanlon, and Maydew (2008) has the advantage of measuring tax avoidance the long term. The authors show that annual effective tax rates are not a good predictor of long-run tax avoidance rates. In particular, high effective annual tax rates are less persistent than low annual effective tax rates. Hence, for any level of long-run corporate tax avoidance, there is some time-series variation in annual effective tax rates. For example, McGuire, Neumann, and Omer (2013) develop a measure of sustainable tax strategies. Instead of using the level of long-run corporate

tax avoidance, they use the ratio of the standard deviation of annual effective tax rates to the absolute level of long-run corporate tax avoidance.

We argue that both elements matter, the level of tax avoidance and the time-series variation in annual tax rates. However, as equation (6) implies, what matters for a firm’s valuation are expectations about future tax rates, as well as the uncertainty surrounding these expectations. The two dimensions are captured in the certainty equivalent of expected future tax rates in equation (6). First, $\delta^* = \mathbb{E}_t(\delta) / a$ captures the level of expected long-run effective tax rates $\mathbb{E}_t(\delta)$. A higher tax rate expected by investors results in lower δ . Second, the reliability or sustainability of a firm’s tax avoidance strategies is captured by the discount factor a that is embedded in δ^* . In line with the descriptive evidence from the analyst sample, a further link is needed that connects the current tax avoidance strategy with the two components of δ^* .

We define a *tax planning score* that captures these two dimensions. We assume that investors are more likely to be risk averse and that they use the success of past tax avoidance strategies as a basis for their expectations about future tax avoidance. The level of historic tax avoidance and its variation over time (both measured via cash rates) are used to proxy for future expected (GAAP) tax rates and the uncertainty associated with these expectations. Note that we document the robustness of our results to using GAAP tax rates in Section 5.4.3.

To build a proxy for $\delta^* = \mathbb{E}_t(\delta) / a$, we follow the logic of the Sharpe-Ratio for stock returns (Sharpe, 1966). The nominator is the net-of-tax income of USD 1 gross income. We use the 10-year CashETR defined in equation (8) as the measure of long-run corporate tax avoidance. We use the standard deviation of the annual CashETR from $t - 9$ to t as the denominator, the measure for the uncertainty embedded in the expected level of tax avoidance. This yields the following definition of our *tax planning score* (*TPS*):

$$\text{Tax Planning Score}_i = TPS_i = \frac{1 - \text{CashETR}}{\text{Vol}(\text{CashETR})} \quad (9)$$

with

$$Vol(CashETR) = \sqrt{\sum_{t=1}^N (CashETR_{i,t} - \text{Mean}(CashETR)_i)^2}.$$

Firms can increase the TPS in two ways. First, they could maximize the net-of-tax return given a level of variability in annual effective tax rates ($\frac{\partial TPS}{\partial \delta} > 0$), that is, minimize the long-term effective tax rate. Second, firms could reduce variation in annual effective tax rates to increase the predictability of future effective tax rates ($\frac{\partial TPS}{\partial Vol(CashETR)} > 0$). Better tax planning can thus be obtained either by lowering *CashETR* or by reducing its volatility.¹¹

Table 4 panel A summarizes the average tax planning score (*TPS*), the CashETR, and the standard deviation of the annual CashETR (*Vol(CashETR)*). The average *TPS* amounts to 6.143. The average CashETR is 26.0% with an average standard deviation of annual ETRs over 10 years of 43.6%. Table 5 provides Pearson and Spearman correlations for the variables used in this study. Of special interest are the correlations between *TPS* and the three operating proxies. For example, the Pearson correlation between *TPS* and *Volatility* is sizeable with -0.23. On the one hand this justifies the inclusion of operating volatility controls. On the other hand, it also indicates that a sizeable part of the variation in *TPS* is unrelated to operating considerations, just as argued in section 3.1.

[Insert Table 4 about here]

[Insert Table 5 about here]

3.3 Predictability of Future CashETRs and the Tax Planning Score

Our theoretical model addresses the implications of expected future tax avoidance. Therefore, it is important to ensure the properties of *TPS* as a predictor of future cash effective tax rates vis-à-vis existing measures, for example, the long-term cash effective tax rate. We test these properties in two ways. First, higher serial correlation of *CashETR* indicates higher persistence of *CashETRs*

¹¹ We do not make any predictions on which attributes of a firm's tax avoidance strategy contributes more or less to uncertain future tax rates, since that would go beyond the scope of this study. However, we do run a determinant model as a validity test in the empirical section (See Section 6.4.2).

over time. If higher tax planning scores lead to higher predictability of future *CashETR*, we would expect higher serial correlation coefficients for firms with high *TPS* values. We therefore regress future *CashETR* at $t + 5$ on current *CashETR*. We allow the serial correlation coefficient to vary across the quintiles of the *TPS* distribution. That is, the effect of current *CashETR* on future *CashETR* is estimated for each quintile. To test the predictive abilities of *TPS* relative to the long-term cash effective tax rate, we additionally sort firms into quintiles of *CashETR*. If our measure of tax avoidance leads to a higher predictability of future *CashETRs*, we expect the effect of current *CashETR* on future *CashETR* to be greater for higher quintiles of the *TPS* distribution. In relation to our model, higher predictive ability translates into lower uncertainty about future tax avoidance outcomes.

[Insert Figure 4 about here]

Figure 4 plots the resulting serial correlation coefficients for each quintile of the *TPS* distribution (black bars) and the *CashETR* distribution (gray bars). We find that the effect of current *CashETR* on future *CashETR* increases with each quintile of the *TPS* distribution. Firms with better tax planning have a higher serial correlation of *CashETR*. The coefficient estimates are significantly different from each other in each pairwise comparison ($p < 0.01$), except for the bottom two quintiles. The results displayed by the gray bars indicate that the level of current *CashETR* does not affect the serial correlation coefficient. That is, the level of *CashETR* alone does not alter the predictability of future *CashETR* with current *CashETR*.

To provide additional evidence, we run simple OLS regressions of future *CashETR* and future *TPS* as dependent variables. Both are measured at $t + 10$. Table 6 presents the coefficient estimates with *CashETR*, $Vol(CashETR)$, and *TPS* measured at t as independent variables. Industry fixed and year fixed effects are included. Current *CashETR* has a significant effect on future *CashETR*, while $Vol(CashETR)$ has no effect on future *CashETR*. Importantly for our argument, we find that current *TPS* has an incremental effect on future *CashETR*.

When using future *TPS* as the dependent variable, we find that current *CashETR* has no explanatory power. The adjusted R^2 is 0%. The volatility of *CashETR* has a significant effect

on future *TPS*. Most importantly for our study, current *TPS* explains future levels of *TPS*. The coefficient estimates are significant and current *TPS* has the largest influence on the adjusted R² values of the model. The seemingly low adjusted R² results from the long forecast period of 10 years.

[Insert Table 6 about here]

4 Data and Summary Statistics

Our regressions include data from Compustat and CRSP over 1996–2011. We exclude financial firms with SIC codes 6789 (real estate investment trusts), investment trusts (firms having the word *trust* in the company name), and limited partnerships. Our firm selection criteria follow those of Dyreng, Hanlon, and Maydew (2008) to ensure the comparability of results. We further truncate variables at the 1% and 99% levels to control for outliers and exclude firms with total assets of less than USD 10 million. To compute long-term corporate tax avoidance measures, we require firms to exist at least 10 years. This returns a final sample of 2,820 firms and 13,879 observations. Table 4 presents the summary statistics of our main variables. The average market-to-book ratio *MtB* is 2.549 and varies considerably, from 1.311 (25th percentile) to 3.165 (75th percentile). The pre-tax return on equity averages 24.9%. The average sales growth from $t - 4$ to t is 10.4%. Panel A of Table 4 summarizes our tax variables, which are discussed in detail below.

[Insert Table 4 about here]

5 Effect of Tax Avoidance on Firm Valuation

5.1 Graphical Evidence

We next turn to our main analysis. After having established the result that higher *TPS* values are associated with better predictability of future levels of effective tax rates, that is, with less uncertainty about future tax avoidance outcomes, we test our main model. The simplest way of

testing our main expectation is to sort the data into quintiles of $CashETR$ and $Vol(CashETR)$. This returns a matrix of 25 portfolios that differ in the TPS levels. We then regress the following equation separately for each portfolio:

$$MtB_{i,t} = \alpha_1 + \beta_1 \cdot RoE_{i,t}^{pretax} + \beta_2 \cdot SGr_{i,t} + \beta_3 \cdot CoC_{i,t} + \alpha_{ind} + \alpha_t + \epsilon \quad (10)$$

where MtB is the market-to-book ratio, RoE^{pretax} is the pre-tax return on equity, SGr is sales growth, CoC denotes the cost of capital, α_{ind} are industry fixed effects, and α_t are year fixed effects. We are interested in the β_1 coefficients in each of the 25 portfolios. Our model predicts that the β_1 coefficient should be positively related to the average TPS in a portfolio. Figure 5 presents a scatter plot of the average tax planning score and the corresponding β_1 coefficient for each portfolio. In line with our expectation that higher TPS to a stronger association of pre-tax earnings and market value, we find a positive relation between the average tax planning score and the RoE^{pretax} coefficient. A linear regression of the RoE^{pretax} -coefficient on TPS yields a positive and significant coefficient of 0.21 (t-stat = 2.69) and a constant of 3.36 (t-stat = 8.71). The R^2 of this regression is 34.74%.¹² This result supports our main hypothesis that good tax planning increases the effect of pre-tax earnings on the market-to-book ratio.

