Title
Taxable Income and Firm Risk

Journal
Journal of the American Taxation Association, 39(1)

ISSN
0198-9073

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Publication Date
2017-04-01

DOI
10.2308/atax-51610

Peer reviewed

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ABSTRACT

We examine whether estimated taxable income provides incremental information about firms' operating risk. We develop taxable income-based measures that should be useful in assessing risk in a simple earnings predictability model. In our empirical tests these taxable income-based measures explain cross-sectional variation in the predictability and variability of future pre-tax financial performance. Further, these measures are associated with predictable variation in market-based measures of firm risk. Our findings shed light on how accounting information – specifically, book income and tax income – impact investors' assessment of firm risk as well as improving our understanding of the extent and nature of information contained in estimated taxable income.

I. I. INTRODUCTION

In this study we examine whether estimated taxable income, an alternative summary measure of financial performance, provides incremental information about firm-level operating risk. Research on the information content of estimated taxable income (TI) is important because it improves our understanding of how market participants employ an alternative summary measure of firm performance and is relevant to the debate regarding the unintended consequences of conforming book income and taxable income. Prior research has identified incremental information in TI about the level of future pre-tax book income, contemporaneous stock returns, and future tax payment uncertainty (Hanlon 2005; Blaylock, Shevlin and Wilson 2012; Dyreng, Hanlon and Maydew 2014). We argue that if a measure of current firm performance is incrementally informative about future performance then variability in that measure should be related to operating risk. Our focus on risk is motivated by studies finding that about one-third of return variation can be attributed to discount rate news (Vuolteenaho 2002). In light of the important role that risk plays in determining a security's price and expected return, our understanding of the information contained in TI is strengthened by obtaining knowledge about the relationship between TI and market-based measures of risk.

We consider TI to be a useful summary measure of firm operating performance due to the different rules governing the calculation of book income (BI) and TI, as well as the different incentives faced by managers when determining each income measure. Differences in reporting rules are important for at least two reasons. First, Lev and Nissim 2004, among others, argue that TI is generally more difficult to manipulate than

BI due to the greater focus on verifiability in the rules governing the calculation of TI. Therefore, errors in accounting accruals, whether intentional or unintentional, should weaken the ability of BI more than TI to reflect the underlying riskiness of the firm's business. Thus, a priori, TI can be seen as another performance measure that can potentially provide incremental information about risk. Second, even absent errors in accounting accruals, a single performance measure is unlikely to capture all information about a firm's fundamental earnings process (Dechow, Ge and Schrand 2010). In addition, differences in incentives could also play an important role, as, ceteris paribus, managers seek to report a higher BI and a lower TI (Hanlon, Laplante and Shevlin 2005; Manzon and Plesko 2002). The ability of income measures to accurately capture economic events (which underlie operating risk) can be attenuated due to the incentives faced by managers when calculating either performance metric. Overall, we think exploring the risk-relevance of TI is particularly interesting because it is one of few summary performance measures and is based on a different reporting regime. Therefore, TI is positioned to provide incremental information that is relevant to predicting future performance as well as assessing the riskiness of a given firm.

In exploring the relationship between TI and market-based measures of risk we focus on the variability of TI, a choice we make for two reasons. First, earnings variability has historically been found to be the accounting variable most closely associated with market-based measures of firm risk (Ryan 1997).[1] This association is consistent with intertemporal earnings variability reflecting underlying firm operating risk. Consistent with this reasoning, in their examination of the risk-relevance of

1 Measuring risk as the variance or standard deviation of expected outcomes or payoffs is a standard approach in finance (e.g., Fama 1976; Cochrane 2001).

estimated fair value income for banks, Hodder, Hopkins and Whalen (2006) regress market-based measures of risk on the variability of both fair-value income and income based on generally accepted accounting principles (GAAP). Under the view that TI is a useful alternative summary measure of firm performance, one would expect the variability of TI to be associated with market-based measures of firm risk. Second, our focus on variability is grounded in a simple model of pre-tax performance predictability. We extend the Dichev and Tang (2009) model, which relates the properties of earnings and the predictability of future earnings, to a setting where there are two measures of performance – BI and TI. The model suggests that the predictability of future earnings is decreasing in the variance of TI (TI Variance). When earnings are less predictable, market-based measures of risk should be higher (Lipe 1990; Francis, LaFond, Olsson and Schipper 2004). Further, our analytical results suggest a positive association between the covariance of BI and TI (BT Covariance) and earnings predictability.[2]

To begin our empirical analysis we examine the association between our TI-based risk measures and pre-tax BI predictability, which we estimate as the negative of the square root of the residual from an earnings predictability model measured over years t+1 through t+5. The purpose of these tests is to provide some assurance that our analytical model is descriptive in our setting and to identify the mechanism linking TI-based measures to market-based measures of firm risk. We expect and find that future pre-tax BI predictability is negatively associated with TI Variance and positively associated with BT Covariance.[3] We employ the predictability of future *pre-tax* BI as the dependent

2 We measure TI Variance and BT Covariance at the firm level over the current and previous four years.

3 Similar results are obtained when we examine future pre-tax BI variability rather than predictability.

variable in our tests because we want to focus on underlying performance predictability and operating risk rather than uncertainty related specifically to future tax payments. For instance, *after-tax* BI predictability could simply reflect the riskiness of a firm's tax strategy (Guenther et al. 2016), which could affect our TI-based proxies and generate uncertainty about future after-tax BI.

If our TI-based measures are able to capture incremental information about future performance predictability, as our model predicts, then it follows that these measures should also be associated with variation in market-based measures of firm risk. Therefore, we examine the association between our TI-based measures and stock return volatility, which is intended to proxy for the market's assessment of total firm risk. Further, if some of the variation in total firm risk associated with our TI-based measures is systematic in nature, then variation in the cost of capital and beta should also be associated with our TI-based measures. However, a link between our TI-based measures and cost of capital is not obvious. TI should only be able to provide incremental information about future performance if BI measures current underlying performance with error. Thus, if errors in BI are idiosyncratic, and can therefore be diversified away by investors, then TI would lose its ability to provide information about cost of capital.[4]

Consistent with our hypotheses, we find that a firm's return volatility, beta, and cost of capital are each increasing in TI Variance and decreasing in BT Covariance. The results are economically significant, as we find that our TI-based measures together explain nearly as much variation in risk as does BI Variance. Our research design

4 Core, Guay & Verdi 2008 provide evidence that accruals quality is not priced by the market. However, there is considerable controversy regarding their findings (e.g., Shevlin (2013)).

includes a comprehensive set of controls including accruals quality, the absolute value of book-tax differences (BTDs) and other variables associated with BTDs, as well as the variance of BI. Because TI excludes some of the accruals included in BI, one can conceptualize TI as lying somewhere between operating cash flows and BI in terms of the degree to which accruals are employed.[5] This reasoning suggests that TI could provide incremental information about risk simply because it serves as a surrogate for cash flows. To address this concern we also include the variability of operating cash flows (as well as its covariate terms) as a control in our tests.

Our study adds to the risk-relevance literature, in particular the stream that examines the risk-relevance of summary accounting numbers. Beaver, Kettler and Scholes (1970) argue that our understanding of how firm risk is determined is incomplete without knowing what non-price variables impact stock prices through discount rates. Ryan (1997) and Ryan (2011) argue that summary accounting numbers play a fundamental role in risk assessment through their ability to reflect operating risk. Individual sources of operating risk, in combination with the multiplier effect of leverage, generate uncertainty about future payouts to shareholders thereby increasing market risk. Existing studies document that the variability of summary accounting numbers such as BI (Beaver et al. 1970) and cash flows (Ismail and Kim 1989) provide incremental information about firm risk. We find that TI, in addition to being value-relevant, is also incrementally risk-relevant as a performance measure. Also, ours is the first study to our knowledge to document the risk-relevance of the covariance between two summary measures of financial performance.

5 TI includes many accruals required by the tax code; see Shackelford & Shevlin 2001 and Hanlon & Heitzman 2010 for comprehensive discussions of the nature and extent of tax accruals.

Our findings complement studies, such as Goh et al. (2013), Henry (2014), and Guenther et al. (2016), which explore risk-related information contained in TI. Goh et al. find that corporate tax avoidance is associated with an increase in the cost of equity capital.[6] Goh et al. reason that a firm's cost of capital will increase when tax avoidance increases the opacity of the firm's information environment and facilitates aggressive financial reporting. Henry (2014) finds that the level of tax expense conveys discount rate news by revealing information about the firm's level of tax avoidance. Guenther et al. (2016) evaluate the consequences of risky or unsustainable tax avoidance strategies using future tax rate volatility and total stock return volatility.[7] Guenther et al. focus on whether tax avoidance is linked to firm risk due to the impact of tax avoidance on the uncertainty surrounding future tax payments. We find evidence supporting another link between the information contained in TI and firm risk by documenting evidence that TI captures information about firms' operating risk. In particular, our findings show that there is information contained in TI that is associated with measures of risk that are unlikely to be driven by uncertainty about future tax payment outcomes (e.g., the predictability and variability of future pre-tax BI). In addition, our results relating TI properties to market-based risk measures are robust to controlling for the variability of future effective tax rates. Researchers and financial professionals should be aware that sorting firms on the absolute value of BTDs[8] can also result in inadvertently sorting firms by operating risk, although in a manner that is inferior to using our TI-based measures of risk.

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6 Motivated by Goh et al. (2013) we have included proxies for "less extreme forms of tax avoidance," such as book-tax differences and long-run effective cash tax rates as controls in our main analyses.

7 One of the nine proxies for aggressive tax strategies employed by Guenther et al. is the variability of effective tax rates (ETRs). We do not employ the variability of ETRs in our study because doing so would not allow us to separate the influence of BI and TI on earnings predictability and market-based measures of firm risk. Also, we are motivated by concerns raised by Henry & Sansing (2014) about using pre-tax book income as a deflator in the ETR measure in the presence of a confounding relation between pre-tax book income and financial reporting incentives.

Research on the nature and extent of incremental information contained in TI is also relevant to the potential cost side of the analysis regarding proposals to conform BI and TI (Hanlon, LaPlante and Shevlin 2005; Hanlon, Maydew and Shevlin 2008). We add to the literature by documenting that the properties of TI are associated with the *precision* of estimates of future pre-tax book income. We note that if conformity of book and taxable incomes were mandated, something that has been proposed at various times (to constrain earnings management for instance), then between-firm variation in BT Covariance would be eliminated and TI Variance would be identical to BI variance. Thus, our evidence suggests that a previously unrecognized unintended consequence of mandating book-tax conformity could be a decrease in risk reporting quality, which is information that aids investors in assessing economic drivers and statistical properties of the variation in firms' future performance (Ryan 2011).

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Prior Research on the Information Content of Taxable Income

A growing body of research investigates the general question of whether estimated taxable income is informative about aspects of firms' earnings, other fundamental firm characteristics, and firms' tax planning and earnings management activities. This line of research is important because it provides evidence on the usefulness of TI as a supplementary measure to BI in assessing firm value and because of the debate over whether book and taxable incomes should be based on the same

8 Our univariate results show that there is a significant relation between the absolute value of BTDs and our TI-based risk measures (the correlation equals 0.224).

measurement rules. The basic premise is that two measures of performance can yield more information relevant to firm valuation than a single measure, a view consistent with Dechow et al. (2010). Dechow et al. (p. 348) argue that (i) reporting a single income number cannot yield "a representation of *X* [i.e., attributes of a firm's unobservable underlying performance] that is equally relevant in all decision models," and (ii) GAAP restricts the choice of measurement standards that firms can use to measure *X*, and it is unlikely that a single measurement standard will perfectly measure *X* for all firms.[9] Thus, it is plausible that the reason that BI and TI are incremental to each other in explaining changes in firm value (Hanlon et al. 2005) is that each is an alternative representation of the same underlying, unobservable *X*.

