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Management Earnings Forecasts and Book-Tax Differences

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Abstract

This study is the first to investigate the incremental usefulness of book-tax differences (BTDs) to discretionary accruals in detecting earnings management to meet quarterly management earnings forecasts. Upward managed earnings that do not affect taxable income result in larger BTDs. This paper uses the ranked tax-to-book income ratio and decomposes BTDs in normal and discretionary BTDs, and tax avoidance activity. The findings show that higher discretionary accruals, larger BTDs, and more aggressive tax avoiding activity are associated with higher probability of meeting management earnings forecasts. The results imply that BTDs are incrementally useful to discretionary accruals in detecting earnings management. Moreover, the analysis shows that firms are more likely to meet management earnings forecasts during the financial crisis of 2008.

Keywords: meeting management earnings forecasts, book-tax differences, BTDs, tax-to-book income ratio, discretionary book-tax differences, tax avoidance, earnings management, discretionary accruals, financial crisis

1. Introduction

This study is the first that investigates the incremental usefulness of book-tax differences (BTDs) beyond discretionary accruals in detecting earnings management to meet/beat (Note 1) voluntary earnings forecasts (i.e., management earnings forecasts). Although prior research reports that earnings response coefficients and meeting earnings targets such as avoiding loss, earnings decline or analysts' forecasts are associated with tax accounts (e.g., Phillips, Pincus, & Rego, 2003; Weber, 2009), the relationship between meeting management earnings forecasts and BTDs is unexplored, yet. The ongoing research on discretion of managers (see Habib & Hansen, 2008, for literature review) and the fact that capital markets react to meeting or missing the earnings targets emphasizes the importance of detecting earnings management. This paper combines the area of earnings management, voluntary earnings disclosures and BTDs by showing that BTDs are incrementally useful to discretionary accruals in detecting earnings management to meet/beat management earnings forecasts. Analyzing the period during the financial crisis (2008-2010), the results show that firms are more likely to meet management earnings forecasts.

This study develops a measure for discretionary book-tax differences, uses tax avoidance based on the methodology of Desai and Dharmapala (2006) and applies the ranked tax-to-book income ratio developed by Lev and Nissim (2004). This paper differs from Desai and Dharmapala (2006) by decomposing BTDs in normal BTDs, discretionary BTDs that comprise the degree of earnings management, and a component that results from aggressive tax avoidance strategies. Since total accruals are decomposed in normal and discretionary accruals, I suggest that BTDs, which are not attributable to normal accruals reflect earnings management and tax sheltering practices. Following Desai and Dharmapala (2006) and Hoi, Wu, and Zhang (2013), the component of BTDs that is not determined by total accruals reflects firm's aggressive tax avoidance activity.

Due to greater discretion under General Accepted Accounting Principles (GAAP) in comparison to tax law, discretionary effects of income-increasing accruals do not affect taxable income (Lev & Nissim, 2004; Hanlon, 2005). This results in higher book income relative to tax income (larger BTDs). Following prior research (e.g., Manzon & Plesko, 2002; Badertscher et al., 2009), I suggest that managers prefer to increase earnings to meet their earnings forecasts without affecting taxable income (non-conforming earnings management). I suppose that greater upward earnings management should be reflected in larger discretionary accruals and larger BTDs, and hypothesize that both proxies are appropriate to detect earnings management. I expect that firms with larger discretionary accruals and BTDs are more likely to meet management earnings forecasts. Following the argumentation of Phillips, Pincus, and Rego (2003), a significant relationship between the proxies for earnings management and meeting earnings benchmarks indicates incremental usefulness of the former for detecting earnings management.

In contrast to Phillips, Pincus, and Rego (2003), who analyze–among others–analysts' forecasts, I find that larger discretionary accruals are associated with higher probability of meeting the earnings benchmark. These results support the findings of Kraft, Lee, and Lopatta (2014), who investigate the relationship between meeting management earnings forecasts and earnings management before insider trades. My results indicate that including both discretionary accruals and BTDs, the model tends to be more accurate. The model's ability to discriminate between firms that meet vs. miss the earnings benchmark is slightly higher when BTDs are included. Overall, the findings imply that book-tax differences are incrementally useful to discretionary accruals in detecting earnings management to meet quarterly management earnings forecasts. However, the results tend to be sensitive to the extent of management earnings forecast errors supporting the findings of Kraft, Lee, and Lopatta (2014). When I restrict the sample to management earnings forecasts errors to be maximum 5 cents, BTDs are not associated with meeting management earnings forecasts. Restricting the sample to larger forecasts errors (i.e., maximum of 10 or 15 cents), supports the results for the whole sample by showing that larger book-tax differences are incrementally useful in detecting earnings management. Moreover, the regressions show comparable results for ranked tax-to-book income ratio, discretionary BTDs, and tax avoidance. Their predicted probability of meeting management earnings forecasts does not statistically differ implicating that no one measure tends to be more accurate. Furthermore, I analyze the impact of the financial crisis of 2008 on the probability of meeting management earnings forecasts by using two subsamples (2008-2010 and 1995-2007). The results show that firms are more likely to meet management earnings forecasts during the financial crisis. I find larger forecast errors and discretionary BTDs as well as tax avoidance for the period 2008-2010. This implies that managers disclose more pessimistic forecast errors and engage more in activities that result in larger BTDs during the financial crisis of 2008.