[Insert Figure 5 about here]

5.2 OLS Regression of the Firm Valuation Model

We next test our main model from equation (7). We expect that higher tax planning scores lead to a stronger effect of earnings on the market-to book value. Table 7 presents the regressions results from estimating our baseline specification while sequentially adding more controls for operating uncertainty.

[Insert Table 7 about here]

¹² To address concerns that our results are driven by the low number of observations, we sort firms into 100 groups that result from 10 deciles of $CashETR$ and 10 deciles of $SD(CashETR)$. We observe a similar pattern. Using all 100 portfolios, we obtain a positive and significant coefficient of TPS on the RoE^{pretax} coefficient of 0.14 (t-stat = 2.84).

We find that RoE^{pretax} has a positive relation with the market-to-book ratio. The coefficient estimate in column (6), suggests that for a one standard deviation increase in the pre-tax return on equity (21.2%), for a TPS of 0 and mean value of $CFVol$ (0.044) and $Volatility$ (0.114), is associated with an increase in the market-to-book ratio of 0.87, 35.2% of the unconditional mean. We further find a positive effect of sales growth (SGr) on the market-to-book value. The interaction effect of SGr with TPS remains insignificant across all specifications. The cost of equity measure is significant in all specifications.

In line with our expectations, we find a positive and significant coefficient for the interaction term between RoE^{pretax} and TPS . The magnitude ranges between 0.182 (t-stat = 3.5) and 0.111 (t-stat 2.17). This indicates that better tax management increases the positive effect of earnings on the market-to-book ratio. The economic effects we find are substantial, even for column (6), which includes the most controls and has the lowest coefficient. Using the coefficient estimates from column (6), the results imply that if a firm goes from the 25th percentile (2.246) to the 75th percentile (8.300) of the TPS distribution, the effective coefficient of RoE^{pretax} on the market-to-book ratio increases by 0.665 ($0.111 \times [8.300 - 2.246]$), about 16.3% of the baseline estimate of RoE^{pretax} . Hence, if a firm goes from the 25th to the 75th percentile of TPS , the effect of a one standard deviation increase in RoE^{pretax} on the market-to-book ratio increases from 35.2% to 40.9% ($=35.2\% \times [1 + 16.3\%]$). Further, the main effect of TPS is insignificant. This result is in line with our model that does not predict any significant main effect.

Adding gross margin $Gmargin$, volatility of operating cash flows $CFVol$, or volatility of stock returns $Volatility$ to the equation does not change the main finding. It reduces the interaction coefficient between RoE^{pretax} and TPS , but the magnitude of the effect is still economically significant as discussed above. More importantly, adding controls for operating volatility shows that TPS does not pick up the underlying operating uncertainty. This is further evidenced by the insignificant interactions between TPS and any of our proxies of operating volatility. tax rate uncertainty seems to be largely independent of operating uncertainty. In Section 5.4.1, we add further firm-level control variables to demonstrate the robustness of our results.

5.3 CashETR and Vol(CashETR) as Measures of Future Tax Avoidance

The question remains as to whether our measure adds anything to existing measures of tax avoidance. Prior studies show that tax avoidance has positive effects on firm valuation (e.g., Wang, 2010; De Simone, Mills, and Stomberg, 2013; Goh, Lee, Lim, and Shevlin, 2013; Inger, 2013). One implication of our *TPS* is that both the level and the volatility of tax avoidance have firm value implications. Therefore, we test whether long-term CashETRs as a proxy for tax avoidance and whether variation in tax avoidance (e.g., McGuire, Neumann, and Omer, 2013) have similar explanatory power. Table 8 reports the coefficient estimates where we replicate our main model. Instead of using *TPS*, we use the 10-year cash effective tax rate and standard deviation of annual *CashETRs* as tax variables.

[Insert Table 8 about here]

In contrast to our prediction, we find no significant effect of *CashETR*. The interaction between RoE^{pretax} and *CashETR* is negative but insignificant. The direct effect of *CashETR* is also not significant. In Columns (2) and (3), we use a measure for the sustainability of tax avoidance. The negative coefficient of $RoE^{pretax} \times Vol(CashETR)$ indicates that more volatile effective tax rates reduce the effect of earnings on the market-to-book value. We observe in Column (3) that, after we control for the variation in tax avoidance, the interaction between RoE^{pretax} and CashETR is still insignificant. One argument for the insignificant effect if the theoretical model implies that the level and volatility of ETR enter the estimation equation as a ratio and not as two separate additive terms. Overall, the results indicate that it is necessary to control for both the level of tax avoidance and the uncertainty of tax avoidance in firm valuation. Moreover, the R-squared of our baseline model with *TPS* exceeds the R-squared from Table 8. This result makes us confident that *TPS* is a better proxy for future tax avoidance than the level of *CashETR*.

5.4 Robustness Tests

5.4.1 Adding Firm-Level Control Variables

We next test the sensitivity of our results and include further control variables (e.g., De Simone, Mills, and Stomberg, 2013). We extend the baseline model and regress the equation

$$\begin{aligned}
 \text{M-to-B}_{i,t} = & \alpha_1 + \beta_1 \cdot \text{RoE}_{i,t}^{\text{pretax}} + \beta_2 \cdot \text{RoE}_{i,t}^{\text{pretax}} \cdot \text{TPS}_{i,t} + \beta_3 \cdot \text{TPS}_{i,t} + \beta_4 \cdot \text{SGr}_{i,t} \\
 & + \beta_5 \cdot \text{SGr}_{i,t} \cdot \text{TPS}_{i,t} + \beta_6 \cdot \text{CoC}_{i,t} + \beta_7 \cdot \text{Gmargin}_{i,t} + \beta_8 \cdot \text{Gmargin}_{i,t} \cdot \text{TPS}_{i,t} \\
 & + \beta_9 \cdot \text{CFVol}_{i,t} + \beta_{10} \cdot \text{CFVol}_{i,t} \cdot \text{TPS}_{i,t} + \beta_{11} \cdot \text{Volatility}_{i,t} + \beta_{12} \cdot \text{Volatility}_{i,t} \cdot \text{TPS}_{i,t} \\
 & + \beta_{13} \cdot \text{RoE}_{i,t}^{\text{pretax}} \cdot \text{CFVol}_{i,t} + \beta_{14} \cdot \text{RoE}_{i,t}^{\text{pretax}} \cdot \text{Volatility}_{i,t} + \beta_{15} \cdot \text{Log_sales}_{i,t} \\
 & + \beta_{16} \cdot \text{CapEx}_{i,t} + \beta_{17} \cdot \text{RD}_{i,t} + \beta_{18} \cdot \text{TotAccruals}_{i,t} + \beta_{19} \cdot \text{ForOper}_{i,t} \\
 & + \beta_{20} \cdot \text{LT-Debt}_{i,t} + \alpha_{\text{ind}} + \alpha_t + \epsilon_{i,t}
 \end{aligned} \tag{11}$$

where *Log_sales* is the natural logarithm of sales, *CapEx* is capital expenditures over the prior year's total assets in $t-1$, *RD* denotes research and development expenditures over the prior year's total assets, *Volatility* is the standard deviation of monthly stock returns over the past 60 months, *TotAccruals* is a measure of accruals, *ForOper* is a dummy variable indicating the firm generates foreign income, and *LT-Debt* is the ratio of long-term debt to the prior year's total assets.

The main regressions already control for operational risk by including covariates for operating and stock return volatility which is a function of operational risk and leverage (Merton, 1974). We further include *Log_sales* as a measure of firm size. The evidence on the effect of firm size is mixed. Smaller firms tend to have better growth opportunities and should thus have higher market-to-book ratios (Morck, Shleifer, and Vishny, 1988). Conversely, larger firms have better and more tax avoidance opportunities, which could result in higher market-to-book ratios (Rego, 2003; Armstrong, Blouin, and Larcker, 2012). We additionally control for investment opportunities by including capital expenditures and research and development investments (Lang and Stulz, 1994). Finally, we include a dummy variable equal to one if the firm has income from foreign operations (*ForOper*) and long-term debt to control for profit-shifting activities. Table 9 uses *TPS* as the

tax avoidance proxy. We add control variables sequentially. All models include industry fixed and year fixed effects.