Several studies closely related to ours explore the relation between TI and various aspects of risk. TI has been used as a proxy for tax aggressiveness and been found to be associated with the cost of equity (Goh et al. 2013), the cost of debt (Shevlin, Urcan and Vasvari 2013), and stock price crash risk (Kim, Li and Zhang 2011). Also, the characteristics of TI have been related to firms' tax risk, which is defined by Guenther et al. (2016) as "the ability of a firm to sustain its tax positions over time." A common thread amongst the studies examining the association between TI and various aspects of firm risk is that they do not explore whether TI's role as an alternative measure of firm performance could provide a mechanism linking TI and firm risk.

Prior Research on the Risk-relevance of Accounting Information

9 Dechow et al. (2010 p. 347) conceptualize reported earnings as: *Reported Earnings* ≡ *f(X)*, where *X* is a firm's performance for a period and the "function *f* represents the accounting system that converts the unobservable *X* into observable earnings." Dechow et al. (p. 348) view *X* as similar to the primitive construct that Penman & Sougiannis (1998) describe in the context of equity valuation as reflecting "attributes within the firm, which are said to capture value-creating activities." Also see footnote 10.

Ryan (2011) surveys the literature on risk-relevance, dividing the research stream into studies examining the risk-relevance of summary accounting measures and studies examining the risk-relevance of other financial disclosures. Ryan (2011) argues that summary accounting flow measures (earnings, operating cash flows, TI) play a fundamental role in risk assessment. Research has established the risk-relevance of BI variability (Beaver et al. 1970), and that this variability is risk-relevant whether it is systematic or idiosyncratic in nature (Baginski and Wahlen 2003). More recent research documents the incremental risk-relevance of fair-value based net income (over GAAP net income) for financial institutions (Hodder et al. 2006). The Hodder et al. study demonstrates that summary income measures that include a different set of accruals – accruals to adjust to fair value-based income – can provide incremental information about risk for financial institutions. TI, because it includes accruals calculated based upon tax rules rather than GAAP, likewise could provide incremental information about risk for non-financial firms.

Sources of Variation in Taxable Income Properties

Before presenting the model from which we derive our hypotheses, we discuss differences between tax rules and GAAP to illustrate how these differences lead to differences between TI and BI and thus to differences in the variability of each income measure. BI and TI are calculated in ways that often differ due to differences in their respective primary purposes: providing information useful for decision-making and contracting, versus raising funds for the taxing authority and providing incentives to promote certain activities.[10] Differences between BI and estimated TI reflect the following: differences in tax rules and GAAP standards; features of firms' underlying fundamentals not fully reflected in either earnings measure by itself; earnings management; and tax aggressiveness. An important caveat is that there are many sources of differences between BI and TI that could be relevant to earnings predictability and risk, and thus the following discussion is not intended to be exhaustive.

First, innate firm characteristics can affect TI Variance and BT Covariance absent any earnings or tax manipulation by management. We argue that many of the innate firm characteristics associated with higher TI Variance and lower BT Covariance are also associated with less predictable future performance. For instance, special items, including restructuring charges, generally are hard to predict; moreover, they are recognized for book purposes on an accrual basis but are not deductible for tax purposes until they are realized. This causes book and taxable incomes to deviate in the year special items occur, thus decreasing BT Covariance and differentially affecting BI Variance vis-à-vis TI Variance.

Lev and Nissim (2004) explain that firms that are not in steady state (e.g., growth firms, declining firms) can experience changes in working capital items that are recognized on a cash basis for tax purposes but on an accrual basis in earnings (e.g., warranty liability, allowance for bad debts). To the extent these items vary year-by-year

10 The Internal Revenue Code governs the determination of TI and Section 446(a) states that "Taxable income shall be computed under the method of accounting on the basis of which the taxpayer regularly computes his income in keeping his books." Accounting systems under tax law and GAAP seek to generate income numbers that reflect a firm's performance, albeit for different purposes, which gives rise to differences in the reporting principles and rules for book and tax reporting. While book and taxable incomes are each a hybrid of cash- and accrual-basis accounting, TI is generally closer to cash basis; e.g., it does not permit provisions that are acceptable under GAAP. Lev & Nissim (2004, p. 1045 and pp. 1070-72) demonstrate that BI and TI are separate from operating cash flows; also see Chi, Pincus & Teoh (2014).

they can create large temporary BTDs, thus reducing the covariance between BI and TI and differentially impacting the variances of BI and TI. In general, firms with more variable warranty or bad debt expenses should have less predictable future performance due to difficulty estimating the magnitude and timing of future bad debts and warranty costs. In addition, firms experiencing accounting losses can have large differences between BI and TI due to tax loss carryback or carryforward rules applied when calculating TI. This should increase TI Variance and reduce BT Covariance, with both being associated with lower earnings predictability.

Defined benefit pension plans can also give rise to differences between BI and TI and can affect risk. TI is generally reduced by contributions to the plan, whereas BI is affected by changes in the plan's funded status, which is a function of plan liabilities, plan asset returns, contributions, and actuarial assumptions. Therefore, higher variability in the plan's funded status, if not offset by contemporaneous contributions, will result in lower BT Covariance. Moreover, this should be associated with more risk according to Haberman and Wong (1997), who state that stability in pension fund performance is preferred by the pension sponsor's shareholders.

Differing treatment of unrealized investment income for book and tax purposes also creates BTDs (Mills, Newberry and Trautman 2002). According to SFAS No. 115, unrealized gains and losses on securities held for trading purposes are recognized in BI. However, TI is generally calculated using only realized gains and losses. This generates temporary BTDs that are increasing in the magnitude of unrealized gains and losses on trading securities. Thus, when variation in the value of trading securities is high the covariance between BI and TI will be lower and the variances of book and taxable incomes will differ. Also, high volatility in the value of trading securities should be associated with less predictable future earnings.

Second, managerial intervention in financial reporting can distort the variance of BI, allowing for TI to provide incremental information about operating risk. TI typically does not include the discretionary portion of accruals that are used to manage BI (Lev and Nissim 2004). For instance, among firms that restated earnings downward due to accounting irregularities, Badertscher, Phillips, Pincus and Rego (2009) show the predominant earnings management strategy was to manage earnings upward in a book-tax nonconforming manner, thereby increasing BI without affecting current TI. Similarly, firms restating earnings upward due to irregularities generally had managed earnings downward in a book-tax nonconforming manner (Badertscher, Phillips, Pincus and Rego 2010). There is also evidence that managers distort BI in a manner to systematically offset variation in underlying performance (i.e., income smoothing), further impairing BI's ability to capture underlying performance variability. Overall, to the extent that TI is generally less subject to managerial manipulation, TI could include incremental information about variation in underlying performance. It is important to note we control for accruals quality in our tests because we are interested in whether TI can provide incremental information about operating risk, not whether TI can identify earnings management.[11] However, the properties that make TI useful in detecting earnings management (i.e., differences in incentives and measurement between BI and TI) are

11 Studies such as Phillips et al. (2003) and Hanlon (2005) compare the level of BI to the level of TI to detect earnings management. We conjecture that it could be possible (analogously to these prior studies) to compare the variance of BI and the variance of TI to detect earnings management (e.g., income smoothing). However, we leave this line of reasoning to future research as it is outside the scope of our research question.

likely the same properties that can result in TI being a performance measure that can provide incremental information about underlying firm operating risk.

Third, managerial intervention to reduce a firm's tax burden should decrease BT Covariance and increase TI Variance when recognition of TI is delayed (e.g., accelerated depreciation) or avoided altogether (e.g., R&D tax credits). Some tax sheltering practices can increase the opaqueness of the firm (Desai and Dharmapala 2006). Further, uncertainties involving the probability of IRS audits and subsequent disallowance of uncertain tax positions can increase the variability of future after-tax performance. Taken together, this reasoning suggests that aggressive tax planning can reduce BT Covariance and impact TI Variance as well. Also, aggressive tax planning could result in decreased future after-tax performance predictability. Similar to pre-tax earnings management, we are not focused on whether TI can provide information about the riskiness of the firms' tax strategies, thus we control for tax aggressiveness in our empirical analyses. Also, we use the predictability of future pre-tax BI as the dependent variable in our predictability tests, which should be unaffected by future tax payments.

Earnings Predictability Model and Hypotheses

We formalize our analysis of the relation between taxable income properties and earnings predictability by extending an autoregression of current on one-year lagged book income scaled by assets (BI), employed by Dichev and Tang (2009), by adding one-year lagged taxable income scaled by assets (TI) to the model.[12] Our model is:

$$BI_t = \alpha + \gamma BI_{t-1} + \delta TI_{t-1} + \epsilon \qquad [1]$$

A necessary condition for eq. [1] to be descriptive in our setting is that both γ and δ are positive. Therefore, we first test this empirically and report the results in Section III (Table 2).

Re-arranging eq. [1] yields:

$$\epsilon_t = -\alpha - \gamma BI_{t-1} - \delta TI_{t-1} + BI_t \qquad [2]$$

Taking the variance of both sides of eq. [2] yields:

$$Var(\epsilon_t) = Var(-\alpha - \gamma BI_{t-1} - \delta TI_{t-1} + BI_t) \qquad [3]$$

Expanding eq. [3], we have:

$$Var(\epsilon_t) = \gamma^2 Var(BI_{t-1}) + \delta^2 Var(TI_{t-1}) + Var(BI_t) + 2\gamma\delta Cov(BI_{t-1}, TI_{t-1}) - 2\delta Cov(BI_t, TI_{t-1}) - 2\gamma Cov(BI_{t-1}, BI \qquad [4]$$

Assuming stationarity in the variances and covariances yields:[13]

12 In a review paper, Hanlon & Heitzman (2010) discuss the importance of employing a tax measure that is appropriate for the setting in question. With regards to the present study, we view this issue along two dimensions: (1) how should TI be calculated? and (2) what properties of TI are important in our setting? With regard to the first issue, because we are interested in the use of TI as an alternative measure of firm performance we follow Lev & Nissim (2004) and Hanlon et al. (2005), among others, and consider the total differences between book and taxable incomes, rather than only temporary differences. Concerning the second issue, we look to a simple model of earnings predictability for instruction and consider the role of TI properties related to the precision (i.e., inverse of the variance) of investors' estimates of future performance. See eq. [6] below and eq. [9] in Section III.

$$\epsilon$$
$$1-2\gamma+\gamma$$
$$(¿¿2)Var(BI)+\delta^2 Var(TI)+2\gamma\delta\, Cov(BI,TI)-2\delta\, Cov(BI,TI)$$
$$Var(¿¿t)=¿$$
$$¿$$

[5]

After simplifying, eq. [5] becomes:

$$\epsilon$$
$$1-2\gamma+\gamma$$
$$(¿¿2)Var(BI)+\delta^2 Var(TI)+[\gamma-1]2\delta\, Cov(BI,TI)$$
$$Var(¿¿t)=¿$$
$$¿$$

[6] To examine the validity of the stationarity assumption used to derive eq. [6], we test whether there is a high auto-correlation in the variances of BI and TI as well as the covariance between TI and BI in our sample. The results of this test are also reported in Section III.