I extend to the literature on management earnings forecasts, information content of taxes and earnings management by relating most closely to Phillips, Pincus, and Rego (2003). This study goes beyond the paper of Phillips, Pincus, and Rego (2003) to analyze whether the BTDs are associated with the probability of meeting quarterly management earnings forecasts. I use a larger sample that comprises 16,224 (1,713) observations (firms) covering the period 1995-2010. While Phillips, Pincus, and Rego (2003) analyze the deferred tax expense, the proxies for BTDs used in this study comprise temporary, permanent differences and tax accruals. The results are robust for different ranking of the tax-to-book income ratio. Furthermore, this paper develops a measure for discretionary BTDs, which reflects earnings management and tax sheltering practices and analyzes the relationship between tax avoidance and meeting management earnings forecasts. I also analyze the impact of the financial crisis of 2008 on the probability of meeting the earnings benchmarks.

The findings of this study should be of interest to several parties such as regulatory authorities, companies, and researchers who deal with issues of information of taxes, voluntary disclosure, earnings management, and consequences of financial crises. The findings show that BTDs are an appropriate metric to detect earnings management and therefore, should be considered in future research. Since investors react to meeting or beating earnings benchmarks, they should be aware of potential earnings management when firms meet management earnings forecasts.

The remainder of this study is organized as follows. The next section provides a literature review and develops the hypotheses. Section 3 describes the research design and the sample. Section 4 presents results of the analyses. Section 5 concludes.

2. Literature Review and Hypothesis Development

2.1 Related Literature

Extensive research deals with earnings management and voluntary disclosures including management earnings forecasts (see Healy & Palepu, 2001; Habib & Hansen, 2008; Hirst, Koonce, & Venkataraman, 2008, for literature review). Anilowski, Feng, and Skinner (2007) and Das, Kim, and Patro (2011) show that management earnings forecasts provide meaningful information for investors. However, the disclosure of management earnings forecasts is voluntary and can be influenced by managers' incentives. Previous research investigates the incentives of voluntary disclosures such as the reduction in information asymmetry (e.g., Coller & Yohn, 1997; Verrecchia, 2001), reduction in litigation costs (Skinner, 1994; Bartov, Givoly, & Hayn, 2002), and equity compensation incentives (e.g., Noe, 1999; Aboody & Kasznik, 2000). Prior studies focus on accrual-based earnings management to avoid negative earnings surprises (e.g., Brown, 1998; Degeorge, Patel, & Zeckhauser, 1999; Matsumoto, 2002; Burgstahler & Eames, 2006).

In their literature review, Hanlon and Heitzman (2010) and Graham, Raedy, and Shackelford (2012) summarize the research on income taxes in different settings. Previous studies analyze whether income tax accounts provide meaningful information about earnings quality such as growth or persistence of future returns and earnings (e.g., Lev & Nissim, 2004; Hanlon, 2005; Schmidt, 2006; Ayers, Jiang, & Laplante, 2009; Blaylock, Shevlin, & Wilson, 2012). The results imply that large BTDs provide incremental useful information and signal low earnings quality.

Other studies investigate tax accounts such as tax contingency account or tax cushion (e.g., Cazier et al., 2011; Gupta, Laux, & Lynch, 2011), the valuation allowance of deferred tax assets (e.g., Visvanathan, 1998; Frank & Rego, 2006), deferred tax accounts (e.g., Phillips, Pincus, & Rego, 2003; Gordon & Joos, 2004; Hanlon, 2005), tax-to-book income ratio (e.g. Mills & Newberry, 2001; Lev & Nissim, 2004; Weber, 2009), and tax expense (e.g., Dhaliwal, Gleason, & Mills, 2004; Cook, Huston, & Omer, 2008; Comprix, Mills, & Schmidt, 2012) as instruments of earnings management. Phillips, Pincus, and Rego (2003) report that the deferred tax expense is incrementally useful to total accruals in detecting earnings management to avoid earnings decline or loss. However, they find no evidence that the deferred tax expense is associated with the probability of meeting analysts' forecasts. In contrast to total accruals, they find no significant relationship between the discretionary accruals and meeting the analysts' forecasts or avoiding earnings decreases.

Prior studies report that firms engage in tax avoidance strategies that results in decreasing effective tax rates (e.g., Rego, 2003; Desai & Dharmapala, 2006; Desai & Dharmapala, 2009). Dhaliwal, Gleason, and Mills (2004) and Cook, Huston, and Omer (2008) report that firms reduce ETR from the third to the fourth quarter when they would have missed the analysts' forecasts. Analyzing factors that affect book-tax gaps, Mills and Newberry (2001) use confidential tax return data to calculate total differences between book and taxable income. They report that earnings management incentives are associated with larger BTDs and note that firms with earnings increases appear to have larger book-tax differences. Hoi, Wu, and Zhang (2013) find that firms with excessive irresponsible CSR activities have a higher probability of engaging in tax sheltering, greater discretionary / permanent book-tax differences and a lower cash effective tax rate. Overall, prior research reports that firms manage tax accounts to meet earnings targets and that earnings management is associated with the gap between book and tax income (e.g., Desai, 2003; Phillips, Pincus, & Rego, 2003; Desai & Dharmapala, 2006).