[Insert Table 9 about here]

Our estimates show that larger firms, firms with foreign operations, and firms with high research and development expenses have higher market-to-book ratios. In contrast, firms with high accruals and more debt have lower market-book-ratios. Most importantly for our study, we consistently find a positive effect of RoE^{pretax} on the market-to-book ratio and a positive interaction of RoE^{pretax} and TPS . Most importantly, the interaction of RoE^{pretax} and TPS remains almost unchanged compared to the main results. Although significance drops slightly, maybe due to the high number of correlated covariates, the coefficient estimate in the full model is still 0.112 and is statistically significant (t-stat = 1.89). We view this as further evidence that our results are not driven by other observable firm characteristics that affect the market-to-book ratio.

5.4.2 Determinants of the Tax Planning Score

We now turn to an alternative empirical approach that controls for determinants of tax avoidance. We first use TPS as dependent variable. There is extensive research on the determinants of effective tax rates (e.g., Gupta and Newberry, 1997; Mills, 1998; Rego, 2003; Richardson and Lanis, 2007; Dyreng, Hanlon, and Maydew, 2008). We test if the determinants developed in the literature also explain the variation in TPS . We then use the residual from this determinants model as our measure of TPS . This exercise is done to test whether the results are robust to significant correlation with the control variables that are known to also be associated with tax avoidance. We therefore estimate the following model:

$$\begin{aligned}
 TPS_{i,t} = & \alpha_1 + \beta_1 \cdot RoE_{i,t}^{pretax} + \beta_2 \cdot Log_sales_{i,t} + \beta_3 \cdot LT-Debt_{i,t} & (12) \\
 & + \beta_4 \cdot Cash_{i,t} + \beta_5 \cdot CapEx_{i,t} + \beta_6 \cdot CapInt_{i,t} + \beta_7 \cdot ForOper_{i,t} \\
 & + \alpha_t + \alpha_{ind} + \alpha_i + \epsilon_{i,t}
 \end{aligned}$$

where TPS is the dependent variable. We include seven control variables. First, we include RoE^{pretax} to control for the profitability of operations (Gupta and Newberry, 1997; Richardson and Lanis, 2007; Dyreng, Hanlon, and Maydew, 2008). Dyreng, Hanlon, and Maydew (2008) document that more profitable firms have lower effective tax rates. If this relation also holds for TPS , we would obtain a positive coefficient. Second, we control for size (Log_sales). Empirical research shows the ambiguous effects of firm size. While some studies document a positive effect on effective tax rates in line with the political cost hypothesis (Gupta and Newberry, 1997; Rego, 2003), others find a negative effect (Richardson and Lanis, 2007; Dyreng, Hanlon, and Maydew, 2008). That is, larger firms have lower effective tax rates. If this results holds, we would obtain a positive sign for size, since better tax management is associated with a higher TPS . Third, we include leverage (Stickney and McGee, 1982; Dyreng, Hanlon, and Maydew, 2008). Highly leveraged firms can reduce effective tax rates through the deductibility of interest expenses. Therefore, we expect TPS to be higher for highly leveraged firms. Fourth, we include $Cash$, which is defined as the ratio of cash holdings to assets. Fifth, we include investments ($CapEx$) and capital intensity ($CapInt$) (Stickney and McGee, 1982; Richardson and Lanis, 2007). These variables capture the depreciation tax shield of fixed assets and capital expenditures. Finally, we include a dummy variable equal to one if the firm has income from foreign operations ($ForOper$). Dyreng and Lindsey (2009) show that firms with tax haven and foreign operations face lower effective tax rates. We subsequently include year fixed effects (α_t), industry fixed effects (α_{ind}), and firm fixed effects (α_i).

[Insert Table 10 about here]

Table 10 presents the regression results. We find that more profitable firms and larger firms have higher tax planning scores. This result suggests that, in line with earlier evidence, larger firms have better tax management, either through lower long-term cash effective tax rates or more sustainable tax management. We further find that firms with higher capital intensity have higher tax planning scores. In contrast to the results for levels of $CashETR$, our results suggest that highly leveraged firms and firms with foreign operations have lower tax planning scores. One possible explanation is the uncertainty of international profit shifting that arises from changes

to tax codes around the world, for example, from the introduction of thin capitalization rules to prevent debt shifting (OECD, 2013). We find no significant effects for capital expenditures and cash holdings.

Table 10 shows that firm-level characteristics explain about 4.8% of the variation in TPS . Some 3% of the variation is explained by industry fixed effects. Column (4) of Table 10 additionally includes firm fixed effects and the adjusted R^2 amounts to 70.33%. Hence, most of the variation in tax avoidance is time invariant. This makes us confident that the variation we pick up in our main specification stems from cross-sectional differences across firms that are not based on industry effects.

To address remaining concerns that the interaction of RoE^{pretax} and TPS in our main model is driven by the positive effect of RoE^{pretax} on TPS , we use the residual from the regression in Column (1) of Table 10 as an alternative measure of TPS . This measure is orthogonal to RoE^{pretax} and other firm-level characteristics. It captures variations in the level and uncertainty of tax avoidance that are not explained by cross-sectional variations in observable firm characteristics. We denote this variable $Residual(TPS)$. Our baseline result from Table 7 is robust to using the residual of TPS as a measure of tax avoidance. The coefficient estimates are presented in Table 11. The interaction of RoE^{pretax} and $Residual(TPS)$ is significant and yields a positive coefficient between 0.246 (t-stat = 4.03) and 0.185 (t-stat = 2.98). The main implications are therefore robust to controlling for firm-level determinants of tax avoidance.

[Insert Table 11 about here]

5.4.3 Alternative Tax Planning Score Definitions

We ensure that our results are robust to alternative definitions of the tax planning score. One concern about our approach is that, while the theoretical model is based on clean surplus accounting, we use a cash-based measure of tax avoidance. Therefore, we redefine our TPS and use the long-term GAAP ETR (over 10 years) and variation in the one-year GAAP ETR. We test whether the main results still hold for these alternative definitions and using the full specification of the main

tests (column (6) in Table 7. Column (2), Panel A of Table 12 presents the coefficient estimates and shows that using a GAAP-based TPS measure yields similar results.

[Insert Table 12 about here]

The second concern pertains the definition of our volatility measure $Vol(CashETR)$, which we base on the one-year $CashETR$. However, the role of the GAAP ETR is to smooth out fluctuations in CashETRs. Hence, our volatility definition in the denominator may be inflated and inaccurate. Therefore, we redefine TPS and use the 10-year CashETR as proxy for the level of tax avoidance and the standard deviation of the 1-year GAAP ETR as proxy for variation in tax avoidance ($Vol(GAAP ETR)$). Results are presented in column (3) of Table 12 and confirm our previous findings. A higher TPS increases the effect of changes in pre-tax earnings on the market-to-book value. The robust findings from these alternative definitions of TPS make us confident that two dimensions of tax avoidance, the level and uncertainty of effective tax rates, have firm-value implications.

5.4.4 Control for Unobserved Firm Characteristics

Panel B of Table 12 replicates the results including firm fixed effects. We test the robustness of our results to unobserved firm characteristics. The determinants analysis from Section 5.4.2 shows that firm fixed effects explain more than 50% of the variation in TPS . If other time-invariant unobserved firm characteristics are correlated with TPS , our results may be biased. In order to control for this possibility, we rerun our full model from equation 7. but applying firm fixed effects instead of industry effects. Table 12 lists the coefficient on the interaction of pre-tax return on equity and TPS as well the alternative definitions. Since all of these measures are computed using rolling 10-year windows their variation over time is limited. Therefore, even in the absence of correlated firm characteristics including firm fixed effects weakens their impact on the dependent variable by construction. Table 12 presents coefficient estimates for TPS from OLS regressions including year fixed effects, firm fixed effects, and firm-level control variables. In line with our

previous results, the interaction between RoE^{pretax} and TPS is positive and significant. The coefficient estimate for the interaction of TPS and RoE^{pretax} is 0.07 and is statistically significant (t-stat = 1.93). This result holds for all three alternative definitions of TPS . We, therefore, conclude that time-invariant unobserved firm characteristics cannot explain our results.