To formally derive the relation between TI Variance and earnings predictability, we assume (for simplicity) the persistence parameters are exogenous and take the derivative:

$$\frac{d(Var(\epsilon))}{d(Var(TI))}=\delta^2 \qquad [7]$$

Eq. [7] implies that an increase in the variance of taxable income should reduce the predictability of earnings by increasing $Var(\epsilon)$. This leads to the following hypothesis:

13 The stationarity assumption concerning the covariance terms does not strictly hold (for instance when taxable income has persistence not equal to 1). Therefore, the prediction regarding the covariance of book and taxable incomes identified in eq. [8] below should be interpreted only as being suggestive.

Hypothesis H1a: *The predictability of future earnings is negatively associated with the variance of taxable income.*

To derive the relation between the covariance of book and taxable incomes and earnings predictability, we take the derivative as follows:

$$\frac{d(Var(\epsilon))}{d(Cov(BI,TI))}=[\gamma-1]2\delta$$

[8]

Assuming both BI and TI have a positive estimated coefficient when future book income is the dependent variable (i.e., $\gamma>0\wedge\delta>0$) and that the coefficient on book income is less than one (i.e., $\gamma<1$), an increase in the covariance between book and taxable incomes should increase the predictability of earnings (i.e., decrease $Var(\epsilon)$). This suggests the following:

Hypothesis H1b: *The predictability of future earnings is positively associated with the covariance between taxable income and book income*.

Evidence supporting Hypotheses 1a and 1b is a necessary condition for the predictability model to be applicable in our setting. Our predictability tests also serve to refine the mechanism that links our TI-based risk proxies to market-based measures of firm risk, namely TI's ability to capture incremental information about pre-tax performance uncertainty. In the following section we move forward to our primary research question, forming hypotheses on the association between TI-based risk proxies and market-based measure of risk.

Primary Hypotheses Linking Taxable Income Properties and Firm Risk

Difficulty in predicting firm performance (e.g., future earnings, cash flows, or dividends) is a fundamental source of risk. Future earnings levels can deviate from expected levels due to idiosyncratic news (e.g., failure to obtain regulatory approval for a new drug), systematic news (e.g., changes in aggregate demand), or because of estimation risk (a failure by market participants to impute all relevant information properly). If TI is an alternative measure of firm performance that is not completely subsumed by BI or operating cash flows, then TI will contain incremental information about the underlying volatility of firm performance that should be reflected in market-based measures of firm risk. Focusing first on total risk as proxied by stock return variability, our model suggests that higher TI Variance should be associated with less predictable performance, leading to the following hypothesis:

Hypothesis H2a: *The variance of taxable income is positively associated with stock return volatility.*

Also, our model suggests that higher BT Covariance should be associated with more predictable performance, leading to the following hypothesis:

Hypothesis H2b: *The covariance between taxable income and book income is negatively associated with stock return volatility.*

Because of the uncertainty related to future firm performance, investors generally increase their required rate of return to compensate for the risk they are taking on. There is strong evidence that firm-level income variability is related to firm-level systematic risk (Beaver at al. 1970; Ryan 1997; Baginski and Wahlen 2003), presumably because a firm's financial performance includes both idiosyncratic and systematic variation. Ryan (1997) notes that variability in BI has historically been the accounting variable most strongly related to systematic risk. If TI properties provide incremental information about underlying performance variability, then they should also be associated with proxies for firms' systematic risk such as beta and cost of capital. We explore this possibility empirically by testing the following hypotheses:

Hypothesis H3a: *The variance of taxable income is positively associated with the cost of capital.*

Hypothesis H3b: *The covariance between taxable income and book income is negatively associated with the cost of capital.*

III. RESEARCH DESIGN AND EMPRICIAL RESULTS

Sample Selection

Our initial sample includes all firms on the Compustat Xpressfeed files with fiscal year-ends occurring in the years 1989-2011. Our first valid observation is in 1993 due to the requirement of four-year lagged performance data. Our last observation is in 2006 since we then require five subsequent years of future performance to obtain future predictability for the validation of our earnings predictability model.[14] We drop (a) financial institutions and utilities, due to the high degree of regulation and tax rules specific to these industries; and (b) foreign firms, due to a limited ability to estimate TI because of different rules across tax jurisdictions and different financial reporting regimes. So that BI and TI are directly comparable, we use pre-tax BI. We delete firms missing pre-tax book income or the data items necessary to calculate TI. We

14 The accounting for income taxes changed to SFAS No. 109 effective in 1993. We include observations from before 1993 for several years in our analyses because we use the most recent five years (from t-4 to t) of data to compute our variables of interest (*BI_VAR*, *TI_VAR*, and *BT_COV*). When we drop observations that include data from prior to 1993 and re-estimate all regression analyses, we obtain similar results. Specifically, for H1(a, b), the coefficients on *RTI_VAR* and *RBT_COV* are -0.0016 and 0.0021, respectively, with each coefficient being significant at the 1% level. For H2(a, b), the coefficients on *RTI_VAR* and *RBT_COV* are 0.0554 and -0.0597, respectively and they are significant at the 1% level. For H3 (a, b), the coefficients on *RTI_VAR* and *RBT_COV* are 0.0156 (p-$value<0.01$) and -0.0089 (p-$value<0.05$), respectively when the dependent variable is market beta while the coefficients on *RTI_VAR* and *RBT_COV* are 0.1771 (p-$value<0.05$) and -0.1795 (p-$value<0.01$), respectively when the dependent variable is the cost of capital.

measure the variances of TI [*TI_VAR*] and BI [*BI_VAR*] over the current and previous four years and employ the correlation between TI and BI over the same period to proxy for BT Covariance [*BT_COV*].[15] We estimate TI using Compustat variables (in parentheses) as: {[(Current federal tax expense (TXFED) + Current foreign tax expense (TXFO))/Top statutory tax rate] - ΔNet operating loss carryforwards (TLCF)}.[16] Pre-tax BI is Compustat variable (PI) and is defined as operating and non-operating income before provisions for income taxes and minority interest and before extraordinary items and discontinued operations. We deflate both pre-tax BI and TI by beginning total assets (AT) before taking the standard deviation or correlation.

We require 12 months of stock returns from CRSP to calculate annual returns. We also require that TI and pre-tax BI are available going back four years as well as for the current year to calculate our proxies for TI Variance (*TI_VAR*) and BT Covariance (*BT_COV*). We winsorize all continuous variables at the top and bottom 1% of their distributions to mitigate the effects of extreme values. This yields a sample of 22,342 firm-year observations for the validation of our earnings variability model and the market-based risk tests.

Table 1, Panel A, outlines the sample selection process. Panel B indicates our overall sample closely reflects the industry representation in the Compustat population, with slightly more (fewer) firms from durable manufacturing (from the computer and service sectors). Panel C reveals the sample is drawn roughly equally from each year in the sample period.

15 Standard deviation and correlation statistics have more well behaved distributions than variance and covariance statistics (Stone 1973; Elton et al. 2006). Therefore, we use standard deviations (for the variances of BI and TI) and correlations (for the covariance of BI and TI) throughout to improve the interpretability of our results.

16 If current federal or current foreign tax expense is missing, we estimate total current tax expense by using the difference between total income tax expense (TXT) and deferred tax expense (TXDI).

Validation of the Earnings Predictability Model

Our first two hypotheses, **H1a** and **H1b**, are derived directly from the model in the "Earnings Predictability Model and Hypotheses" section. We make two key assumptions that are necessary conditions for these hypotheses to apply in our setting, both of which are empirically testable. In eq. [1], we assume the coefficients on BI and TI are positive, and to derive eq. [6], which forms the basis for these hypotheses, we assume stationarity in variances and covariances.

We first provide evidence on whether our assumption of positive coefficients holds in Table 2. We find that both BI and TI have positive and significant coefficients in a regression where future book income is the dependent variable. For example, for one-year-ahead earnings (BI) the coefficients on lagged BI and lagged TI in column (3) are $\gamma = 0.6664$ and $\delta = 0.0594$, respectively, and significant (*p-values* < 0.01). In addition, untabulated results indicate that our assumption that the coefficient on lagged BI is significantly less than one also holds.

We test the reasonableness of our stationarity assumption by examining the auto-correlation of our variance and covariance terms; *BI_VAR*, *TI_VAR* and *BT_COV*. To do so, we regress each variance or covariance term as measured over years t+1 to t+5 on the same term as measured over years t-4 to t. In untabulated results we find that the auto-regressive coefficient on *BI_VAR* is positive (0.8803) and significant (p-value < .01), the coefficient on *TI_VAR* is positive (0.8782) and significant (p-value < .01) and the coefficient on BT_COV is positive (0.7197) and significant (p-value < .01). We think these results suggest that the stationarity assumption is reasonable in light of the fact that the stationarity assumption only serves to consolidate the number of variance and covariance terms employed in our empirical tests.

To further validate our earnings predictability model, we examine whether future earnings predictability is associated with past TI Variance and BT Covariance. We focus on this inter-temporal relation because it is the key motivation for our tests examining investors' assessment of firm risk. We employ the following model, which is an extension of eq. [6] with the exception that future earnings predictability is the dependent variable:

$$PRED_{it+5} = \beta_0 + \beta_1 RBI_{VARit} + \beta_2 RTI_{VARit} + \beta_3 RBT_{COV\,it} + \varepsilon \qquad [9]$$

where *PRED* is the negative of the standard deviation of the residuals from eq. [1] estimated using future rolling five-year windows for years t+1 to t+5; thus, less negative values of *PRED* imply more predictable earnings.[17] Other variables in eq. [9] are as defined above.

Table 3 presents descriptive statistics for variables in eq. [9]. *PRED* has a mean (median) value of -0.054 (-0.035) and a standard deviation of 0.057. *BT_COV* is positive with a mean (median) correlation of 0.632 (0.819), which is consistent with the principle of BI and TI sharing a common source (fundamental earnings). The mean (median) of *TI_VAR* is 0.106 (0.051), while that of *BI_VAR* is 0.089 (0.058).[18]

To aid comparison across our multivariate analyses, we employ ranks of our key variables of interest to reduce the effect of outliers and because of the possibility of

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17 We use the negative of the square root of Var(ϵ_t) as the dependent variable, thereby adapting the predictability variable in Lipe (1990) to our earnings predictability model. Also see the second issue discussed in footnote 11.

18 Untabulated results indicate that both the difference in means and the difference in medians are statistically significant at the 1% level.

nonlinearity in the relation between dependent variables and our variables of interest.[19] We rank *BI_VAR*, *TI_VAR*, and *BT_COV* into quintiles and denote ranks by the prefix "*R*." Table 3, Panel B provides correlation results for the variables used in the validation of our earnings predictability model. As expected, *PRED* is negatively correlated with both *RBI_VAR* and *RTI_VAR*, with Pearson (Spearman) correlations of -0.343 (-0.376) and -0.283 (-0.307), respectively, and *PRED* is positively correlated with *RBT_COV*, with a correlation of 0.021 (0.011). Also, *RBI_VAR* and *RTI_VAR* are positively correlated (0.627), and each is correlated with *RBT_COV* (0.153 and 0.175, respectively).