2.2 Hypothesis Development

The literature reviews of Healy and Wahlen (1999) and Fields, Lys, and Vincent (2001) show that market incentives appear to dominate other incentives, such as a reduction in information asymmetry (e.g., Ajinkya & Gift, 1984; Hassell & Jennings, 1986; Diamond & Verrecchia, 1991; Kim & Verrecchia, 1994; Verrecchia, 2001) or a reduction in litigation costs (e.g., Lev, 1992; Francis, Philbrick, & Schipper, 1994; Skinner, 1994, Skinner, 1997). However, management earnings forecasts is a voluntary disclosure and managers have some discretion about the amount of forecast that may results in optimistic or pessimistic earnings targets. This study does not primary focus on managers' incentives to meet management earnings forecasts. The paper aims rather to analyze whether BTDs–beyond discretionary accruals–are incrementally useful in detecting earnings management. Earnings management is described as managers' discretion over accounting numbers (Watts & Zimmermann, 1990). Using discretionary accruals as a metric to detect earnings management, prior research reports a positive association with earnings benchmarks (management earnings forecasts: e.g., Kasznik, 1999; Kraft, Lee, & Lopatta, 2014; avoid earnings decline or loss, and analyst' forecasts: e.g., Degeorge, Patel, & Zeckhauser, 1999; Ayers, Jiang, & Yeung, 2006). To confirm the findings of previous studies, I analyze the impact of earnings-increasing accruals on the probability of meeting management earnings forecasts. Following the argumentation of Phillips, Pincus, and Rego (2003), I suggest that if discretionary accruals increase the probability of meeting management earnings forecasts, they are incrementally useful in detecting earnings management. This leads to my first hypothesis.

H1: *Discretionary accruals are useful in detecting earnings management to meet/beat management earnings forecasts*.

Guidelines to prepare financial statements (GAAP) that do not completely correspond to the rules of tax law result in temporary and permanent differences between book and taxable income. Temporary differences (e.g., depreciation) result from accruals for revenue and expense that affect taxable income and book income in different periods (Phillips, Pincus, & Rego, 2003; Hanlon, 2005). Permanent differences (e.g., recognition of goodwill, R&D process) arise when revenue or expense is recognized under one system but not under the other (Manzon & Plesko, 2002; Lev & Nissim, 2004). Previous research argues that there is more discretion under

GAAP than under tax law (e.g., Plesko, 2003; Phillips, Pincus, & Rego 2003; Badertscher et al., 2009).

Prior studies analyze the ability of BTDs to predict future returns (e.g., Lev & Nissim, 2004; Weber, 2009). They argue that the relation between BTDs and future returns stems from mispricing. Weber (2009) argues that it may be too costly to process tax-related information and Lev and Nissim (2004) suggest that market participants fail to fully appreciate the information of taxes. Since BTDs can arise from unbiased application of accounting and tax rules as well as from earnings management, it is not fully possible to distinguish between the two reasons and therefore, leads to mispricing. I assume that mispricing or incomplete appreciation of tax related information is at least partly attributable to opportunistic earnings management that result in larger BTDs. If executives manage earnings upward to meet their earnings forecasts, they can manipulate earnings generating permanent and/or temporary book-tax differences (non-conforming earnings management). Non-conforming earnings managements affects book income without increasing taxable income, such as deferring expenses for financial reporting or increasing revenues (e.g., expending the useful life of depreciable assets, reducing the provision for bad debts, aggressively recognizing unearned revenue). For instance, Badertscher et al. (2009), Weber (2009) and Seidman (2010) suggest that the book-tax gap is a reasonable proxy for detecting earnings management. Prior studies show that the BTDs are incrementally useful in detecting earnings management to meet earnings benchmarks such as avoiding earnings decline or loss, or analysts' forecasts (e.g., Burgstahler, Elliott, & Hanlon, 2002; Phillips, Pincus, & Rego, 2003; Schrand & Wong, 2003). Yet, the relationship between book-tax differences and the likelihood of meeting management earnings forecasts is unexplored. This paper aims to close this gap.

Lev and Nissim (2004) construct an after-tax measure for BTDs that comprises temporary and permanent differences, and discretionary tax accruals (e.g., changes in tax valuation allowance). They use the tax-to-book income ratio as a proxy for earnings management and argue that their measure should be a more powerful proxy to detect earnings management than specific tax accounts. This study applies the methodology of Lev and Nissim (2004) to calculate the tax-to-book income ratio and decomposes BTDs to estimate the components that are attributable to earnings management and tax avoidance based on the methodology of Desai and Dharmapala (2006).

Income-increasing accruals leave the taxable income unaffected because the tax income excludes discretionary effects such as provision for bad debt or changes in depreciation (Lev & Nissim, 2004; Hanlon, 2005). If managers use non-conforming earnings management, they increase book income (denominator) without affecting taxable income (numerator). This results in lower tax-to-book income ratio reflecting larger BTDs and greater earnings management. However, the tax-book income ratio will not reflect conforming management. This means that if managers use earnings management that has the same impact on book and taxable income, the tax-to-book income ratio will be unaffected. Following the suggestion of Manzon and Plesko (2002) and Badertscher et al. (2009), I assume that executives prefer to manage earnings upward to meet their management earnings forecasts without increasing taxable income. Hence, I expect that firms with larger book-tax differences are more likely to meet management earnings forecasts. Following the argumentation of Phillips, Pincus, and Rego (2003), I claim that if larger BTDs are associated with higher probability of meeting management earnings forecasts, they are incrementally useful in detecting earnings management. The second hypothesis is as follows.

H2: *Book-tax differences are incrementally useful in detecting earnings management to meet/beat management earnings forecasts*.

BTDs can also arise besides tax planning or earnings management due to normal differences between the regulations for tax purposes and financial reporting (Blaylock, Shevlin, & Wilson, 2012) or by aggressive tax reporting in order to reduce the taxable income (Hanlon, 2005). Furthermore, executives can engage in earnings management that affect both tax and book income simultaneously (conforming earnings management). Therefore, the proxy to detect earnings management, tax-to-book income ratio, may be subject of estimation error.