6 Conclusion

This paper studies the firm value implications of tax avoidance. We decompose the valuation model of Feltham and Ohlson (1995) and Ohlson (1995) into expected future tax rates and pre-tax numbers. First, the level of expected tax avoidance has a multiplicative effect on expected pre-tax profitability. This paper builds and tests a valuation framework that incorporates two outcome dimensions of corporate tax avoidance strategies: the uncertainty and level of expected tax rates. We develop a measure of tax avoidance that captures two dimensions relevant to tax avoidance: the level and variation of tax rates. The combined measure—the tax planning score—improves the predictability of future levels of tax avoidance. The empirical application of the tax planning score in the theoretical model shows that good (poor) tax management increases (decreases) the effect of pre-tax earnings on the market-to-book ratio.

The considerable variation in the tax planning score raises a number of unanswered questions. Why do some firms manage their tax positions better than others? Dyreng, Hanlon, and Maydew (2010) show that CEOs have a large impact on the level of tax avoidance. Do they also improve the second dimension of tax avoidance, the variation in effective tax rates, to obtain a better overall tax management? Since the capital market apparently responds to the quality of tax management, the question remains as to why all firms do not increase their tax planning score. Finally, how does the institutional setting affect tax avoidance? A cross-country comparison of tax avoidance and firm value implications would shed more light on the role of tax avoidance in firms.

References

- Armstrong, Christopher S., Jennifer L. Blouin, and David F. Larcker (2012): The incentives for tax planning, *Journal of Accounting and Economics*, 53 (1-2): 391–411.
- Barth, Mary E., John A. Elliott, and Mark W. Finn (1999): Market Rewards Associated with Patterns of Increasing Earnings, *Journal of Accounting Research*, 37 (2): 387–413.
- Bris, Arturo, Yrjö Koskinen, and Mattias Nilsson (2009): The euro and corporate valuations, *Review of Financial Studies*, 22 (8): 3171–3209.
- Collins, Julie H. and Deen Kemsley (2000): Capital Gains and Dividend Taxes in Firm Valuation: Evidence of Triple Taxation, *The Accounting Review*, 75 (4): 405–427.
- De Simone, Lisa, Lillian F. Mills, and Bridget Stomberg (2013): Measuring income mobility, Working Paper.
- Dechow, Patricia M., Amy P. Hutton, and Richard G. Sloan (1999): An empirical assessment of the residual income valuation model, *Journal of Accounting and Economics*, 26 (1-3): 1–34.
- Desai, Mihir A. and Dhammika Dharmapala (2006): Corporate tax avoidance and high-powered incentives, *Journal of Financial Economics*, 79 (1): 145–179.
- Desai, Mihir A. and Dhammika Dharmapala (2009): Corporate Tax Avoidance and Firm Value, *Review of Economics & Statistics*, 91 (3): 537–546.
- Dhaliwal, Dan, Merle Erickson, Mary Margaret Frank, and Monica Banyi (2003): Are shareholder dividend taxes on corporate retained earnings impounded in equity prices? Additional evidence and analysis, *Journal of Accounting and Economics*, 35 (2): 179–200.
- Dong, Ming, David Hirshleifer, Scott Richardson, and Siew Hong Teoh (2006): Does investor misvaluation drive the takeover market?, *Journal of Finance*, 61 (2): 725–762.
- Dong, Ming, David Hirshleifer, and Siew Hong Teoh (2012): Overvalued equity and financing decisions, *Review of Financial Studies*, 25 (12): 3645–3683.
- Dyreng, Scott D., Michelle Hanlon, and Edward L. Maydew (2008): Long-run corporate tax avoidance, *The Accounting Review*, 83 (1): 61–82.
- Dyreng, Scott D., Michelle Hanlon, and Edward L. Maydew (2010): The Effects of Executives on Corporate Tax Avoidance, *The Accounting Review*, 85 (4): 1163–1189.

- Dyreng, Scott D. and Bradley P. Lindsey (2009): Using financial accounting data to examine the effect of foreign operations located in tax havens and other countries on US multinational firms' tax rates, *Journal of Accounting Research*, 47 (5): 1283–1316.
- Easton, Peter, Gary Taylor, Pervin Shroff, and Theodore Sougiannis (2002): Using forecasts of earnings to simultaneously estimate growth and the rate of return on equity investment, *Journal of Accounting Research*, 40 (3): 657–676.
- Feltham, Gerald A. and James A. Ohlson (1995): Valuation and clean surplus accounting for operating and financial activities, *Contemporary Accounting Research*, 11 (2): 689–731.
- Gallemore, John, Edward L. Maydew, and Jacob R. Thornock (2014): The Reputational Costs of Tax Avoidance, *Contemporary Accounting Research*, 31 (4): 1103–1133.
- Goh, Beng Wee, Jimmy Lee, Chee Yeow Lim, and Terry Shevlin (2013): The Effect of Corporate Tax Avoidance on the Cost of Equity, SSRN Working Paper.
- Gupta, Sanjay and Kaye Newberry (1997): Determinants of the Variability in Corporate Effective Tax Rates: Evidence from Longitudinal Data, *Journal of Accounting and Public Policy*, 16 (1): 1–34.
- Hanlon, Michelle and Shane Heitzman (2010): A review of tax research, *Journal of Accounting and Economics*, 50 (2-3): 127–178.
- Hanlon, Michelle, James N. Myers, and Terry Shevlin (2003): Dividend taxes and firm valuation: a re-examination, *Journal of Accounting and Economics*, 35 (2): 119–153.
- Hanlon, Michelle and Joel Slemrod (2009): What does tax aggressiveness signal? Evidence from stock price reactions to news about tax shelter involvement, *Journal of Public Economics*, 93 (1–2): 126–141.
- Harris, Trevor S. and Deen Kemsley (1999): Dividend Taxation in Firm Valuation: New Evidence, *Journal of Accounting Research*, 37 (2): 275–291.
- Inger, Kerry Katharine (2013): Relative Valuation of Alternative Methods of Tax Avoidance, SSRN Working Paper.
- Kothari, S.P. (2001): Capital markets research in accounting, *Journal of Accounting and Economics*, 31 (1-3): 105–231.
- Lambert, Richard, Christian Leuz, and Robert E. Verrecchia (2007): Accounting Information, Disclosure, and the Cost of Capital, *Journal of Accounting Research*, 45 (2): 385–420.

- Lang, Larry H.P. and Rene M. Stulz (1994): Tobin's q, Corporate Diversification, and Firm Performance, *Journal of Political Economy*, 102 (6): 1248–1280.
- Lee, Charles, James Myers, and Bhaskaran Swaminathan (1999): What is the Intrinsic Value of the Dow?, *The Journal of Finance*, 54 (5): 1693–1741.
- Lipe, Robert (1990): The Relation between Stock Returns and Accounting Earnings Given Alternative Information, *The Accounting Review*, 65 (1): 49 – 71.
- Loh, Roger K and G Mujtaba Mian (2006): Do accurate earnings forecasts facilitate superior investment recommendations?, *Journal of Financial Economics*, 80 (2): 455–483.
- Loughran, Tim and Jay R. Ritter (1995): The New Issues Puzzle, *Journal of Finance*, 50 (1): 23–51.
- McGuire, Sean T., Stevanie S. Neumann, and Thomas C. Omer (2013): Sustainable Tax Strategies and Earnings Persistence, Working Paper.
- McNichols, Maureen, Madhav V. Rajan, and Stefan Reichelstein (2014): Conservatism correction for the market-to-book ratio and Tobins Q, *Review of Accounting Studies*, 19 (4): 1393–1435.
- Merton, Robert C. (1974): On the Pricing of Corporate Debt: The Risk Structure of Interest Rates, *Journal of Finance*, 29 (2): 449–470.
- Mills, Lillian F. (1998): Book-Tax Differences and Internal Revenue Service Adjustments, *Journal of Accounting Research*, 36 (2): 343–356.
- Modigliani, Franco and Merton H. Miller (1985): The Cost of Capital, Corporation Finance and the Theory of Investment, *American Economic Review*, 48 (3): 261–297.
- Morck, Randall, Andrei Shleifer, and Robert W. Vishny (1988): Management ownership and market valuation: An empirical analysis, *Journal of Financial Economics*, 20: 293–315.
- OECD (2013): Addressing Base Erosion and Profit Shifting, OECD Publishing.
- Ohlson, James A. (1995): Earnings, book values, and dividends in equity valuation, *Contemporary Accounting Research*, 11 (2): 661–687.
- Plumlee, Marlene A. (2003): The effect of information complexity on analysts' use of that information, *The Accounting Review*, 78 (1): 275–296.
- Rego, Sonja O. (2003): Tax-Avoidance Activities of U.S. Multinational Corporations, *Contemporary Accounting Research*, 20 (4): 805–833.