Table 4, Panel A presents coefficient estimates from a regression based on eq. [9] that includes industry and year fixed effects and standard errors clustered by firm and year (Petersen 2009). We observe significant effects in the predicted direction when considering our variables of interest (*TI_VAR* and *BT_COV*) in a separate regression in column (3) and when all key variables (*BI_VAR*, *TI_VAR*, and *BT_COV*) are in the model. Focusing on the results for the full model in column (4), the coefficient on *BI_VAR* is negative and significant ($\beta_1 = -0.0111$, *p-value* < 0.01), consistent with our expectation that higher current BI variance is associated with lower future predictability of book income. The coefficient on *TI_VAR* also is negative and significant ($\beta_2 = -0.0049$, *p-value* < 0.01). This result is consistent with **H1a** where we predict that future predictability of book income should be decreasing in the variance of TI. In addition, the coefficient on *BT_COV* is positive ($\beta_3 = 0.0034$, *p-value* < 0.01), consistent with **H1b**. These

19 Using continuous measures instead of ranks yields qualitatively similar results. Specifically, for H1(a, b), the coefficients on *TI_VAR* and *BT_COV* are -0.0193 (*p-value*<*0.01*) and 0.0023 (*p-value*<*0.05*). For H2(a, b), the coefficients on *TI_VAR* and *BT_COV* are 0.4704 and -0.1309, respectively and they are significant at the 1% level. For H3(a, b), the coefficients on *TI_VAR* and *BT_COV* are 0.1111 (*p-value*<*0.01*) and -0.0179 (*p-value*<*0.10*), respectively when the dependent variable is market beta while the coefficients on *TI_VAR* and *BT_COV* are 1.6382 (*p-value*<*0.05*) and -0.4059 (*p-value*<*0.05*), respectively when the dependent variable is the cost of capital.

results provide evidence that TI properties provide incremental information about future predictability of book income beyond the current variances of BI.

In Table 4, Panel B we include the variance of operating cash flows in the model to ensure that taxable income-based risk proxies do not act merely as an instrument for cash flows. We also include the control variables from Kothari, Li and Short (2009) as well as adding market-based measures of firm risk and performance[20] that previous studies show are associated with variation in risk, and presumably future BI variability. Controls include the following: the rank of *CFOVAR*, the standard deviation of pre-tax operating cash flows calculated for years t-4 through t; *lnBTM*, the log of book value of equity divided by market value of equity at the end of year t; *lnMVE*, the log of market value of equity at the end of year t; *LEV*, long-term debt deflated by total assets; *TURN*, average daily share turnover; *SKEW*, skewness of daily stock returns; and *RET*, annual stock return calculated using compounded returns from the CRSP Monthly Stock File. We also include as an additional control the rank of *ABSBTD*, the absolute value of book-tax differences. Our inclusion of *ABSBTD* is motivated by numerous studies that examine the impact of large positive and negative BTDs as well as the absolute value of BTDs, which are correlated with our TI properties (see Table 3, Panel B). Focusing on the results for the full model in column (4) of Table 4, Panel B, the coefficient on *TI_VAR* is negative and significant ($\beta_2 = -0.0022$, $p\text{-value} < 0.01$) consistent with **H1a**. In addition, the coefficient on *BT_COV* is positive ($\beta_3 = 0.0020$, $p\text{-value} < 0.01$), consistent with **H1b**. These results provide evidence that TI properties provide incremental information

20 We add share turnover, return skewness, and annual stock return as additional controls. Including only the control variables from Kothari et al. (2009), without adding market-based measures of firm risk and performance, does not change our inferences. Specifically, the coefficients on *RTI_VAR* and *RBT_COV* are 0.2166 ($p\text{-value}<0.05$) and -0.2708 ($p\text{-value}<0.01$).

about future predictability beyond the variance of BI even when controlling for the variance of cash flows and other observable firm characteristics associated with risk. Overall, the results in Table 4 support the notion that TI-based risk proxies can provide additional information about future earnings predictability.

To gauge the economic significance of the results we consider the coefficients reported in the last column of Table 4, Panel B and assume that *BI_VAR*, *TI_VAR*, and *BT_COV* change from their respective lowest to highest quintiles. When *BI_VAR* changes there is a 0.0264 (0.0066*4) decrease in *PRED*, equivalent to 48.89% (0.0264/|0.054|) of *PRED*'s mean of |0.054| in Table 3. For an equivalent change in *TI_VAR* there is a decrease in *PRED* equal to 16.30% of its mean. For an equivalent change in *BT_COV*, *PRED* increases by 14.82% of its mean.

In untabulated tests we replace *PRED* with the variability of future pre-tax book income (*FBI_VAR*), estimated using rolling five-year windows for years t+1 to t+5, as the dependent variable in eq. [9]. In tests similar to those presented in Table 4, Panels A and B, *TI_VAR* is positively and significantly related to *FBI_VAR* while *BT_COV* is negatively and significantly related to *FBI_VAR*. The results imply that our TI-based measures are associated with future pre-tax performance variability as well as future pre-tax performance predictability.

Taxable Income Properties and Volatility of Stock Returns

Our primary hypotheses focus on the links between TI properties and firm risk. In **H2a** we predict that the volatility of stock returns will be increasing in the variance of TI, and in **H2b** we predict that the volatility of stock returns will be decreasing in the covariance between BI and TI. To test these predictions we regress future stock return volatility on *BI_VAR*, *TI_VAR*, and *BT_COV*. As previously noted, we also include all of the control variables from Kothari et al. 2009 as well as adding market-based measures of firm risk and performance and the variance of operating cash flows. The regression is specified as follows:

$$FSTDRET_{t+1} = \beta_0 + \beta_1 BI_{VARit-4,it} + \beta_2 TI_{VARit-4,it} + \beta_3 BT_{COV\,it-4,it} + \beta_4 CFOVAR_{it-4,it} + \beta_5 lnBTM_{it} + \beta_6 lnMVE_{it} + \beta_7 LE$$

[10]

In eq. [10], *FSTDRET* is the standard deviation of returns for the 250 trading days beginning three months after the end of year t. All other variables are defined as before. We continue to employ the quintile ranks of our key variables of interest.

Table 3, Panel A also presents descriptive statistics for the variables used in our estimation of eq. [10]. The dependent variable *FSTDRET* has a mean (median) of 3.253 (2.784), which is somewhat higher than the mean (median) 2.7 (2.3) reported by Kothari et al. (2009). The average firm in the sample experienced positive returns during the sample period with a mean (median) *RET* of 21.6% (9.7%).[21] Table 3, Panel B reveals that *FSTDRET* is positively correlated with *BI_VAR* with a Pearson (Spearman) correlation of 0.325 (0.366). Consistent with H2a, *FSTDRET* is positively correlated with *TI_VAR* with a Pearson (Spearman) correlation of 0.289 and (0.320). On the other hand, unsupportive of H2b we find that *FSTDRET* is insignificantly negatively correlated with *BT_COV*.

21 We require firms to have ten (five) consecutive years of pre-tax book income (estimated taxable income). Before imposing these requirements our sample mean and median annual returns are similar to prior studies.

Table 5 presents coefficient estimates from a regression based on eq. [10] that includes industry and year fixed effects and standard errors clustered by firm and year. Across all model specifications we find that the volatility of stock returns is decreasing in *lnBTM* and firm size (*lnMVE*). Consistent with the finding in Kothari et al. 2009, we find no significant relationship between stock return volatility and leverage. We also find that the volatility of stock returns is increasing in *TURN*, *SKEW*, absolute value of BTDs[22], and variance of operating cash flows.

We observe significant effects in the predicted direction for all of our variables of interest when considering those variables (*TI_VAR* and *BT_COV*) in a separate regression and when all key variables (*BI_VAR*, *TI_VAR*, and *BT_COV*) are in the model. Focusing on the results for the full model in column (4), the coefficient on *BI_VAR* is positive and significant ($\beta_1 = 0.1337$, $p\text{-value} < 0.01$), consistent with our expectation that higher BI variance is associated with greater stock return volatility. The coefficient on *TI_VAR* is also positive and significant ($\beta_2 = 0.0765$, $p\text{-value} < 0.01$). This result is consistent with **H2a,** which predicts the volatility of stock returns should be increasing in the variance of TI. In addition, the coefficient on *BT_COV* is negative and significant ($\beta_3 = -0.0661$, $p\text{-value} < 0.01$), consistent with **H2b**. The results provide evidence that TI properties provide incremental information about total firm risk beyond the variances of BI and operating cash flows, the absolute value of BTDs, and a set of other control variables.

22 In untabulated tests we find that our results continue to be significant and in the predicted direction when we control for the five-year average cash ETR instead of absolute value of BTDs. Specifically, for H1(a, b), the coefficients on *TI_VAR* and *BT_COV* are -0.0016 ($p\text{-value}<0.01$) and 0.0014 ($p\text{-value}<0.01$). For H2(a, b), the coefficients on *TI_VAR* and *BT_COV* are 0.0883 ($p\text{-value}<0.01$) and -0.0107 ($p\text{-value}<0.1$), respectively. For H3(a, b), the coefficients on *TI_VAR* and *BT_COV* are 0.0186 ($p\text{-value}<0.01$) and -0.0062 ($p\text{-value}<0.05$), respectively when the dependent variable is market beta while the coefficients on *TI_VAR* and *BT_COV* are 0.2220 ($p\text{-value}<0.01$) and -0.1426 ($p\text{-value}<0.05$), respectively when the dependent variable is the cost of capital.

To gauge the economic significance for the total firm risk analysis, we consider the coefficients in the last columns of Tables 5 and again assume that *BI_VAR*, *TI_VAR*, and *BT_COV* each change from their lowest to highest quintiles. When *BI_VAR* changes, *FSTDRET* increases by 16.44% of its mean (4×0.1337/3.253); when *TI_VAR* changes, *FSTDRET* increases by 9.41% of its mean; and when *BT_COV* changes, *FSTDRET* decreases by 8.13% of its mean.

Taxable Income Properties, Beta and Cost of Capital

H3a predicts that beta and cost of capital will be increasing in the variance of TI and **H3b** predicts that beta and cost of capital will be decreasing in the covariance between book and taxable incomes. To test these predictions we regress beta and cost of capital on TI-based risk measures, the variance of BI, and all of the control variables we include in eq. [10]. The regression is specified as follows:

$$FBETA_{t+1}\text{¿}FCOC_{t+1}=\beta_0+\beta_1 BI_{VARit-4,it}+\beta_2 TI_{VARit-4,it}+\beta_3 BT_{COVit-4,it}+\beta_4 CFOVAR_{it-4,it}+\beta_5 lnBTM_{it}+\beta_6 \ln MVE$$

[11]

In eq. [11], *BI_VAR*, *TI_VAR*, *BT_COV*, *RET*, and other control variables are defined as before, and we include industry and year fixed effects and standard errors clustered by firm and year. Our proxies for systematic risk, beta and cost of capital, which alternatively serve as the dependent variable in eq. [11], are *FBETA* and *FCOC*. We estimate next year's market beta [*FBETA*] over the 250 trading days beginning three months after fiscal year-end. Per Table 3, Panel A, the mean (median) of *FBETA* is 0.920 (0.931), indicating that firms in our sample have somewhat lower systematic risk than firms in the population of publicly traded entities. *FCOC* is measured in a manner similar to that in Kothari et al. 2009. That is, we estimate the following model based on the 250 trading days (subscript d) beginning three months after fiscal year-end:

$$RET_{itd} = \alpha_{it} + bmkt_{it} MKT_{td} + bsmb_{it} SMB_{td} + bhml_{it} HML_{td} + \epsilon_{itd} \quad [12]$$

We transform a firm's factor loadings into a cost of capital measure by multiplying the estimated coefficients *bmkt*, *bsmb*, and *bhml* by the average returns to the factor mimicking portfolios during the 250 trading days beginning three months after fiscal year-end.[23] The mean (median) *FCOC* is 10.93% (10.13%), which is somewhat lower than in the Kothari et al. study, where the mean (median) was 15% (14%).[24] We continue to employ the quintile ranks of our key variables of interest in the regression based on eq. [11].