3. Empirical Methodology

3.1 Research Design

3.1.1 Meeting Management Earnings Forecasts

This study uses meeting or beating management earnings forecast as a proxy for detecting earnings management. *Meet* indicates whether the firm meets the management earnings forecasts (*Meet* = 1) or not (*Meet* = 0). Management earnings forecast errors (*MngError*) are calculated by the difference between the current earnings measure and the forecast value. I use the most recent management earnings forecasts because they better capture market expectations and represent the benchmark for managers. In the robustness checks, the sample is restricted by the extent of management earnings forecast errors. *Meet5*, *Meet10*, or *Meet15* are used as a binary dependent variable for firms that miss or beat the forecast by maximum of 5 cents, 10 cents, and 15 cents, respectively.

3.1.2 Accruals

I use the model of Dechow, Richardson, and Tuna (2003) to estimate discretionary accruals. In contrast to Dechow, Sloan, and Sweeney (1995), they assume that not all credit sales are discretionary. The expected change in credit sales/receivables controls for their non-discretionary part and is captured by k. While the modified Jones' model (1990) classifies the change in receivables ($\Delta Receiv$) as discretionary, the model of Dechow, Richardson, and Tuna (2003) classifies the expected change in receivables based on changes in sales ($\Delta Sales$) as non-discretionary. I estimate k as the coefficient from the regression of $\Delta Receiv$ on $\Delta Sales$ for each two-digit SIC code and quarter ($\Delta Receiv_q = \alpha + k\ \Delta Sales_q + \varepsilon$). k is restricted to lie between 0 and 1. Dechow, Richardson, and Tuna (2003) include the lagged scaled total accruals ($TotAcc_{i,q\text{-}1}/Assets_{i,q\text{-}2}$) to capture the predictable portion of total accruals and they adjust for future sales ($\Delta Sales_{q+1}$). The authors argue that if a firm is growing and therefore, increases its inventory to account for expected future sales, this expected increase in inventory does not represent the discretionary part.

For quarterly data, previous studies include indicator variables for fiscal quarters to calculate accruals (e.g., Barton & Simko, 2002; Gong, Louis, & Sun, 2008; Greco, 2012). Managers' incentives and discretion for earnings management may vary across quarters (Jeter & Shivakumar, 1999). Altamuro, Beatty, and Weber (2005) and Kerstein and Rai (2007) show greater earnings management in the fourth quarter (see Dechow, Ge, & Schrand, 2010, for literature review). I modify the model of Dechow, Richardson, and Tuna (2003) by including a binary variable *4Fqtr* to capture the effects of the fourth quarter because they use annual data (Note 2). The estimated error terms from the cross-sectional regression for each two-digit SIC code and quarter represents the discretionary accruals (DiscAcc).

$$\frac{TotAcc_{iq}}{Assets_{i,q\text{-}1}} = \beta_0 + \beta_1 \frac{1}{Assets_{i,q\text{-}1}} + \beta_2 \frac{(1+k)\Delta Sales_{iq} - \Delta Receiv_{iq}}{Assets_{i,q\text{-}1}} + \beta_3 \frac{PPE_{iq}}{Assets_{i,q\text{-}1}} + \beta_4 \frac{TotAcc_{i,q\text{-}1}}{Assets_{i,q\text{-}2}} + \beta_5 \frac{\Delta Sales_{i,q+1}}{Sales_{iq}} + \beta_6 4Fqtr_q + \varepsilon_{iq}. \quad (1)$$

where i stands for the firm and q for the quarter. To avoid possible problems resulting from non-operating events such as reclassification or acquisitions in estimating accruals using a balance sheet approach, accruals are calculated using the data from the statements of cash flows (Hribar & Collins, 2002). *TotAcc* is total accruals calculated by income before extraordinary items minus operating cash flows (Compustat item "IBCQ" – [Compustat item "OANCFY" – Compustat item "XIDOCY"]), $\Delta Receiv$ is change in accounts receivable (Compustat item "RECTQ" in q – Compustat item "RECTQ" in q–1), *PPE* (Note 3) is gross property, plant, and equipment (Compustat item "PPEGTQ"), and $\Delta Sales_{q+1}$ is change in revenues (Compustat item "SALEQ" in q + 1 – Compustat item "SALEQ" in q). The variables are scaled (i.e., normalized) by total assets (Compustat item "ATQ"). *4Fqtr* is an indicator variable, which equals 1 for the fourth fiscal quarter, and 0 otherwise.

3.1.3 Book-Tax Differences

I use the methodology developed by Manzon and Plesko (2002) and Lev and Nissim (2004) to calculate BTDs. Because tax return data is not publicly available, Lev and Nissim (2004) construct an after tax ratio of tax-to-book income (*TAX*), using accounting data. Investigating tax information as a proxy for earnings quality, prior studies focus on specific tax accounts, e.g., deferred taxes or valuation allowance. Lev and Nissim (2004) argue that the advantage of *TAX* is that it reflects temporary (e.g., depreciation) and permanent differences (e.g., goodwill impairment), and tax accruals (valuation allowance). Prior literature points out that calculating taxable income using accounting data can be subject of estimation error (see Hanlon, 2005; Desai & Dharmapala, 2006, for more details). For instance, the tax rate for foreign operations may differ from the U.S. statutory rate that used to estimate taxable income. Furthermore, net operating losses (NOLs) can result in a tax refund or tax expense of zero. Therefore, the use of financial data offers little information about taxable income of NOL-firms (Hanlon, 2003).

The taxable income is estimated as current tax expense divided by the U.S. statutory tax rate (τ) (see Lev & Nissim, 2004, for a detailed discussion). I calculate the quarterly current tax expense as a difference between total income taxes (Compustat item "TXTQ") less deferred income taxes (Compustat item "TXDIQ"). If deferred taxes are not reported, they are replaced by zero. The statutory tax rate is 35% for the period analyzed (1995-2010). The after tax ratio of tax-to-book income (*TAX*) is calculated as taxable income multiplied by $(1 - \tau)$ divided by income before extraordinary items (Compustat item "IBQ").