- Richardson, Grant and Roman Lanis (2007): Determinants of the variability in corporate effective tax rates and tax reform: Evidence from Australia, *Journal of Accounting and Public Policy*, 26 (6): 689–704.
- Shackelford, Douglas A. and Terry Shevlin (2001): Empirical tax research in accounting, *Journal of Accounting and Economics*, 31 (1-3): 321–387.
- Sharpe, William F. (1966): Mutual Fund Performance, *Journal of Business*, 39 (1): 119–138.
- So, Eric C. (2013): A new approach to predicting analyst forecast errors: Do investors overweight analyst forecasts?, *Journal of Financial Economics*, 108 (3): 615–640.
- Stickney, Clyde P. and Victor E. McGee (1982): Effective corporate tax rates the effect of size, capital intensity, leverage, and other factors, *Journal of Accounting and Public Policy*, 1 (2): 125–152.
- Thomas, Jacob and Frank Zhang (2014): Valuation of tax expense, *Review of Accounting Studies*, 19 (4): 1436–1467.
- Wang, Xiaohang (2010): Tax Avoidance, Corporate Transparency, and Firm Value, SSRN Working Paper.

A Proofs

Given the assumptions of a constant expected future return on equity and clean surplus accounting the proof is straight forward. Starting from our definition of book value at time $t+i$ as the sum of book value at time t plus retained and not distributed earnings ($B_{t+i} = B_t + \sum_{k=1}^i \tilde{\delta} \cdot (1-\alpha) \cdot E_{t+k}^{pretx}$), we can write growth in book value as:

$$\frac{B_{t+i}}{B_{t+i-1}} = \frac{B_t + \sum_{k=1}^i \tilde{\delta} \cdot (1-\alpha) \cdot E_{t+k}^{pretx}}{B_t + \sum_{k=1}^{i-1} \tilde{\delta} \cdot (1-\alpha) \cdot E_{t+k}^{pretx}}$$

Denote, retained earnings before tax as $REB_t = (1-\alpha) \cdot E_t^{pretx}$. Taking the derivative with respect to $\tilde{\delta}$ then yields:

$$\begin{aligned} \frac{\partial \frac{B_{t+i}}{B_{t+i-1}}}{\partial \tilde{\delta}} &= \frac{\left[B_t + \sum_{k=1}^i REB_{t+k} \right] \left[B_t + \tilde{\delta} \sum_{k=1}^{i-1} REB_{t+k} \right] - \left[B_t + \tilde{\delta} \sum_{k=1}^i REB_{t+k} \right] \left[B_t + \sum_{k=1}^{i-1} REB_{t+k} \right]}{(B_{t+i-1})^2} \\ &= \frac{(B_t)^2 + \sum_{k=1}^i REB_{t+k} \cdot B_t + B_t \cdot \tilde{\delta} \sum_{k=1}^{i-1} REB_{t+k} + \tilde{\delta} \sum_{k=1}^i REB_{t+k} \cdot \sum_{k=1}^{i-1} REB_{t+k}}{(B_{t+i-1})^2} \\ &\quad - \frac{(B_t)^2 + \tilde{\delta} \sum_{k=1}^i REB_{t+k} \cdot B_t + B_t \cdot \sum_{k=1}^{i-1} REB_{t+k} + \tilde{\delta} \sum_{k=1}^i REB_{t+k} \cdot \sum_{k=1}^{i-1} REB_{t+k}}{(B_{t+i-1})^2} \\ &= \frac{REB_{t+i} \cdot B_t - B_t \cdot \tilde{\delta} REB_{t+i}}{(B_{t+i-1})^2} \\ &= \frac{(1-\tilde{\delta})REB_{t+i} \cdot B_t}{(B_{t+i-1})^2} \\ &= \frac{(1-\tilde{\delta})(1-\alpha)E_{t+i}^{pretx} B_t}{(B_{t+i-1})^2} \geq 0, \quad \forall E_{t+i}^{pretx} \geq 0 \end{aligned}$$

the effect of lower expected tax rates (higher $\tilde{\delta}$) is therefore positive and decreasing in magnitude with increasing $\tilde{\delta}$, as long as pre-tax earnings are positive.

B Variable Definitions

Table 1: Description of Variables

<i>TPS</i>	<i>TPS</i> is the tax planning score from equation (9). <i>TPS</i> is defined as the ratio of $(1 - CashETR)$ to $Vol(CashETR)$.
<i>CashETR</i>	<i>CashETR</i> is the long-term cash effective tax rate according to Dyreng, Hanlon, and Maydew (2008) over 10 years. We compute the <i>CashETR</i> as $\frac{\sum_{t=1}^N \text{Cash Taxes Paid}_{i,t}}{\sum_{t=1}^N (\text{Pretax Income}_{i,t} - \text{Special Items}_{i,t})}$.
$Vol(CashETR)$	$Vol(CashETR)$ is the standard deviation of annual cash effective tax rates from $t - 9$ to t .
<i>MtB</i>	<i>MtB</i> is the market-to-book ratio and is computed as MV_t/BV_t .
RoE^{pretax}	RoE^{pretax} is the ratio of pre-tax earnings to equity.
<i>SGr</i>	<i>SGr</i> denotes the growth in sales from $t - 4$ to t .
<i>CoC</i>	<i>CoC</i> is the cost of equity calculated as $R_i - R_f = \delta_0 + \delta_1(R_m - R_f) + \delta_2(SMB) + \epsilon$ using CRSP monthly returns from t to $t - 3$.
<i>Gmargin</i>	<i>Gmargin</i> is the ratio of Cost of goods sold to sales in $t - 1$.
<i>CFVol</i>	<i>CFVol</i> is the standard deviation of operating cash flows scaled by total assets from $t - 4$ to t .
<i>Log_sales</i>	<i>Log_sales</i> is defined as the logarithm of sales.
<i>CapEx</i>	<i>CapEx</i> is the ratio of capital expenditures to total assets in $t - 1$.
<i>RD</i>	<i>RD</i> is the ratio of R&D Expenditures to total assets in $t - 1$.
<i>LT-Debt</i>	<i>LT-Debt</i> is the ratio of Long-Term Debt to total assets in $t - 1$.
<i>Volatility</i>	<i>Volatility</i> is the standard deviation of monthly stock returns over the past 60 months.
<i>TotAccruals</i>	<i>TotAccruals</i> is a measure of accruals. It is defined as operating activities net cash flow scaled by assets in $t - 1$ times -1.
<i>ForOper</i>	<i>ForOper</i> is a dummy variable for foreign operations equal to 1 if the firm has foreign income different from 0.

C Tables and Figures

Figure 1: Market-to-Book Ratios and Effective Tax Rates

This figure presents a bar chart with average Market-to-Book Ratios on the y-axis and CashETR sorted into 25 bins on the x-axis. CashETR is the 10-year cash effective tax rate.

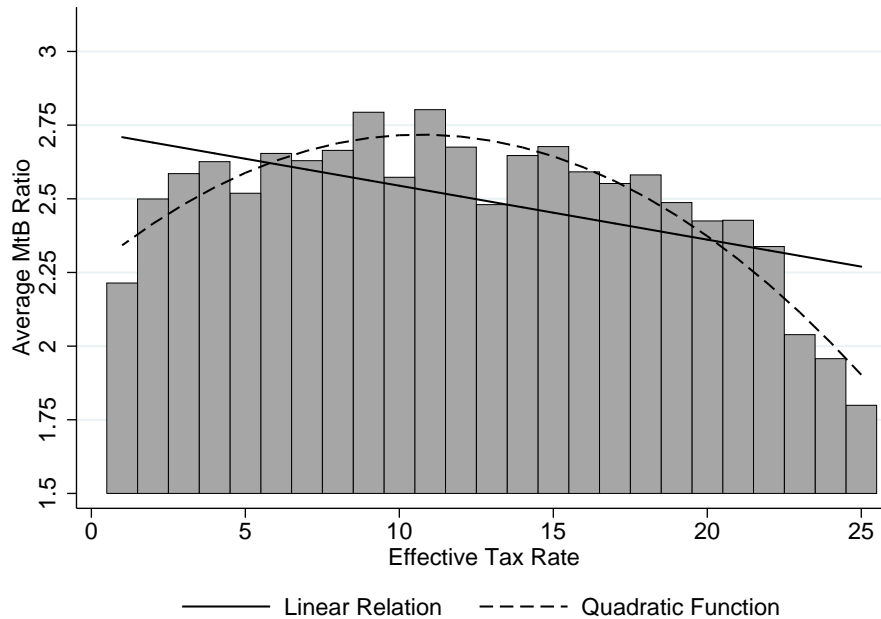


Figure 2: Forecast Difference in Effective Tax Rates

This figure presents a histogram of the distribution of the difference in forecasted effective tax rates of 2015 and the historical effective tax rate of 2013. We use the sample of 468 analyst forecasts from 2014.