Table 3, Panel B provides the Pearson (Spearman) correlations for variables used in the systematic risk tests. Of note is the high correlation, 0.767 (0.745), between *FBETA* and *FCOC*. This suggests that much of the variation in firms' cost of capital is driven by firms' market return sensitivity loading, rather than the value and size factors. The correlations between *FBETA* and *TI_VAR* are positive and significant while the correlations between *FBETA* and *BT_COV* are negative but insignificant. The correlations between *FCOC* and *TI_VAR* are positive and significant and the correlations between *FCOC* and *BT_COV* are negative and significant.

Table 6 presents coefficient estimates based on eq. [11] when *FBETA* is employed as the dependent variable and also when using *FCOC* as the dependent variable. The

23 See the Appendix for additional details on the calculation of *FCOC*.

24 This is consistent with our sample including firms that are somewhat less risky than average, which potentially is due to our forward-looking data requirements of at least five years of data for a firm to be included. Requiring at least five years of data is similar, for example, to studies that estimate accruals quality using the Dechow & Dichev 2002 model (e.g., Francis et al. 2005).

results for our variables of interest are highly consistent across the two risk proxies, both when our variables of interest (*TI_VAR* and *BT_COV*) are considered in a separate regression and when all key variables (*BI_VAR*, *TI_VAR*, and *BT_COV*) are considered together. Focusing on the full model results (Column 4) for *FBETA* in Table 6, the coefficient on *BI_VAR* is positive ($\beta_1 = 0.0341$) and significant (*p-value* < 0.01), consistent with our expectation that higher BI variance is associated with a higher beta. The results for *TI_VAR* indicate that the coefficient is also positive ($\beta_2 = 0.0193$) and significant (*p-value* < 0.01). This result is consistent with **H3a** where we predict that beta should be increasing in the variance of TI. In addition, the coefficient on *BT_COV* is negative ($\beta_3 = -0.0130$) and significant (*p-value* < 0.01). This result is consistent with **H3b**, which predicts the covariance of BI and TI is negatively related to beta. Also, note that the results are incremental to the inclusion of the variance in operating cash flows. The results using *FCOC* in Table 6 are qualitatively identical except that the coefficient on *TI_VAR* is significant at the 0.05 level in the full model. Finally, we find that (i) the TI-based risk measures are always incrementally significant beyond *ABSBTD*, and (ii) when all the variables are in the risk models, the TI properties are always significant whereas the coefficient on *ABSBTD* is not significant. This suggests that our TI-based risk measures gauge firm riskiness in a manner incremental to common risk proxies as well as the variance of cash flows and the magnitude of BTDs.[25]

25 In untabulated tests, we also include the covariance between cash flows and book income. The coefficients on *BI_VAR*, *TI_VAR*, and *BT_COV* remain significant and of similar magnitude to those reported. Specifically, for H1(a, b), the coefficients on *RTI_VAR* and *RBT_COV* are -0.0022 (*p-value*<0.01) and 0.0019 (*p-value*<0.01). For H2(a, b), the coefficients on *RTI_VAR* and *RBT_COV* are 0.0774 and -0.0639, respectively and they are significant at the 1% level. For H2(a, b), the coefficients on *RTI_VAR* and *RBT_COV* are 0.0191 (*p-value*<0.01) and -0.0138 (*p-value*<0.01), respectively when the dependent variable is market beta while the coefficients on *RTI_VAR* and *RBT_COV* are 0.2043 (*p-value*<0.05) and -0.3003 (*p-value*<0.01), respectively when the dependent variable is the cost of capital.

We gauge the economic significance of the effects on the cost of capital by considering the coefficients reported in the respective column (4) of Table 6, again assuming that *BI_VAR*, *TI_VAR*, and *BT_COV* change from their lowest quintile to highest quintiles. When *BI_VAR* changes, *FBETA* and *FCOC* increase, respectively, by 14.83% of mean *FBETA* (0.1364/0.920) and 17.36% of mean *FCOC* (1.90%/10.93%). When *TI_VAR* changes, *FBETA* and *FCOC* increase, respectively, by 0.077 or 8.39% of mean *FBETA*, and 0.85% or 7.74% of mean *FCOC*. When *BT_COV* changes, *FBETA* and *FCOC* decrease, respectively, by 0.052 or 5.65% of mean *FBETA*, and 1.07% or 9.76% of mean *FCOC*.

Robustness Checks and Additional Analysis

In this section we report on robustness tests and additional analyses. In the first robustness test, we replace our accounting-based earnings predictability measure with a market-based measure of earnings predictability to test our first two hypotheses, **H1a** and **H1b**. We employ a FERC approach (Collins, Kothari, Shanken and Sloan 1994; Lundholm and Myers 2002) that is designed to capture the extent to which current stock returns reflect future earnings, and is specified as follows:

$$RET_{it} = \beta_0 + \beta_1 LEARN_{it-1} + \beta_2 EARN_{it} + \beta_3 FEARN_{it3} + \beta_4 FRET_{it3} + \varepsilon_{it} \qquad [13]$$

where *RET*, is calculated using monthly stock returns compounded over the fiscal year. *FEARN* is the sum of the future three years' pre-tax earnings scaled by total assets. A more positive coefficient on *FEARN* (β_3) indicates that investors are better able to price future earnings into current stock prices. We also include the lagged value of earnings [*LEARN*], which is intended to control for the effect of recent financial performance on stock returns, and future years' stock returns [*FRET*], which is included to control for measurement error from earnings-related news occurring after year t. In addition, we allow the coefficient on *FEARN* to vary, by interacting it with TI Variance and with BT Covariance. Table 7 presents the results. The coefficient on *FEARN* * *RTI_VAR* is negative and significant, supporting **H1a**. Further, the coefficient on *FEARN* * *RBT_COV* is positive and significant, consistent with **H1b**.

Second, we check the robustness of our main analyses, the tests of **H2(a, b)** and **H3(a, b)** regarding the risk-relevance of TI, to controlling for accruals quality. Prior research documents a relation between accruals quality, *AQ* (Dechow and Dichev 2002), and risk (e.g., beta and cost of capital), so we augment eq. [10], which has *FSTDRET* as the dependent variable, and eq. [11], which alternately uses *FBETA* or *FCOC* as the dependent variable, with *AQ* as an additional control variable. We estimate *AQ* over the same five-year periods as our key variables and similarly use ranks. Table 8 reports the full model results for each risk variable.[26] In the *FSTDRET* analysis, the coefficient on *AQ* is positive and significant, and the results for the test variables, *TI_VAR* and *BT_COV*, as well as on *BI_VAR*, are consistent with the results in Table 5. The results for estimating eq. [11] alternatively using the two systematic risk proxies indicate that when *FBETA* (*FCOC*) is the dependent variable, the coefficient on *AQ* is insignificant in the full model while the coefficients on each of our key variables continue to be significant in the expected direction, consistent with the results in Tables 6. In untabulated results we also examine whether the results of testing **H1**, where PRED is the dependent variable, are sensitive to the inclusion of *AQ* as a control variable. In a regression similar to that presented in column 4 of Table 1, Panel B, but with AQ added as a control, we find that

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26 The sample falls to 21,042 observations that have the data necessary to compute *AQ*.

the coefficient on *TI_VAR* is negative (β_3= *-0.0022)* and significant (*p-value* < *0.01*) while the coefficient on BT_COV is positive (β_3= *0.0018)* and significant (*p-value* < *0.01*). Thus, our findings related to earnings predictability are also robust to the inclusion of an accruals quality control variable.

In a third robustness test, we incorporate the findings of Guenther (2011). He investigates causes of the association between large BTDs and BI persistence found in Hanlon (2005), documenting evidence that firm age, large transitory items, large accruals, and high levels of pre-tax return-on-assets drive the relationship. We perform several tests to determine whether our firm risk results are robust to the inclusion of control variables for firm age (*AGE*), pre-tax return-on-assets (*ROA*), the mean of transitory items for the current and previous four years (*TRANSMEAN*), and the mean of accruals for the current and previous four years (*ACCMEAN*). We also control for the magnitude of BTDs (*ABSBTD*). Untabulated results indicate the continued significance on our variables of interest in the regression analyses.

In a fourth robustness test, we include several additional control variables. We include the covariance between cash flows and BI because TI could act as an instrument for operating cash flows, leading to the possibility that our *BT_COV* measure could actually be capturing the covariance between BI and cash flows. We include the bid/ask spread to address the possibility that the association between our TI-based risk proxies and market-based risk could be explained by an information asymmetry mechanism rather than an operating risk mechanism. We control for the level of foreign pre-tax BI, as we are more likely to miss-estimate TI when foreign pre-tax BI is high due to varying international tax rates. We add operating cycle and operating leverage, which should both be related to differences between BI and TI. None of these additional control variables alter our findings (untabulated) as the coefficients on *BI_VAR*, *TI_VAR*, and *BT_COV* in Tables 5 and 6 remain significant and of similar magnitude to those reported.

In a fifth robustness test, we replace future BI predictability (*PRED*), the dependent variable in eq. [9], with the predictability of pre-tax operating cash flows (*FCF_PRED*). One concern with our tests based on eq. [9] is that earnings management could simultaneously impact our TI-based risk proxies and the predictability of future BI through accruals. By using a summary accounting measure that excludes the effect of accruals (i.e., operating cash flows) we remove much of the effect of managers' discretionary reporting choices on the dependent variable in eq. [9]. This test, therefore, provides additional evidence that our TI-based risk measures are providing information about underlying firm risk that is manifested in future cash flow predictability. When we replace *PRED* with *FCF_ PRED* in eq. [9] we find (untabulated) that the coefficients on *BI_VAR*, *TI_VAR*, and *BT_COV* remain significant and of similar magnitude to those of the full model results presented on Table 4.

In a final robustness test, we examine whether our results are sensitive to the exclusion of pre-tax loss firms. It is difficult to accurately measure taxable income at loss firms due to various issues, the most important being measurement error in TI due to changes in the tax loss valuation allowance. We form a sub-sample of firms where pre-tax loss firms are excluded, dropping our sample size from 22,342 to 14,199 firm-year observations. In this profitable sub-sample, we find results that are broadly consistent with our full-sample results. In tests of H1(a, b) as well as H2(a, b) we find that the coefficients on both *TI_VAR* and *BT_COV* are all significant at the 1% level in our full model results (untabulated). In tests of H3(a, b) we find that the coefficients on *TI_VAR* and *BT_COV* are significant at the 5% level in our full model results when Beta is the dependent variable (untabulated). However, in tests of H3(a, b) when Cost of Capital is the dependent variable, we find that only *BT_COV* is significant at the 5% level, whereas the coefficient on *TI_VAR* is insignificant.