Prior studies show that book-tax differences vary across industries and years (e.g., Plesko, 1999; Desai, 2003). Following previous research, I rank *TAX* to control for these issues. Moreover, ranking the proxies mitigates potential estimation errors of taxable income and overweighting of outlying observations (Hanlon, 2005; Weber, 2009).

While Lev and Nissim (2004) use industry based quintile ranks, Weber (2009) uses, among others, decile ranks by calendar year. To robust my results, I use different procedures for ranking of TAX. *r_TAXy* is the decile ranking of *TAX* for each fiscal year scaled to range from [0,1]. *r_TAXyi* is the decile ranking of *TAX* for each fiscal year and industry (two-digit SIC code) scaled to range from [0,1]. *R_TAXi* is an ordered categorical variable within industries (two-digit SIC code) with values between 1 (lowest quintile of *TAX*) and 5 (highest quintile of *TAX*). *R_TAXyi* is an ordered categorical variable within fiscal year and industry (two-digit SIC code) with values between 1 and 5. Firms with higher book income relative to tax income have lower tax-to-book income ratio (*TAX*), and therefore included in lower ranks of *TAX*.

In section 4.3, I develop the proxy for the discretionary part of BTDs (*DiscBTD*) and calculate a proxy for tax avoidance activity (*TaxAvoid*) using the methodology of Desai and Dharmapala (2006) to analyze whether they have an incremental information content for detecting earnings management.

3.1.4 Regression Method

Following Kraft, Lee, and Lopatta (2014), I use a logistic regression to analyze the association between meeting management earnings forecasts and BTDs. The logistic regression presents odds ratios, which quantify the likelihood of meeting management earnings forecast. Firstly, I analyze whether managers use accrual-based earnings management to meet their earnings forecasts.

Model 1:

$$log\left(\frac{Prob(event)}{Prob(noevent)}\right)=Meet_q=\alpha_0+\alpha_1 DiscAcc_q+\alpha_2 Profit_q+\alpha_3 Size_q+\alpha_4 Issue_{q+1}+\alpha_5 Litig_q$$
$$+\alpha_6 CFOVol_q+\alpha_7 Range_q+\alpha_8 Horizon_q+\sum_{m=1}^{M}\alpha_{9m} Industry_q+\sum_{y=1}^{Y}\alpha_{10} year_y+\varepsilon_q \quad (2)$$

where $\left(\frac{Prob(event)}{Prob(noevent)}\right)$ is the ratio of probability of meeting management earnings forecasts to the probability of missing the forecast, *Meet* is indicator variable which equals 1 if the firm meets or beats the management earnings forecast, and 0 otherwise. Firm subscripts are suppressed. *Year* indicates the fiscal year (Note 4). I use several control variables, which are described below.

Secondly, the study investigates whether larger BTDs – beyond higher discretionary accruals – increase the probability of meeting management earnings forecasts and thus, indicate usefulness to discretionary accruals in detecting earnings management. Therefore, I include discretionary accruals and the proxy for BTDs in one regression.

Model 2:

$$log\left(\frac{Prob(event)}{Prob(noevent)}\right)=Meet_q=\alpha_0+\alpha_1 DiscAcc_q+\alpha_2 Rank_{TAX_q}+\alpha_3 Profit_q+\alpha_4 Size_q+\alpha_5 Issue_{q+1}$$
$$+\alpha_6 Litig_q+\alpha_7 CFOVol_q+\alpha_8 Range_q+\alpha_9 Horizon_q+\sum_{m=1}^{M}\alpha_{11m} Industry_q+\sum_{y=1}^{Y}\alpha_{12} year_y+\varepsilon_q \quad (3)$$

where *Rank_TAX* is a proxy for the ranked tax-to-book income ratio (*TAX)* calculated as *r_TAXy*, *r_TAXyi*, *R_TAXi*, or *R_TAXyi*.

I expect a positive relationship between meeting earnings forecasts (*Meet*) and discretionary accruals (*DiscAcc*). This implies that discretionary accruals are useful in detecting earnings management and that firms are more likely to meet the management earnings forecasts when they use income-increasing accruals (H1). As described in section 2.2, I propose that upward earnings management to meet management earnings forecasts results in larger BTDs. Using the tax-to-book income ratio (*TAX*), greater earnings management leads to lower *TAX* that are included in lower quintiles (*R_TAXi*, or *R_TAXyi*) or deciles (*r_TAXy*, *r_TAXyi*). Therefore, I expect that *Rank_TAX* is negatively associated with the probability of meeting management earnings forecasts.

Exponentiated coefficients (e^{β}) from a logistic regression represent the odds ratio (α). The odds are defined as the ratio of the probability of success (meeting management earnings forecasts, *Meet* = 1) to the probability of failure (missing the earnings forecasts, *Meet* = 0). The percentage change in odds for a unit change in the explanatory variable is calculated by the difference of the odds ratio minus one and then multiplied by 100. If the change in odds is positive (negative), a unit change in the independent variables increases (decreases) the probability of meeting management earnings forecasts.