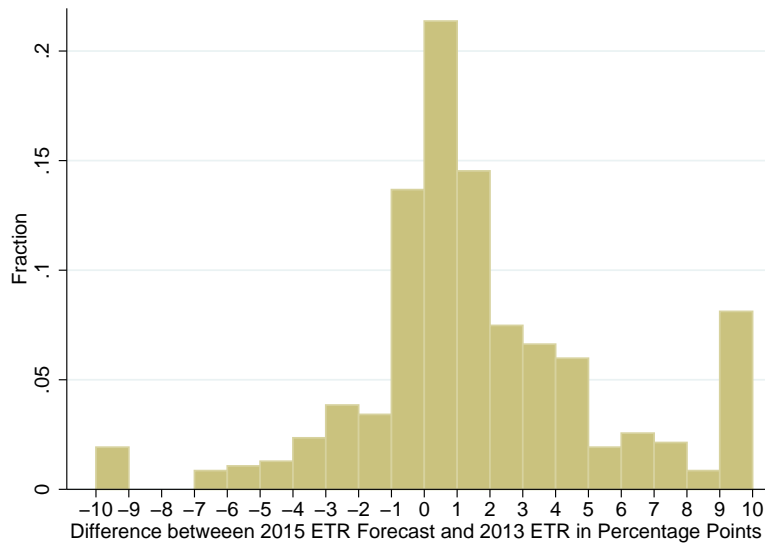


Figure 3: Differences in Tax Rates from Year t to $t-1$

Panel A of this Figure presents a scatter of the 2014 and the 2015 effective tax rate forecast from a sample of 468 analyst forecasts (collected in 2014). Panel B of this figure presents a scatter plot of this year's effective tax rate and last year's effective tax rate using the Compustat sample

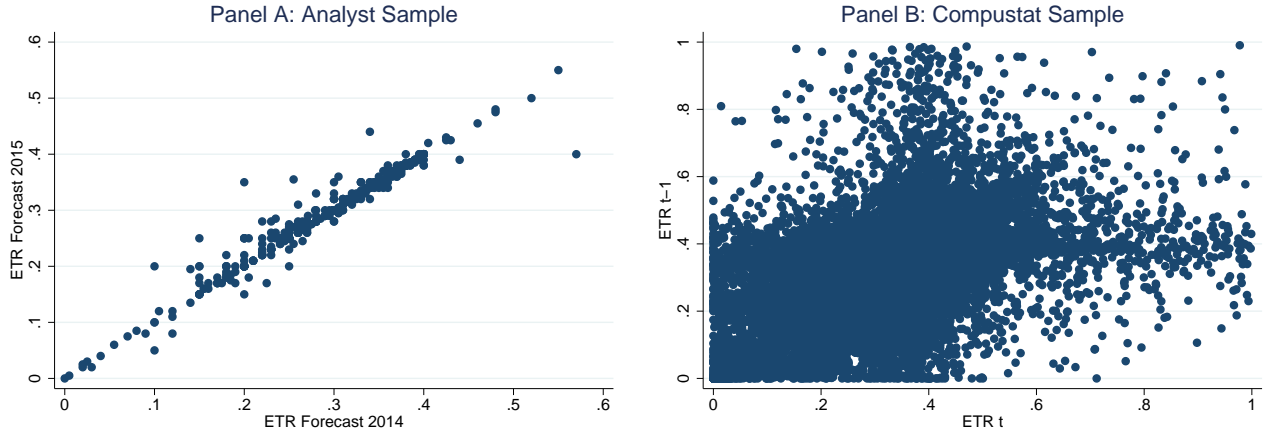


Figure 4: Serial Correlation of CashETR and the Tax Planning Score

This figure plots CashETR coefficients from regressions with future CashETR ($t+5$) as the dependent variable. The serial correlation coefficient is estimated for different quintiles. The black bars represent coefficient estimates for each quintile of the Tax Planning Score distribution. Coefficient estimates are significantly different from each other except for the lowest two quintiles. The gray bars represent quintiles of the CashETR distribution. Estimates are not significantly different from each other.

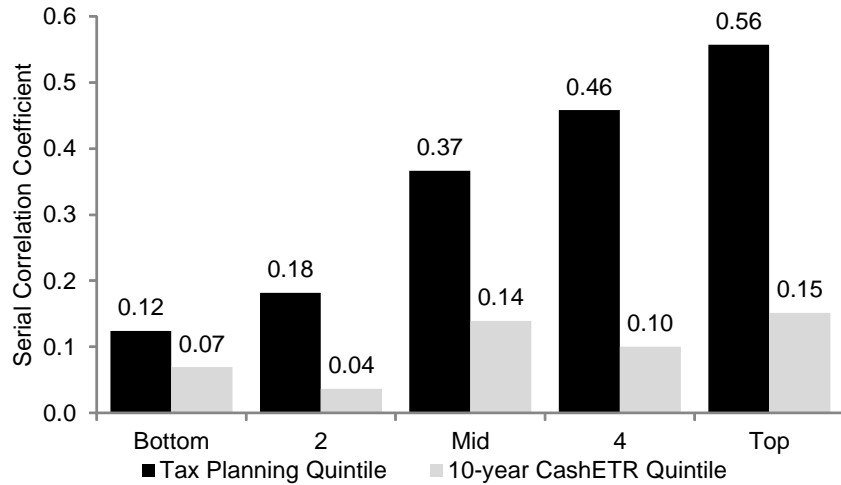


Figure 5: Tax Planning Score and Pre-Tax Earnings Coefficient

This figure plots RoE^{pretax} coefficients from regressing the market-to-book ratio (MtB) on RoE^{pretax} , SGr, and CoC (y-axis) and the average Tax Planning Score TPS (x-axis). Means and coefficients are computed for 25 portfolios from sorting firms into quintiles of the CashETR distribution and quintiles the Vol(CashETR) distribution. The fitted line is the OLS regression of RoE^{pretax} coefficients on TPS . The circle denotes the portfolio of firms in the bottom CashETR and the bottom Vol(CashETR) quintile.

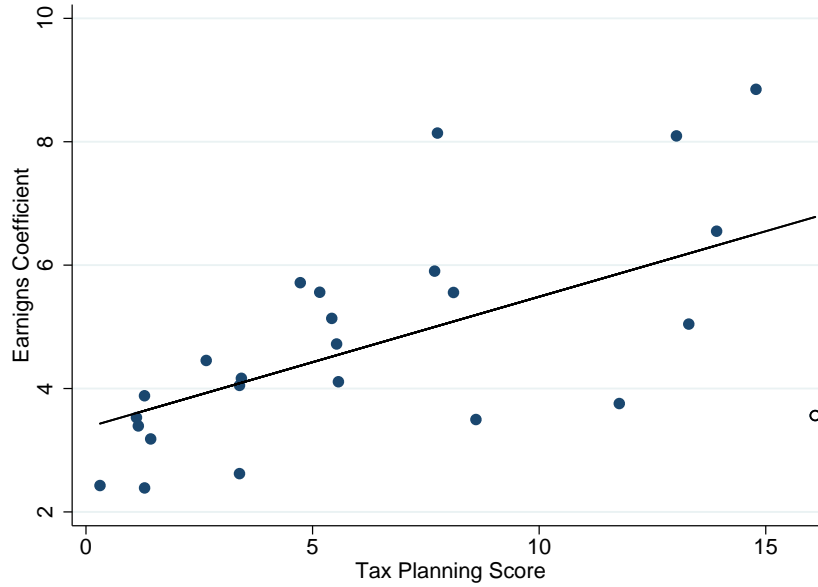


Table 2: The Relation of Forecasted and Future Tax Rates to Past Tax Rates

	Analyst Sample		Compustat Sample	
	\widehat{ETR}_{2014}	\widehat{ETR}_{2015}	ETR_{t+1}	ETR_{t+2}
	(1)	(2)	(3)	(4)
ETR_{2013}	0.4836*** (0.0680)	0.4403*** (0.0668)		
ETR_{2012}	0.2908*** (0.0690)	0.3178*** (0.0658)		
ETR_t			0.6610*** (0.0171)	0.6146*** (0.0170)
ETR_{t-1}			0.1417*** (0.0134)	0.1339*** (0.0112)
Observations	468	468	21,681	21,681
R-squared	0.717	0.724	0.446	0.364

This table presents regression results from estimating future GAAP effective tax rates (ETR) on past tax rates. We use the sample of forecasted ETRs from analyst reports (Analyst Sample) and the sample of observed future ETRs from Compustat firms (Compustat Sample). We regress the one year and two year forecast/future ETR on current ETR and one lag of ETR. We report robust standard errors. In the Compustat Sample we also cluster by firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 3: Forecast Adjustments and Past Tax Rate Variation