In an additional analysis, we explore whether our results are altered by the difficulty in estimating taxable income. To do so, we split our sample into domestic and multi-national firms. We identify multi-national firms as those firms with non-zero foreign pre-tax income. Multi-national firms face very different tax rates, tax incentive and tax reporting environments that could attenuate the relationship between tax-related information and firm risk. Therefore, we predict that the association between our variables *BI_VAR* and *BT_COV* and market-based measures of firm risk will be weaker in a sub-sample of multi-national firms as compared to domestic firms. In untabulated tests we find evidence broadly consistent with our conjecture.[27]

IV. CONCLUSION

In this study we add to a growing body of research that investigates the general question of whether taxable income (TI) is a useful supplementary measure to book income (BI) in assessing firm value. We begin by adapting a simple autoregressive earnings model where future pre-tax book income is a function of current BI, current TI, and an error term. Our analytical model indicates that the variance of TI and the

27 Specifically, for tests of H2(a, b) and H3(a, b) in the domestic firm sub-sample, the coefficients on *RTI_VAR* and *RBT_COV* significant at the 1% level and in the predicted sign across each of the three market-based measures of risk. However, in tests of H2(a, b) and H3(a, b) in the multi-national sub-sample we find generally insignificant results, with only one exception being the coefficient on *RBT_COV*, which is significant at the 10% level when the dependent variable is the cost of capital.

covariance between TI and BI should be risk-relevant through their ability to provide information about BI predictability. Our empirical findings support our analytical results as the TI-based measures we identify appear to provide incremental information about future BI predictability. While the predictability of firm performance is a key aspect of risk, the primary focus of our research is an examination of whether TI properties are associated with market-based measures of risk. We find predictable variation in stock return volatility, beta, and cost of capital related to the properties of TI. These results are incremental to the variance of BI and the variance of operating cash flows, and to other firm characteristics generally thought to be linked to firm risk. Overall, the results support our prediction that the properties of TI can capture uncertainty about future performance by providing a useful alternative summary of financial performance variability.

Our results are economically significant, though the economic significance estimates of the TI-based risk measures individually tend to be of smaller magnitude than those for BI variability. This is not surprising, as we must estimate TI based on firms' financial report disclosures rather than based on their tax returns, which are not publicly available. Hence, relative to BI, TI likely reflects greater measurement error (e.g., Hanlon et al. 2005). Moreover, TI may not be as good a measure of performance as BI because it typically reflects less accrual accounting, although both BI and TI should be incrementally informative relative to current operating cash flows (consistent with Dechow 1994).

Our analyses consider between-firm variation in TI properties to be a function of firms' characteristics rather than changes in GAAP or tax rules. We note that if it were mandated that BI and TI must conform, between-firm variation in BT Covariance would be eliminated and TI Variance would be identical to BI variance. Hence, our results suggest that an unintended consequence of possible book-tax conformity could be a decrease in risk-relevant information.

A primary contribution of our study is to provide evidence on a new mechanism that links TI characteristics to market-based measure of firm risk. Our evidence is consistent with TI-based risk proxies capturing information about underlying operating risk, a separate mechanism from the previously documented ability of TI to capture information about earnings management or tax avoidance activities. This conclusion is based on our future income predictability tests which employ measures of future financial performance that should be relatively unaffected by earnings management (pre-tax cash flows) or tax planning (pre-tax book income and pre-tax cash flows). This leads us to conclude that the underlying mechanism is the ability of TI-based risk measures to capture information about innate riskiness not fully captured by BI or cash flows.

We leave for future research an investigation of the relative importance of specific book-tax-difference (BTD) categories in capturing information germane to risk assessment. Given the complexity of tax reporting and the information processing costs involved, it would be interesting to examine whether the source of BTDs matters. Future research might employ hand-collected data from the tax footnotes to determine precisely which permanent or temporary differences between book and taxable income generate the associations we document. Another seemingly fruitful avenue for future research is to explore the usefulness of TI-based risk measures in assessing risk in bond markets. Also, an exploration of when TI-based risk measures yield more incremental information about firm risk (similar to studies such as Ayers, Jiang and Laplante (2009) and Chen, Dhaliwal and Trombley (2012) examining cross-sectional variation in the information contained in TI about future BI levels) could contribute to our understanding of how sophisticated investors are in employing information contained in TI about risk. Finally, future research could examine whether comparing the variability of BI to that of TI could reveal information about manager’s discretionary smoothing activities.

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Appendix

Variable Definitions

PRED: The negative of the square root of residuals from eq. [1]: $BI_{it+1} = \beta_0 + \beta_1 BI_{it} + \beta_2 TI_{it} + \varepsilon_{it+1}$, using firm-specific maximum likelihood estimation and rolling five-year windows for years t+1 to t+5. That is, *PRED* = $-\sqrt{\sigma^2(\hat{\varepsilon}_i)}$. Large values of *PRED* imply more predictable earnings. BI is operating and non-operating income before provisions for income taxes and minority interest and before extraordinary items and discontinued operations deflated by total assets (BI_{it} = Compustat data item PI_{it}/AT_{it-1}),

BI_VAR: Standard deviation of pre-tax income deflated by total assets (PI_{it}/AT_{it-1}) calculated for years t-4 to t (Compustat),

TI_VAR: Standard deviation of estimated taxable income deflated by total assets (TI_{it}/AT_{it-1}) calculated for years t-4 through t. Taxable income (TI) = {[(current federal tax expense (TXFED) + current foreign tax expense (TXFO))/Top statutory tax rate] - ΔNet Operating Loss Carryforwards (TLCF)}. If either current federal tax expense or current foreign tax expense is missing, we estimate total current tax expense as the difference between total income tax expense (TXT) and deferred tax expense (TXDI) (Compustat),

BT_COV: Correlation between pre-tax book and taxable incomes calculated for years t-4 through t,

RBI_VAR: Quintile ranks of *BI_VAR*,

RTI_VAR: Quintile ranks of *TI_VAR*,

RBT_COV: Quintile ranks of *BT_COV*.

FBETA: Coefficient loading on the market excess return for the 250 trading day period beginning three months after fiscal year end (Fama French factors),

FCOC: Expected annual cost of capital calculated based on the 250 trading day period beginning three months after fiscal year ending. We employ the Fama and French (1993; 1996) three-factor model, where the size factor [*bsmb*] is the firm's sensitivity to the small minus large firm size factor mimicking portfolio return, the value factor [*bhml*] is the firm's sensitivity to the high minus low book-to-market factor mimicking portfolio return, and the market factor [*bmkt*] is the firm's sensitivity to the excess return on the CRSP value-weighted portfolio (R_m - R_f). We obtain daily returns on the three-factor mimicking portfolios from the Fama and French dataset on WRDS. The loadings (*bmkt*, *bsmb*, and *bhml*) on the factors are the slope coefficients estimated at the firm level by running the regression by firm (subscript i) and year (subscript t).

FSTDRET: Standard deviation of daily stock returns for the 250 trading day period beginning 3 months after fiscal year ending (CRSP),

CFOVAR: Standard deviation of pre-tax operating cash flows ((OANCF+TXPD-XIDOC)/AT_{t-1}) calculated for years t-4 through t (Compustat),

RCFOVAR: Quintile ranks of *CFOVAR*,

BTM: Book value of equity (CEQ) divided by the market value of equity (PRCC_F*CSHO) (Compustat),

lnMVE: Log of the market value of equity (PRCC_F*CSHO) (Compustat),

LEV: Book value of long-term debt (DLTT) divided by total assets (AT) (Compustat),

TURN: Average daily share turnover (expressed as a percentage) for the 250 trading day period ending three months after fiscal year ending (CRSP),

SKEW: Skewness of daily stock returns for the 250 trading day period ending three months after fiscal year ending (CRSP),

RET: Ex-dividend stock return during fiscal year t (CRSP),

ABSBTD: Absolute value of book-tax differences,

RABSBTD: Quintile ranks of *ABSBTD*,

BI: Pre-tax income (PI_t /AT_{t-1}) (Compustat),

BI_{t-1}: Pre-tax income at year t-1 (Compustat),

TI_{t-1}: Taxable income (TI_{t-1}/AT_{t-2}) at year t-1, *LEARN*: Pre-tax earnings deflated by lagged total assets for year t-1 (Compustat),

EARN: Pre-tax earnings for year t deflated by lagged total assets (PI_t/AT_{t-1}) (Compustat),

FEARN: Future EARN. The sum of pre-tax earnings for years t+1 to t+3 deflated by lagged total assets (Compustat),

FRET: Aggregate stock return for years t+1 to t+3 (CRSP),

RAQ: Quintile ranks of accruals quality, the standard deviation of firm i's residuals for years t-4 to t from annual cross-sectional estimations of the modified Dechow and Dichev (2002) model with pre-tax current accruals and cash flow from operations (Compustat),

Table 1

Sample Selection

Panel A: Sample Construction

Number of firm-year observations in Compustat Xpressfeed (1989-2011)			140,935
Less:	Financial institutions/Utilities	(33,098)	
	Non-US firms	(12,753)	
	Missing Pre-tax income (BI) and Taxable income (TI)	(12,185)	
	Missing BI_VAR, TI_VAR, BT_COV	(39,223)	
	Missing PRED	(19,807)	
	Missing FSTDRET, FBETA, FCOC	(682)	
	Missing CFVAR, lnBTM, lnMVE, LEV, TURN, SKEW, RET	(845)	(118,593)
Final Sample			22,342

Panel B: Industry Concentration (Barth, Beaver and Landsman 1998)

	Sample		Compustat	
Industry	Number	Percent	Number	Percent

Mining and Construction	549	2.46%	2,177	2.29%
Food	761	3.41%	2,447	2.57%
Textiles, Printing, and Publishing	1,617	7.24%	5,297	5.57%
Chemicals	823	3.68%	2,767	2.91%
Pharmaceuticals	1,104	4.94%	6,001	6.31%
Extractive Industries	956	4.28%	4,357	4.58%
Durable Manufacturers	6,907	30.91%	24,672	25.95%
Computers	3,253	14.56%	16,377	17.22%
Transportation	1,150	5.15%	6,060	6.37%
Retail	3,016	13.50%	12,332	12.97%
Services	1,974	8.84%	11,175	11.75%
Other	232	1.04%	1,422	1.50%
Total	22,342	100%	95,084	100.00%

Panel C: Distribution by Year

Year	Number	Percent
1993	1,638	7.33%
1994	1,576	7.05%
1995	1,508	6.75%
1996	1,501	6.72%
1997	1,506	6.74%
1998	1,556	6.96%
1999	1,594	7.13%
2000	1,619	7.25%
2001	1,658	7.42%
2002	1,670	7.47%
2003	1,639	7.34%
2004	1,627	7.28%
2005	1,637	7.33%
2006	1,613	7.22%

Total	22,342	100%

Table 1 describes our sample. Panel A outlines the sample selection criteria. Panel B classifies our sample by industry groups, based on Barth, Beaver and Landsman (1998). Panel B also presents a similar breakdown for all Compustat firms (during the same sample period) for comparison. Panel C describes the frequency of sample observations by calendar year.

Table 2

Validation of the Earnings Predictability Model: Results of Estimating Equation [1]

$$BI_t = \alpha + \gamma BI_{t-1} + \delta TI_{t-1} + \varepsilon \qquad [1]$$

Variables	Prediction	Dependent Variable = BI_t (1)	(2)	(3)
Intercept	?	0.0055	0.0314	0.0059
		(0.63)	(1.43)	(0.68)
BI_{t-1}	+	0.6964		0.6664
		(14.73)***		(13.21)***
TI_{t-1}	+		0.4091	0.0594
			(9.25)***	(4.75)***
Observations		49,804	49,804	49,804
Adj_R^2		0.518	0.229	0.520

***, **, * Denote significance at the 0.01, 0.05, 0.10 levels, respectively. All tests are two-tailed.

Table 2 presents coefficient estimates for eq. [1] using observations with available pre-tax income and taxable income during our sample from 1993 to 2006. t-statistics are shown in parentheses below the estimated coefficient. Standard errors presented are calculated using two-way clustered standard errors, clustered by firm and year, thus correcting for heteroscedasticity and serial correlation. We also assume that the coefficient on BI_{it-1} (i.e., lagged book income) is less than 1 in each of the regressions, and untabulated results confirm this is the case.