3.1.5 Control Variables

Following previous research, I include control variables that could have an impact on earnings and/or earnings forecasts. For instance, Burgstahler and Dichev (1997) and Dechow, Richardson, and Tuna (2003) report that executives manage earnings to avoid losses (Degeorge, Patel, & Zeckhauser, 1999). Therefore, I include an indicator variable (*Profit*) which equals 1 if firm's actual earnings (EPS) equal at least zero, and 0 otherwise. I expect a positive relation between *Meet* and *Profit*. Previous studies on equity issuance show that firms increase the frequency of earnings forecasts (e.g., Ruland & Tung, 1990) and use earnings management to meet the earnings benchmark around the time of an equity issuance (e.g., Cohen & Zarowin, 2010). I control for common shares issuances (*Issue*) in the following quarter scaled by the market value at the beginning of the quarter (Compustat item "CSHIQ") / Compustat item "PRCCQ" x Compustat item "CSHOQ"). Prior studies report that managers' forecasting behavior is associated with firm's size (e.g., Baginski, Hassell, & Kimbrough, 2002). Therefore, I include the proxy *Size*, which is calculated by the logarithm of total assets at the end of the quarter (Compustat item "ATQ"). Gong, Li, and Xie (2009) report lower forecasts errors for larger firms and Baginski and Hassell (1997) conclude that larger firms benefit less from precise earnings forecasts. I propose that larger firms have more possibilities to manage earnings towards the earnings forecasts and have a higher reputation risk. Therefore, I expect that larger firms are more likely to meet management earnings forecasts. Baginski, Hassell, and Kimbrough (2002) show that litigation costs affect managerial incentives to manage earnings or to bias forecasts. I include the dummy variable (*Litig*) that equals 1 if the firm belongs to one of the four industries that are most at risk of litigation (biotechnology, computer, electronics, and retail) (Francis, Philbrick, & Schipper, 1994), and 0 otherwise, expecting a positive relationship. Following Gong, Li, and Xie (2009) and Kraft, Lee, and Lopatta (2014), I use cash flow volatility (*CFOVol*) to control for business development. *CFOVol* is the standard deviation of operating cash flows (as described above) scaled by the lagged total assets up to the last 20 quarters. Xu (2010) shows that managers overestimate the accruals persistency in range forecasts by reporting a negative relationship between current accruals and the following earnings forecasts. A dummy variable (*Range*) is included, which is equal to 1 if a firm discloses a range forecast and 0 otherwise, to control for forecast precision. I do not predict a relationship between *Meet* and the control variable *Range* because this paper does not focus on the accuracy of forecasts. Ajinkya, Bhojraj, and Sengupta, 2005 report that managers' forecasts with shorter horizon are less pessimistic. However, Zang (2012) proposes that during the period, firm can use real actions and accrual-based earnings management to meet the earnings target. I control for the forecast horizon using the variable (*Horizon*), calculated by the logarithm difference of days between the forecast date and the period end.

3.2 Sample Development

Management forecasts of quarterly earnings are collected from the First Call's Company Issued Guidance (CIG) database for the period 1995-2010 (Note 5). Forecasts prior to 1995 are excluded due to little coverage in the CIG database. Chuk, Matsumoto, and Miller (2013) discuss the characteristics of the database. They report that firms, which release an EPS forecast and at least one specific dollar amount are more likely to be represented on CIG. Therefore, I keep only point and closed-range forecasts in the sample and exclude open-range and qualitative estimates and only investigate EPS forecasts. For closed-range estimates, I use the average forecast. Chuk, Matsumoto, and Miller (2013) note that the coverage of CIG is more complete for forecasts after 1997. To address this issue, I exclude management earnings forecasts prior to 1997, or to 1998 in untabulated analyses (available on request). The results are similar to the findings of this paper and the inferences are unchanged (Note 6). I include management earnings forecasts for quarter $q + 1$ issued at or after the actual earnings reporting date for quarter q and before the earnings announcement for quarter $q + 1$. If several forecasts are provided, I use the last earnings forecast. Actual earnings are obtained from the First Call Historical Database (FCHD). This results in 31,440 observations. Following prior studies, regulated firms such as utilities (SIC codes 4400-5000 from Compustat) and financial institutions (SIC codes 6000-6999) are excluded because they are likely to have different earnings management incentives in comparison to non-regulated firms, or they do not have to account for income taxes, such as mutual funds or trusts. Observations with missing financial data from Compustat are dropped and management earnings forecast errors are truncated at the 1st and 99th percentiles. Following prior literature, observations with negative current tax expense are excluded (Hanlon, 2005; Weber, 2009). For the calculation of quarterly discretionary accruals, at least six two-digit SIC-quarter observations are required (Note 7). The final sample comprises 16,224 (1,713) observations (firms).

4. Results

4.1 Descriptive Statistics for the Earnings Management Examination

Table 1 provides the definitions of the variables used in the analyses and table 2 presents the descriptive statistics. Both the mean and the median of discretionary accruals are 0.000. The mean discretionary accruals of firms that meet or beat their management earnings forecasts are positive (0.001), while the discretionary accruals for firms that miss their earnings targets are negative (-0.001). The mean comparison test for the subgroups shows that they are statistically different. Using decile ranking of *TAX* (*r_TAXy*), the *t*-test reveals no significant difference between the two groups. In contrast, *r_TAXyi* and quintile ranked *TAX* (*R_TAXi* and *R_TAXyi*) are statistically different in the two subgroups. The mean *Size* of firms that meet the earnings benchmark is higher and statistically different from firms, which miss the management earnings forecasts. Untabulated results reveal 9,410 (5,608) observations for *Profit* equals 1 when firms meet (miss) management earnings forecasts. There are 8,030 (4,575) range forecasts when managers meet (miss) the earnings benchmarks. This implies that profitable firms and companies with a range forecast more frequently meet the management earnings forecasts as discussed in section 3.1. The mean comparison test shows that *Profit* and *Litig* are statistically different in the subgroups.