	$\widehat{\text{ETR}}_{2015} < \text{ETR}_{2013}$	$\widehat{\text{ETR}}_{2015} = \text{ETR}_{2013}$	$\widehat{\text{ETR}}_{2015} > \text{ETR}_{2013}$
	(1)	(2)	(3)
N	133	100	235
Var($\text{ETR}_{2013} - \text{ETR}_{2012}$)	5.536	4.978	6.722
Variance Ratio, Reference is Group (2)	1.112 (p=0.2659)		1.350*** (p=0.0008)
Variance Ratio Reference is Group (1)		0.899 (p=0.2659)	1.223** (p=0.0014)

This table presents the average variation of the difference between 2012 and 2013 effective tax rates (ETR) in the analyst sample for three different groups. The first (second) group, $\widehat{\text{ETR}}_{2015} < \text{ETR}_{2013}$ ($\widehat{\text{ETR}}_{2015} = \text{ETR}_{2013}$), comprises 133 (100) firms for which the 2015 ETR forecast is smaller than (equal to) the realized 2013 ETR. The third group comprises 235 firms for which the 2015 ETR forecast exceeds the realized 2013 ETR. We also present results of a variance ratio test. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4: Descriptive Statistics for Model Variables

Panel A: Tax Variables						
Variable	Mean	St.Dev	P25	Median	P75	NrObs
CETR	0.260	0.875	0.140	0.258	0.353	13,879
TPS	6.143	5.526	2.246	4.982	8.300	13,879
Vol(CETR)	0.436	1.137	0.088	0.147	0.312	13,879
Panel B: Main Firm Variables						
MtB	2.549	1.876	1.311	2.000	3.165	13,879
RoE ^{pretax}	0.249	0.212	0.126	0.208	0.314	13,879
SGr	0.104	0.119	0.029	0.086	0.159	13,879
CoC	0.185	0.175	0.100	0.100	0.224	13,879
Gmargin	0.636	0.184	0.525	0.670	0.775	13,879
CFVol	0.044	0.032	0.022	0.036	0.057	13,879
Panel C: Additional Control Variables						
Log_sales	6.619	1.606	5.490	6.666	7.731	13,544
CapEx	0.053	0.049	0.020	0.038	0.069	13,506
RD	0.018	0.034	0.000	0.000	0.020	13,879
LT-Debt	0.164	0.149	0.014	0.142	0.268	13,879
Volatility	0.114	0.045	0.081	0.106	0.138	13,879
TotAccruals	-0.047	0.066	-0.081	-0.046	-0.015	13,817
ForOper	0.445	0.497	0.000	0.000	1.000	13,879

This table presents summary statistics for our main variables. Panel A summarize tax variables. Panel B uses our main firm level variables. In Panel C, we use additional firm level control variables. *TPS* is the tax planning score from equation (9). *CETR* is the long-term cash effective tax rate from equation (8) over ten years as defined by Dyreng, Hanlon, and Maydew (2008). *Vol(CETR)* is the standard deviation of annual cash effective tax rates between $t - 9$ and t . *MtB* is the market-to-book ratio. *RoE^{pretax}* denotes pre-tax earnings over prior year total assets. *SGr* is the growth in sales from $t - 4$ to t . *CoC* denotes the cost of equity. *Gmargin* is the ratio of Cost of goods sold to sales. *CFVol* is the standard deviation of operating cash flows scaled by total assets over the past five years. *Log_sales* is the logarithm of total sales. *CapEx* denote capital expenditures over total assets in $t - 1$. *RD* are research and development expenditures over total assets in $t - 1$. *LT-Debt* is the ratio of long-term debt to total assets. *Volatility* is the standard deviation of monthly stock returns over the past 60 months. *TotAccruals* is operating activities net cash flow scaled by assets in $t - 1$ times -1. *ForOper* is a dummy variable equal to 1 if the firm has foreign income different from 0.

Table 5: Correlation Matrix for Model Variables

Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]
[1] CETR																
[2] TPS	0.01															
[3] Vol(CETR)	-0.09	1.00														
[4] SGr	0.05	0.10														
[5] MFB	-0.02	0.25														
[6] RoE _{pretax}	0.09	0.22														
[7] CoC	-0.06	-0.04														
[8] Gmargin	0.05	-0.11														
[9] CFVol	0.00	-0.24														
[10] LogSales	-0.02	0.20														
[11] CapEx	0.01	0.08														
[12] RD	-0.10	0.01														
[13] Volatility	-0.13	-0.30														
[14] TotAccruals	0.11	-0.06														
[15] ForOper	-0.06	0.02														
[16] LT-Debt	-0.11	0.01														

This table reports the Pearson correlation coefficients (above the diagonal) and Spearman correlation coefficients (below the diagonal). Correlations in bold are significant at the 5% level.

Table 6: Predicting Future Tax Avoidance

	Panel A: CETR $t+10$			Panel B: TPS $t+10$		
CETR	0.228*** (0.039)	0.240*** (0.038)	0.262*** (0.038)	-1.050 (1.839)	-2.230 (1.975)	0.225 (2.174)
Vol(CETR)		0.000 (0.001)	0.001 (0.001)		-0.128*** (0.026)	-0.048*** (0.016)
TPS			0.002*** (0.001)			0.246*** (0.045)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	4.16%	4.58%	5.30%	-0.01%	1.21%	6.91%
Observations	1,505	1,486	1,486	1,494	1,476	1,476

This table reports regression results on future tax avoidance. Panel A uses *CETR* in $t + 10$ as dependent variable. Panel B uses *TPS* in $t + 10$ as dependent variable. Independent variables *CETR*, *Vol(CETR)* and *TPS* are based on a ten-year horizon. All regressions include year and industry fixed-effects. Standard errors (reported in parentheses) are clustered at the firm level and by years. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 7: Tax Avoidance and Firm Valuation

	(1)	(2)	(3)	(4)	(5)	(6)
RoE ^{pretax}	3.357*** (0.355)	3.234*** (0.349)	3.257*** (0.347)	3.279*** (0.347)	4.843*** (0.487)	6.326*** (0.668)
SGr	0.452* (0.274)	0.543** (0.262)	0.531** (0.263)	0.588** (0.282)	0.539** (0.271)	0.568** (0.274)
RoE ^{pretax} × TPS	0.182*** (0.052)	0.179*** (0.051)	0.178*** (0.051)	0.170*** (0.051)	0.133*** (0.050)	0.111** (0.051)
SGr × TPS	0.015 (0.048)	0.017 (0.045)	0.018 (0.045)	0.036 (0.045)	0.038 (0.044)	0.039 (0.045)
TPS	-0.001 (0.011)	-0.000 (0.024)	-0.003 (0.024)	0.004 (0.027)	0.011 (0.025)	0.014 (0.025)
CoC	0.653** (0.282)	0.633** (0.265)	0.639** (0.266)	0.863*** (0.286)	0.860*** (0.282)	0.852*** (0.285)
Gmargin		-1.690*** (0.220)	-1.680*** (0.219)	-1.690*** (0.215)	-1.670*** (0.217)	-1.650*** (0.219)
Gmargin × TPS		-0.011 (0.027)	-0.011 (0.027)	-0.013 (0.027)	-0.013 (0.027)	-0.012 (0.027)
CFVol			-1.050 (0.730)	-0.067 (0.840)	5.251*** (1.084)	3.744*** (1.109)
CFVol × TPS			0.049 (0.113)	0.113 (0.145)	0.217 (0.156)	0.169 (0.147)
Volatility				-2.710*** (0.832)	-2.400*** (0.845)	0.998 (0.999)
Volatility × TPS				-0.111 (0.120)	-0.144 (0.122)	-0.112 (0.114)
RoE ^{pretax} × CFVol					-21.6*** (3.377)	-14.7*** (3.473)
RoE ^{pretax} × Volatility						-13.8*** (3.184)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	39.63%	41.56%	41.57%	41.94%	42.80%	43.29%
Observations	13,879	13,879	13,879	13,879	13,879	13,879

This table presents regressions results for the market-to-book ratio. Independent variables are described in Table 1. We report robust standard errors clustered at the firm level and by years in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8: Tax Avoidance and Firm Valuation—CETR and Sustainability