See the Appendix for variable definitions.

Table 3

Descriptive Statistics

Panel A: Summary Statistics

Variables	N	Mean	Std Dev	P10	Q1	Median	Q3	P90
PRED	22,342	-0.054	0.057	-0.124	-0.070	-0.035	-0.017	-0.009
BI_VAR	22,342	0.089	0.096	0.019	0.032	0.058	0.107	0.188
TI_VAR	22,342	0.106	0.190	0.016	0.028	0.051	0.103	0.214
BT_COV	22,342	0.632	0.439	-0.066	0.472	0.819	0.949	0.985
FSTDRET	22,342	3.253	1.784	1.520	2.009	2.784	4.010	5.601
FBETA	22,342	0.920	0.617	0.151	0.544	0.931	1.296	1.653
FCOC	22,342	10.931	11.064	-1.175	4.174	10.130	16.802	24.270
CFVAR	22,342	0.078	0.066	0.022	0.035	0.059	0.098	0.154
BTM	22,342	0.613	0.544	0.175	0.295	0.483	0.764	1.165
lnMVE	22,342	5.858	2.166	3.008	4.259	5.832	7.335	8.705

LEV	22,342	0.157	0.155	0.000	0.007	0.123	0.259	0.376
TURN	22,342	5.914	6.676	0.946	1.869	3.758	7.366	13.350
SKEW	22,342	0.375	1.050	-0.521	-0.022	0.326	0.739	1.348
RET	22,342	0.216	0.661	-0.381	-0.155	0.097	0.403	0.857
ABSBTD	22,342	0.070	0.138	0.005	0.013	0.031	0.067	0.150
AQ	21,405	0.073	0.063	0.023	0.034	0.054	0.087	0.142

Panel B: Pearson (Spearman) correlations above (below) the diagonal

	PRED	RBI_VAR	RTI_VAR	RBT_COV	FSTDRET	FBETA	FCOC	RCFVAR	lnBTM	lnMVE	LEV	TURN	SKEW	RET	RABSBTD	RAQ
PRED	1.000	**-0.343**	**-0.283**	**0.021**	**-0.384**	**-0.069**	**-0.017**	**-0.281**	**0.130**	**0.202**	**0.153**	**-0.225**	**-0.103**	**-0.060**	**-0.207**	**-0.265**
RBI_VAR	**-0.376**	1.000	**0.627**	**0.153**	**0.325**	**0.050**	**0.034**	**0.583**	**-0.056**	**-0.249**	**-0.119**	**0.207**	**0.084**	**0.038**	**0.281**	**0.561**
RTI_VAR	**-0.307**	**0.626**	1.000	**0.175**	**0.289**	**0.036**	**0.022**	**0.505**	**-0.061**	**-0.234**	**-0.140**	**0.159**	**0.080**	**0.042**	**0.224**	**0.385**
RBT_COV	**0.011**	**0.153**	**0.177**	1.000	-0.024	-0.009	**-0.025**	**0.156**	**0.027**	-0.012	**-0.109**	0.029	**-0.026**	-0.009	**-0.244**	**-0.068**
FSTDRET	**-0.426**	**0.366**	**0.320**	-0.006	1.000	**0.038**	**0.091**	**0.293**	**0.133**	**-0.539**	**-0.104**	**0.107**	**0.182**	**0.023**	**0.148**	**0.278**
FBETA	**-0.055**	**0.049**	**0.035**	-0.007	**0.094**	1.000	**0.767**	0.000	**-0.177**	**0.288**	**0.052**	**0.253**	**-0.068**	**0.096**	**0.035**	-0.003
FCOC	**-0.012**	**0.023**	**0.011**	**-0.020**	**0.092**	**0.745**	1.000	-0.004	**0.049**	**0.045**	**0.109**	**0.012**	**-0.032**	-0.003	0.018	0.008
RCFVAR	**-0.306**	**0.582**	**0.505**	**0.156**	**0.345**	-0.003	-0.014	1.000	**-0.041**	**-0.287**	**-0.165**	**0.187**	**0.079**	**0.053**	**0.167**	**0.472**
lnBTM	**0.054**	**-0.046**	**-0.051**	**0.024**	**0.139**	**-0.184**	**0.048**	**-0.029**	1.000	**-0.479**	**0.056**	**-0.237**	-0.007	**-0.332**	**-0.116**	**-0.035**
lnMVE	**0.248**	**-0.249**	**-0.231**	-0.013	**-0.553**	**0.333**	**0.102**	**-0.287**	**-0.489**	1.000	**0.109**	**0.232**	**-0.206**	**0.074**	**-0.064**	**-0.255**
LEV	**0.188**	**-0.153**	**-0.164**	**-0.113**	**-0.158**	**0.061**	**0.129**	**-0.195**	**0.089**	**0.164**	1.000	**-0.089**	**-0.037**	**-0.052**	**-0.018**	**-0.080**
TURN	**-0.200**	**0.188**	**0.147**	0.008	**0.113**	**0.394**	**0.128**	**0.150**	**-0.321**	**0.388**	**-0.067**	1.000	**-0.015**	**0.148**	**0.092**	**0.128**
SKEW	**-0.105**	**0.113**	**0.102**	**-0.026**	**0.201**	**-0.070**	**-0.044**	**0.098**	-0.002	**-0.237**	**-0.058**	**-0.077**	1.000	**0.251**	**0.047**	**0.088**
RET	**0.057**	**-0.057**	**-0.032**	-0.007	**-0.109**	**0.069**	-0.002	**-0.025**	**-0.350**	**0.157**	**-0.023**	**0.059**	**0.257**	1.000	**0.038**	**0.034**
RABSBTD	**-0.194**	**0.280**	**0.223**	**-0.244**	**0.148**	**0.031**	0.010	**0.166**	**-0.109**	**-0.064**	**-0.033**	**0.097**	**0.059**	**-0.015**	1.000	**0.233**
RAQ	**-0.283**	**0.560**	**0.384**	**-0.067**	**0.309**	-0.007	-0.004	**0.471**	**-0.027**	**-0.256**	**-0.105**	**0.104**	**0.106**	**-0.039**	**0.232**	1.000

***Bold text** indicates significance at the 0.1 level or better, two tailed.

Table 3 presents summary statistics of all variables used in our study. Panel A provides descriptive statistics and Panel B provides Pearson (above) and Spearman (below) correlation coefficients matrix. Our sample covers the period from 1993 to 2006. All continuous variables are winsorized at the top and bottom 1% of their distributions to mitigate the effects of extreme values.

See the Appendix for variable definitions.

Table 4

Validation of the Earnings Predictability Model: Results of Estimating Equation [9]

$$PRED_{it+5} = \beta_0 + \beta_1 RBI_{VARit} + \beta_2 RTI_{VARit} + \beta_3 RBT_{COV\,it} + \varepsilon \quad [9]$$

Panel A: Earnings predictability model without controls

		Dependent Variable = PRED			
Variables	Prediction	(1)	(2)	(3)	(4)
Intercept	?	-0.0441	-0.0171	-0.0269	-0.0190
		(-3.58)***	(-1.51)	(-2.25)**	(-1.64)*
RBI_VAR	-		-0.0137		-0.0111
			(-18.02)***		(-17.95)***
RTI_VAR	-			-0.0118	-0.0049
				(-13.35)***	(-7.55)***
RBT_COV	+			0.0029	0.0034
				(6.00)***	(8.06)***
N		22,342	22,342	22,342	22,342
Adj_R^2		0.097	0.210	0.179	0.225

Panel B: Earnings predictability model with controls

Variables	Prediction	Dependent Variable = PRED			
		(1)	(2)	(3)	(4)
Intercept	?	-0.0515	-0.0419	-0.0473	-0.0434
		(-4.67)***	(-3.84)***	(-4.15)***	(-3.88)***
RBI_VAR	-		-0.0072		-0.0066
			(-13.46)***		(-11.99)***
RTI_VAR	-			-0.0047	-0.0022
				(-8.95)***	(-4.52)***
RBT_COV	+			0.0016	0.0020
				(3.93)***	(5.38)***
RCFOVAR	-	-0.0054	-0.0021	-0.0039	-0.0019
		(-13.81)***	(-4.83)***	(-8.76)***	(-4.36)***
lnBTM		0.0116	0.0104	0.0105	0.0100
		(5.94)***	(5.66)***	(5.90)***	(5.64)***
lnMVE		0.0067	0.0058	0.0061	0.0056
		(11.45)***	(10.68)***	(11.42)***	(10.60)***
LEV		0.0203	0.0187	0.0190	0.0194
		(4.55)***	(4.19)***	(4.32)***	(4.30)***
TURN		-0.0015	-0.0013	-0.0014	-0.0013
		(-6.62)***	(-6.46)***	(-6.80)***	(-6.51)***
SKEW		-0.0016	-0.0014	-0.0014	-0.0013
		(-2.72)***	(-2.81)***	(-2.63)***	(-2.69)***
RET		0.0021	0.0016	0.0019	0.0016
		(0.78)	(0.64)	(0.71)	(0.62)
RABSBTD		-0.0053	-0.0041	-0.0043	-0.0034
		(-14.06)***	(-13.67)***	(-13.48)***	(-13.06)***
N		22,342	22,342	22,342	22,342
Adj_R^2		0.256	0.275	0.265	0.278

***, **, * Denote significance at the 0.01, 0.05, 0.10 levels, respectively. All tests are two-tailed.

Table 4 presents coefficient estimates for eq. [9]. In both Panels A and B, t-statistics are shown in parentheses below the estimated coefficient; standard errors presented are calculated using two-way clustered standard errors, clustered by firm and year, thus correcting for heteroscedasticity and serial correlation; And industry and year fixed effects are included but not reported.

See the Appendix for variable definitions.