Table 1. Definition of variables

Meet	Indicator variable which equals 1 if firm's realized earnings meet or beat management earnings forecasts, and 0 otherwise.
Meet5, Meet10, Meet15	Indicator variable which equals 1 if firm's realized earnings meet or beat management earnings forecasts by 5 cents or less, 10 cents or less, or 15 cents, respectively, and 0 otherwise.
MngError	Management earnings forecast error; actual EPS less management earnings forecast EPS.
DiscAcc	Discretionary accruals, defined as the error term from the cross-sectional regression below for each two-digit SIC code and quarter. $\frac{TotAcc_{iq}}{Assets_{i,q-1}} = \alpha_0 + \alpha_1 \frac{1}{Assets_{i,q-1}} + \alpha_2 \frac{(1+k)\Delta Sales_{iq} - \Delta Receiv_{iq}}{Assets_{i,q-1}} + \alpha_3 \frac{PPE_{iq}}{Assets_{i,q-1}} + \alpha_4 \frac{TotAcc_{i,q-1}}{Assets_{i,q-2}} + \alpha_5 \frac{\Delta Sales_{i,q+1}}{Sales_{i,q}} + \alpha_6 4Fqtr_q + \varepsilon_{iq}$ *TotAcc* represents total accruals for firm *i* in quarter *q* calculated by income before extraordinary items less operating cash flows (Compustat item "IBCQ" – [Compustat item "OANCFY" – Compustat item "XIDOCY"]), *ΔReceiv* is change in accounts receivable (Compustat item "RECTQ" in *q* – Compustat item "RECTQ" in *q*–1), PPE is gross property, plant, and equipment (Compustat item "PPEGTQ"), $\Delta Sales_{q+1}$ is change in revenues from following quarter (Compustat item "SALEQ" in *q* + 1 – Compustat item "SALEQ" in *q*) all variables deflated by total assets (Compustat item "ATQ"). *4Fqtr* is an indicator variable which equals 1 for the fourth fiscal quarter and 0 otherwise.
TAX	Net tax-to-book income, defined as taxable income * (1 – τ) / income before extraordinary items (Compustat item "IBQ"). τ is the statutory tax rate (35%). Taxable income is calculated as the difference between total income taxes (Compustat item "TXTQ") less deferred income taxes (Compustat item "TXDIQ") divided by τ.
r_TAXy	Ranked tax-to-book income ratio; decile ranking of *TAX* for each fiscal year scaled to range from [0,1]
r_TAXyi	Ranked tax-to-book income ratio; decile ranking of *TAX* for each fiscal year and industry (two-digit SIC code) scaled to range from [0,1].
R_TAXi	Ranked tax-to-book income ratio; ordered categorical variable within industries (two-digit SIC code) with values between 1 (lowest quintile of TAX) and 5 (highest quintile of TAX) based on two-digit SIC code.
R_TAXyi	Ranked tax-to-book income ratio; ordered categorical variable within industries (two-digit SIC code) with values between 1 (lowest quintile of TAX) and 5 (highest quintile of TAX) in a given fiscal year.
BT	Book-tax differences, difference between income before extraordinary items and taxable income scaled by lagged total assets.
NormAcc	Normal accruals, estimated as fitted values from the following panel regression for a given fiscal year and two-digit SIC code.
DiscBTD	Discretionary BTDs, the combined residual from the following panel regression using fixed effects. $BT_{iq} = \beta_1 NormAcc_{iq} + \mu_i + \varepsilon_{iq}$ $DiscBTD_{iq} = \mu_i + \varepsilon_{iq}$
TaxAvoid	Tax avoidance, combined residual from the following panel regression using fixed effects. $BT_{iq} = \beta_1 TotAcc_{iq} + \mu_i + \varepsilon_{iq}$ $TaxAvoid_{iq} = \mu_i + \varepsilon_{iq}$
Profit	Indicator variable; equals to 1 if firms actual EPS are higher than or equal to zero, and 0 otherwise.
Size	Natural logarithm of total assets (Compustat item "ATQ") at the end of quarter *q*.

Issue	Common shares issuances (Compustat item "CSHIQ") in the following quarter scaled by market value of equity (Compustat item "PRCCQ" x Compustat item "CSHOQ")at the beginning of the.
Litig	Indicator variable, equals to 1 if the firm belongs to one of the four industries that are most at risk of litigation (biotechnology, computer, electronics, and retail), and 0 otherwise.
$CFOVol_t$	Cash flow volatility; calculated by the standard deviation of operating cash flows (Compustat item "OANCFY" – Compustat item "XIDOCY"),) divided by the lagged total assets (Compustat item "ATQ") for maximum the last 20 quarters.
$Range_t$	Forecast specificity; equal to 1 if a firm discloses a range forecast, and 0 otherwise.
Horizon	Forecast horizon; logarithm difference of days between the forecast's date and period-end for management earnings forecasts.
IncomeXTR	Income before extraordinary items (Compustat item "IBQ")

Note. Table 1 describes the variables used in the paper.