	Effective Tax Rate	Sustainability of ETR	Both Measures
RoE ^{pretax}	7.958*** (0.610)	7.619*** (0.422)	7.950*** (0.624)
SGr	0.846* (0.446)	0.824*** (0.266)	0.748 (0.463)
RoE^{pretax} × CETR	-0.795 (1.840)		-1.130 (1.852)
SGrxCETR	-0.026 (1.362)		0.106 (1.382)
CETR	0.469 (0.820)		0.406 (0.845)
RoE^{pretax} × Vol(CETR)		-0.018** (0.007)	-0.022** (0.010)
SGrxVol(CETR)		0.026** (0.010)	0.027** (0.011)
Vol(CETR)		-0.019** (0.008)	-0.018** (0.008)
CoC	0.861*** (0.293)	0.873*** (0.288)	0.865*** (0.292)
Gmargin	-1.630*** (0.310)	-1.900*** (0.185)	-1.700*** (0.325)
CFVol	7.073*** (1.658)	4.360*** (1.106)	6.958*** (1.639)
Volatility	0.650 (1.555)	0.109 (0.908)	0.334 (1.567)
Gmargin × CETR	-0.628 (0.910)		-0.506 (0.935)
CFVol × CETR	-7.640** (3.583)		-8.150** (3.423)
Volatility × CETR	-1.580 (3.167)		-1.250 (3.141)
Gmargin × Vol(CETR)		0.020** (0.010)	0.019* (0.010)
CFVol × Vol(CETR)		0.034 (0.046)	0.008 (0.044)
Volatility × Vol(CETR)		0.034 (0.023)	0.038* (0.021)
Firm Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Adjusted R ²	42.13%	41.91%	42.19%
Observations	13,879	13,879	13,879

This table presents regressions results for the market-to-book ratio. As tax measures, we use the 10-year *CETR*, the volatility of the annual *CETR* over 10 years (*Vol(CETR)*), and finally both measures. Independent variables are explained in Table 1. Each regression contains the full set of control variables as in regression (9) in Table 7. We report robust standard errors clustered at the firm level and by years in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 9: Firm Valuation and Tax Planning Score—Control for Other Firm Characteristics

	(1)	(2)	(3)	(4)	(5)
RoE^{pretax}	6.007*** (0.803)	6.031*** (0.814)	6.105*** (0.829)	6.098*** (0.835)	6.137*** (0.816)
$RoE^{pretax} \times TPS$	0.116** (0.059)	0.114* (0.059)	0.112* (0.059)	0.112* (0.060)	0.112* (0.059)
TPS	0.007 (0.027)	0.014 (0.027)	0.015 (0.028)	0.014 (0.028)	0.012 (0.028)
Log_sales	0.155*** (0.031)	0.146*** (0.030)	0.139*** (0.029)	0.121*** (0.030)	0.137*** (0.030)
CapEx	1.946*** (0.635)	2.037*** (0.616)	1.387** (0.596)	1.496** (0.597)	1.455** (0.590)
RD		5.675*** (1.011)	5.544*** (1.008)	5.345*** (1.003)	4.781*** (0.966)
TotAccruals			-1.890*** (0.301)	-1.890*** (0.301)	-1.900*** (0.295)
ForOper				0.184*** (0.052)	0.181*** (0.052)
LT-Debt					-0.835*** (0.182)
Baseline Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	45.70%	46.23%	46.58%	46.73%	47.05%
Observations	13,120	13,120	13,120	13,120	13,120

Variables are described in Table 1. We subsequently add controls for firm size (*Log_sales*), investments (*CapEX* and *RD*), stock volatility (*Volatility*), total accruals (*TotAccruals*), foreign operations (*ForOper*), and long-term debt (*LT-Debt*). We include all firm level variables from Column (7) of Table 7. We report robust standard errors clustered at the firm level and by years in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 10: Determinants of the Tax Planning Score

	(1)	(2)	(3)	(4)
RoE ^{pretax}	2.548*** (0.407)	2.534*** (0.408)	2.559*** (0.395)	0.250 (0.311)
Log_Sales	0.638*** (0.067)	0.655*** (0.068)	0.766*** (0.071)	1.731*** (0.368)
Leverage	-0.696*** (0.161)	-0.708*** (0.162)	-0.653*** (0.160)	-0.490*** (0.185)
Cash	1.002 (0.759)	1.147 (0.761)	1.517* (0.778)	-0.655 (0.829)
ForOper	-0.359* (0.214)	-0.348 (0.215)	-0.762*** (0.229)	-0.191 (0.315)
CapEx	-0.024 (0.036)	-0.022 (0.037)	-0.007 (0.038)	0.019 (0.046)
CapInt	1.217** (0.488)	1.122** (0.492)	3.173*** (0.712)	2.670** (1.188)
Year FE	No	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
Firm FE	No	No	No	Yes
Adjusted R ²	4.78%	5.02%	8.05%	70.33%
Observations	13,761	13,761	13,714	13,714

This table presents regressions results with the 10-year tax planning score as dependent variable. We include pre-tax earnings (RoE^{pretax}), firm size (log_sales), debt-to-assets ratio ($Leverage$), cash-to-assets ratio ($Cash$), foreign operations ($ForOper$), investments ($CapEX$), and the capital intensity ($CapInt$). We report robust standard errors clustered at the firm level in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 11: Tax Avoidance and Firm Valuation—Alternative Tax Planning Score Measure

	(1)	(2)	(3)	(4)	(5)	(6)
RoE ^{pretax}	5.423*** (0.236)	5.271*** (0.230)	5.272*** (0.232)	5.225*** (0.238)	6.296*** (0.320)	7.489*** (0.462)
SGr	0.495* (0.281)	0.583** (0.281)	0.583** (0.281)	0.782*** (0.286)	0.746*** (0.285)	0.802*** (0.282)
RoE^{pretax} × Residual(TPS)	0.246*** (0.061)	0.237*** (0.058)	0.237*** (0.059)	0.232*** (0.059)	0.199*** (0.060)	0.185*** (0.062)
SGr × Residual(TPS)	0.015 (0.058)	0.018 (0.054)	0.019 (0.053)	0.027 (0.055)	0.031 (0.054)	0.035 (0.054)
Residual(TPS)	−0.028** (0.013)	−0.032** (0.013)	−0.033 (0.023)	−0.035 (0.029)	−0.025 (0.028)	−0.021 (0.028)
CoC		0.678** (0.273)	0.678** (0.274)	0.905*** (0.284)	0.898*** (0.282)	0.889*** (0.284)
Gmargin		−1.760*** (0.177)	−1.760*** (0.178)	−1.780*** (0.178)	−1.780*** (0.177)	−1.760*** (0.178)
CFVol		−1.490** (0.639)	−1.490** (0.660)	−0.114 (0.707)	5.125*** (1.101)	3.466*** (1.153)
Gmargin × Residual(TPS)			0.002 (0.028)	−0.000 (0.028)	0.000 (0.028)	0.003 (0.028)
CFVol × Residual(TPS)			0.006 (0.115)	−0.001 (0.144)	−0.002 (0.147)	−0.001 (0.145)
Volatility				−3.470 (0.898)	−3.390*** (0.907)	0.008*** (0.948)
Volatility × Residual(TPS)				−0.004 (0.143)	−0.028 (0.140)	−0.059 (0.132)
RoE ^{pretax} × CFVol					−19.000*** (3.958)	−12.400*** (4.193)
RoE ^{pretax} × Volatility						−13.100*** (3.233)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	42.38%	44.56%	44.55%	44.93%	45.43%	45.79%
Observations	12,226	12,226	12,226	12,226	12,226	12,226

This table presents regressions results for the market-to-book ratio. Independent variables are described in Table 1. The residuals are the ϵ from the following regression: $TPS_{i,t} = \alpha_1 + \beta_1 \cdot ROA_{i,t} + \beta_2 \cdot SIZE_{i,t} + \beta_3 \cdot Leverage_{i,t} + \beta_4 \cdot Cash_{i,t} + \beta_5 \cdot Investment_{i,t} + \beta_6 \cdot CapInt_{i,t} + \beta_7 \cdot ForOp_{i,t} + \epsilon$. We report robust standard errors clustered at the firm level and by years in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 12: Tax Avoidance and Firm Valuation—Alternative TPS Measures and Firm Fixed Effects

TPS Definition	$\frac{1-CETR}{Vol(CETR)}$ (1)	$\frac{1-GAAP_ETR}{Vol(GAAP_ETR)}$ (2)	$\frac{1-CETR}{Vol(GAAP_ETR)}$ (3)
Panel A: Baseline Model			
RoE ^{pretax} × TPS	0.111** (0.051)	0.059** (0.007)	0.055*** (0.007)
Full Firm Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Adjusted R ²	43.29%	43.86%	44.03%
Observations	13,879	11,928	12,025
Panel B: Firm Fixed Effects Model			
RoE ^{pretax} × TPS	0.070* (0.036)	0.116*** (0.018)	0.098*** (0.015)
Firm Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Adjusted R ²	71.10%	72.40%	72.52%
Observations	13,879	11,878	11,977

This table presents regressions results for the market-to-book ratio where we additionally include firm fixed effects. Independent variables are described in Table 1. Column (1) uses the TPS measure. In Column (2), we use the TPS measure based on GAAP numbers. In Column (3), we use the variations of GAAP ETRs (Vol(GAAP ETR)) as denominator of TPS. We report robust standard errors clustered at the firm level and by industry-year-cells in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.