Table 5

Properties of Taxable Income and Firm Risk (I): Variability of Stock Returns (H2a & H2b)

$$FSTDRET_{it+1} = \beta_0 + \beta_1 RBI_{VARit} + \beta_2 RTI_{VARit} + \beta_3 RBT_{COV\,it} + \beta_4 RCFVAR_{it} + \beta_5 lnBTM_{it} + \beta_6 lnMVE_{it} + \beta_7 LEV_{it} + \beta_8 T$$

[10]

Variables	Prediction	Dependent Variable = FSTDRET			
		(1)	(2)	(3)	(4)
Intercept	?	4.2768 (13.97)***	4.0680 (13.33)***	4.1910 (14.02)***	4.1127 (13.69)***
RBI_VAR	+		0.1565 (8.44)***		0.1337 (7.31)***
RTI_VAR **(H2a)**	+			0.1283 (7.91)***	0.0765 (5.27)***
RBT_COV **(H2b)**	-			-0.0566 (-5.82)***	-0.0661 (-6.82)***
RCFOVAR	+	0.1008 (8.03)***	0.0274 (2.35)**	0.0615 (4.80)***	0.0211 (1.75)*
lnBTM	?	-0.1607 (-3.16)***	-0.1354 (-2.79)***	-0.1310 (-2.84)***	-0.1200 (-2.62)***
lnMVE	?	-0.4596 (-12.52)***	-0.4405 (-12.18)***	-0.4414 (-12.98)***	-0.4314 (-12.52)***
LEV	?	0.0445 (0.36)	0.0776 (0.64)	0.0679 (0.57)	0.0595 (0.50)
TURN	?	0.0477 (5.65)***	0.0429 (5.47)***	0.0449 (5.76)***	0.0420 (5.54)***
SKEW	?	0.0742 (3.11)***	0.0714 (3.18)***	0.0705 (3.00)***	0.0687 (3.05)***
RET	?	0.0036 (0.04)	0.0139 (0.17)	0.0097 (0.11)	0.0155 (0.19)
RABSBTD	+	0.0913 (8.63)***	0.0656 (7.07)***	0.0605 (6.55)***	0.0422 (5.06)***
N		22,342	22,342	22,342	22,342
Adj_R^2		0.491	0.500	0.499	0.504

***, **, * Denote significance at the 0.01, 0.05, 0.10 levels, respectively. All tests are two-tailed.

Table 5 presents coefficient estimates for eq. [10] using the standard deviation of the daily stock returns in year t+1 as a dependent variable. t-statistics are shown in parentheses below the estimated coefficient. Standard errors presented are calculated using two-way clustered standard errors, clustered by firm and year, thus correcting for heteroscedasticity and serial correlation. Industry and year fixed effects are included but not reported.

See the Appendix for variable definitions.

Table 6

Properties of Taxable Income and Firm Risk (II): Cost of Capital (H3a & H3b)

$$FBETA_{it+1} \vee FCOC_{it+1} = \beta_0 + \beta_1 RBI_{VARit} + \beta_2 RTI_{VARit} + \beta_3 RBT_{COVit} + + \beta_4 RCFVAR_{it} + \beta_5 lnBTM_{it} + \beta_6 lnMVE_{it} + \beta_7 L$$

[11]

		Dependent Variable = FBETA				Dependent Variable = FCOC			
Variable	Prediction	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Intercept	?	0.0620	0.0079	0.0327	0.0127	3.8494	3.1542	3.7031	3.4254
		(0.86)	(0.11)	(0.47)	(0.18)	(2.12)**	(1.75)*	(2.00)**	(1.87)*
RBI_VAR	+		0.0406		0.0341		0.5212		0.4743
			(8.75)***		(7.57)***		(5.70)***		(5.91)***
RTI_VAR **(H3a)**	+			0.0325	0.0193			0.3954	0.2114
				(7.31)***	(4.88)***			(4.07)***	(2.44)**
RBT_COV **(H3b)**	-			-0.0106	-0.0130			-0.2330	-0.2666
				(-2.79)***	(-3.51)***			(-3.01)***	(-3.50)***
RCFOVAR	+	0.0186	-0.0004	0.0079	-0.0024	0.1330	-0.1116	0.0233	-0.1199
		(3.37)***	(-0.09)	(1.59)	(-0.50)	(1.40)	(-1.30)	(0.28)	(-1.45)
lnBTM	?	-0.0007	0.0058	0.0066	0.0095	0.9202	1.0045	1.0145	1.0535
		(-0.05)	(0.40)	(0.47)	(0.67)	(2.96)***	(3.30)***	(3.45)***	(3.60)***
lnMVE	?	0.0788	0.0838	0.0833	0.0859	0.3262	0.3898	0.3843	0.4198
		(7.68)***	(8.32)***	(8.56)***	(8.83)***	(1.90)*	(2.26)**	(2.27)**	(2.46)**
LEV	?	0.2273	0.2359	0.2365	0.2343	4.8753	4.9855	4.8982	4.8683
		(4.68)***	(4.89)***	(4.76)***	(4.79)***	(5.56)***	(5.72)***	(5.47)***	(5.51)***
TURN	?	0.0177	0.0164	0.0170	0.0162	0.0569	0.0410	0.0486	0.0383
		(6.62)***	(6.49)***	(6.72)***	(6.56)***	(1.94)*	(1.43)	(1.68)*	(1.34)
SKEW	?	-0.0141	-0.0148	-0.0149	-0.0154	-0.2123	-0.2218	-0.2255	-0.2320
		(-1.41)	(-1.54)	(-1.52)	(-1.60)	(-1.14)	(-1.23)	(-1.23)	(-1.29)
RET	?	0.0491	0.0517	0.0507	0.0522	0.4047	0.4389	0.4226	0.4432
		(2.82)***	(3.10)***	(3.02)***	(3.17)***	(1.44)	(1.60)	(1.55)	(1.63)
RABSBTD	+	0.0142	0.0075	0.0074	0.0027	0.2110	0.1253	0.1003	0.0354
		(3.35)***	(1.95)*	(2.01)**	(0.82)	(3.64)***	(2.46)**	(2.15)**	(0.85)
N		22,342	22,342	22,342	22,342	22,342	22,342	22,342	22,342
Adj_R^2		0.184	0.190	0.188	0.191	0.069	0.071	0.071	0.072

***, **, * Denote significance at the 0.01, 0.05, 0.10 levels, respectively. All tests are two-tailed.

Table 6 presents coefficient estimates for eq. [11] using the market beta in year t+1 and the expected annual cost of capital as the dependent variable, respectively. t-statistics are shown in parentheses below the estimated coefficient. Standard errors presented are calculated using two-way clustered standard errors, clustered by firm and year, thus correcting for heteroscedasticity and serial correlation. Industry and year fixed effects are included but not reported.

See the Appendix for variable definitions.

Table 7

Properties of Taxable Income and Earnings Predictability (H1a & H1b):

FERC Analysis

$$RET_t = \beta_0 + \beta_1 LEARN_{it-1} + \beta_2 EARN_{it} + \beta_3 FEARN_{it3} + \beta_4 FRET_{it3} [13]$$

$$RET_t = \beta_0 + \beta_1 LEARN_{it-1} + \beta_2 EARN_{it} + \beta_3 FEARN_{it3} + \beta_4 FRET_{it3} + \beta_5 RBI_{VARit} + \beta_6 LEARN_{it-1} * RBI_{VARit} + \beta_7 EARN$$

		Dependent Variable = RET				
Variables	Prediction	(1)	(2)	(3)	(4)	(5)
Intercept		0.1489	0.1093	0.1159	0.1735	0.1244
		(3.07)***	(1.84)*	(2.07)**	(2.81)***	(1.95)*
LEARN	-	-1.3933	-3.6847	-1.8639	-0.9227	-3.1902
		(-8.27)***	(-12.51)***	(-8.20)***	(-6.01)***	(-11.34)***
EARN	+	1.3085	3.0083	1.3875	1.0768	2.7183
		(10.78)***	(8.76)***	(6.88)***	(9.40)***	(8.58)***
FEARN	+	0.1629	0.2067	0.2179	0.0861	0.1387
		(6.53)***	(4.06)***	(5.10)***	(2.01)**	(2.27)**
FRET	-	-0.0677	-0.0435	-0.0534	-0.0592	-0.0369
		(-5.56)***	(-4.36)***	(-4.00)***	(-6.11)***	(-3.90)***
RBI_VAR	?		0.0194			0.0170
			(1.66)*			(1.72)*
LEARN*RBI_VAR	?		0.6691			0.6371
			(11.71)***			(12.93)***
EARN*RBI_VAR	?		-0.4533			-0.4831
			(-5.52)***			(-5.88)***
FEARN*RBI_VAR	-		-0.0315			-0.0226
			(-3.35)***			(-2.58)***
FRET*RBI_VAR	?		-0.0096			-0.0088
			(-2.99)***			(-2.55)**
RTI_VAR	?			0.0170		0.0083
				(1.76)*		(1.42)
LEARN*RTI_VAR	?			0.1657		0.0364
				(4.35)***		(1.10)
EARN*RTI_VAR	?			-0.0006		0.0671
				(-0.02)		(1.54)
FEARN*RTI_VAR **(H1a)**	-			-0.0352		-0.0222
				(-3.72)***		(-2.07)**
FRET*RTI_VAR	?			-0.0055		-0.0012
				(-2.14)**		(-0.49)
RBT_COV	?				-0.0152	-0.0162
					(-4.15)***	(-3.53)***
LEARN*RBT_COV	?				-0.2693	-0.2727
					(-4.99)***	(-5.20)***
EARN*RBT_COV	?				0.1328	0.1068
					(2.30)**	(1.91)*
FEARN*RBT_COV **(H1b)**	+				0.0491	0.0535
					(3.51)***	(3.79)***
FRET*RBT_COV	?				-0.0058	-0.0040
					(-2.19)**	(-1.65)*
Adj_R^2		0.156	0.162	0.151	0.169	0.170

***, **, * Denote significance at the 0.01, 0.05, 0.10 levels, respectively. All tests are two-tailed.

Table 7 presents coefficient estimates for eq. [13] and [13]’ (N = 25,003). The first column presents coefficient estimates for a regression of the eq. [13] and the second column through the fifth column presents coefficient estimates for a regression of the eq. [13]’ with various interactions. t-statistics are shown in parentheses below the estimated coefficient. Standard errors presented are calculated using two-way clustered standard errors, clustered by firm and year, thus correcting for heteroscedasticity and serial correlation. Industry and year fixed effects are included but not reported.

See the Appendix for variable definitions.

Table 8

Properties of Taxable Income and Firm Risk: Accruals Quality as a Control Variable

		Dependent Variable		
Variables	Prediction	FSTDRET	FBETA	FCOC
Intercept	?	3.9854	0.0336	3.7611
		(12.43)***	(0.48)	(1.95)*
RBI_VAR	+	0.1215	0.0357	0.5185
		(6.58)***	(8.20)***	(6.47)***
RTI_VAR	+	0.0753	0.0186	0.1913
		(5.03)***	(4.48)***	(2.18)**
RBT_COV	-	-0.0623	-0.0127	-0.2629
		(-6.33)***	(-3.37)***	(-3.34)***
lnBTM	?	0.0195	-0.0044	-0.1481
		(1.72)*	(-0.99)	(-1.98)**
lnMVE	?	-0.1087	0.0100	1.0709
		(-2.41)**	(0.73)	(3.70)***
LEV	?	-0.4247	0.0867	0.4236
		(-12.69)***	(8.68)***	(2.45)**
TURN	?	0.0590	0.2204	4.7154
		(0.50)	(4.86)***	(5.73)***
SKEW	?	0.0418	0.0160	0.0372
		(5.50)***	(6.40)***	(1.29)
RET	?	0.0677	-0.0160	-0.2295
		(2.91)***	(-1.65)*	(-1.26)
RCFVAR	+	0.0190	0.0517	0.4302
		(0.23)	(3.09)***	(1.57)
RABSBTD	+	0.0439	0.0024	0.0362
		(5.07)***	(0.72)	(0.86)
RAQ	+	0.0295	0.0014	-0.0065
		(3.16)***	(0.38)	(-0.11)
Adj_R^2		0.507	0.183	0.066

***, **, * Denote significance at the 0.01, 0.05, 0.10 levels, respectively. All tests are two-tailed.

Table 8 presents coefficient estimates for eq. [10] and [11] (N = 21,405) with accruals quality as an additional control variable. t-statistics are shown in parentheses below the estimated coefficient. Standard errors presented are calculated using two-way clustered standard errors, clustered by firm and year, thus correcting for heteroscedasticity and serial correlation. Industry and year fixed effects are included but not reported. See the Appendix for variable definitions.