Table 2. Descriptive statistics

							Meet = 1 (*n* = 9,951)		Meet = 0 (*n* = 6,273)		
	Mean	Std Dev	Median	Min	Max	n	Mean	Median	Mean	Median	
DiscAcc	0.000	0.028	0.000	-0.291	0.212	16,224	0.001	0.000	-0.001	0.000	***
MngError	-0.032	0.157	0.010	-1.100	0.470	16,224	0.041	0.025	-0.147	-0.070	***
r_TAXy	0.5	0.3	0.5	0.1	1.0	16224	0.5	0.5	0.6	0.6	*
r_TAXyi	0.5	0.3	0.5	0.1	1.0	16224	0.5	0.5	0.5	0.6	
R_TAXi	3.0	1.4	3.0	1.0	5.0	16,224	3.0	3.0	3.1	3.0	***
R_TAXyi	3.0	1.4	3.0	1.0	5.0	16224	3.0	3.0	3.1	3.0	*
Size	6.7	1.6	6.6	3.3	10.8	16,224	6.8	6.6	6.6	6.6	***
CFOVol	0.066	0.039	0.055	0.018	0.246	16,224	0.066	0.055	0.067	0.055	*
Issue	0.1	0.1	0.0	0.0	0.6	16,224	0.1	0.0	0.1	0.0	
Horizon	3.5	1.0	4.0	0.0	6.2	16,224	3.5	4.0	3.4	3.9	***

Note. Panel A of Table 2 provides the number of observations of subgroups meeting/beating vs. missing management earnings forecasts. The variables are as defined in Table 1. Variables are winsorized at the 1st and 99th percentiles. I compare the differences between the two subgroups using a *t*-test on mean. ***, **, and * indicate the the two-tailed *p*-value<0.01, *p*<0.05, and *p*<0.1, respectively.

4.2 Spearman Correlations

Table 3 contains Spearman's rank correlations. I find a positive and significant correlation (Spearman's rho = 0.0299, sig = 0.000) between discretionary accruals (*DiscAcc*) and the proxy for meeting management earnings forecasts (*Meet*). As expected, Spearman's rho (-0.0306) reflects a negative and significant correlation (sig = 0.000) between *Meet* and *R_TAXi*. This confirms the assumption that lower *TAX* (higher book income relative to tax income) is associated with meeting management earnings forecasts. However, using other ranks of *TAX*, there is no significant relation between *Meet* and *r_TAXy, r_TAXyi*, or *r_TAXyi*. Moreover, proxies for ranked *TAX* are negatively associated with management earnings forecast errors (*MngError*) indicating that firms with higher book income relative to tax income (lower ranks of *TAX*) are associated with positive *MngError* (actual less forecast). However, I find a positive relation between *DiscAcc* and the proxies for BTDs. The results show positive and significant Spearman's rho between *Meet* and *Profit*, *Size*, *Issue, Horizon*, *Range,* and *Litig* supporting the discussions described in section 3.1. However, *CFOVol* shows a negative Spearman's rho. The correlations between the variables used in regressions are modest suggesting there are no concerns regarding multicollinearity (Note 8).

Table 3. Spearman's rank correlations

	Meet	DiscAcc	MngError	r_TAXy	r_TAXyi	R_TAXy	R_TAXyi	Profit	Size	Issue	CFOVol	Horizon	Range	Litig
Meet	1													
DiscAcc	0.0299*	1												
MngError	0.8435*	0.0278*	1											
r_TAXy	-0.012	0.0319*	-0.0258*	1										
r_TAXyi	-0.0048	0.0438*	-0.0147*	0.8769*	1									
R_TAXi	-0.0306*	0.0409*	-0.0474*	0.8660*	0.9432*	1								
R_TAXyi	-0.0105	0.0389*	-0.0216*	0.8649*	0.9750*	0.9365*	1							
Profit	0.0959*	0.0785*	0.0820*	0.3837*	0.3536*	0.3441*	0.3274*	1						
Size	0.0338*	-0.0052	0.0508*	0.0838*	0.0546*	0.0268*	0.0432*	0.2732*	1					
Issue	0.0717*	-0.008	0.0559*	-0.1402*	-0.1203*	-0.1179*	-0.1158*	-0.2892*	-0.4772*	1				
CFOVol	-0.0140*	-0.0428*	-0.0257*	-0.0356*	-0.0712*	-0.0513*	-0.0615*	-0.1302*	-0.2995*	0.0873*	1			
Horizon	0.0506*	0.0109	0.1030*	-0.0631*	-0.0039	-0.0343*	-0.0158*	0.0517*	0.0806*	-0.0579*	-0.0829*	1		
Range	0.0908*	-0.0082	0.1097*	0.0367*	0.0513*	0.0137*	0.0423*	0.0418*	0.0052	0.0391*	-0.0870*	0.1202*	1	
Litig	0.0401*	-0.0154*	0.0221*	-0.0611*	-0.0551*	-0.0566*	-0.0667*	-0.0687*	-0.0937*	0.1671*	0.1814*	-0.0445*	-0.0294	1

Note. Panel A of Table 3 presents the Spearman correlations for the exclusive sample. The variables are as defined in Table 1. All continuous variables are winsorized at the 1st and 99th percentiles. * indicates significant Spearman coefficients at two-sided p-value ≤ 0.10.

4.3 Regression Results

Using the regression models described in section 3.1, I analyze whether book-tax differences are incrementally useful to discretionary accruals in detecting earnings management to meet management earnings forecasts. Table 4 reports the logistic regression results for the different proxies of BTDs (*r_TAXy*, *r_TAXyi*, *R_TAXi*, and *R_TAXyi*) (Note 9).

If the odds ratio is greater (lower) than one, the variable has a positive (negative) effect on the probability of meeting management earnings forecast. I report the Chi-square statistics for the joint significance of explanatory variables by testing whether the parameters are zero. The test is performed separately for the variables of interest and control variables, year, and industry dummies. To analyze whether BTDs provide incremental information in detecting earnings management, I compare the model including only discretionary accruals (model 1) and the model including both discretionary accruals and proxies for BTDs (model 2). In non-linear regression, there is no measure of fit that is comparable with R^2 for linear regressions (see Hosmer and Lemeshow, 2004; Green, 2012, for details). I compare the models using the area under the Receiver Operating Characteristic (ROC) curve and the Bayesian information criterion (BIC). The ROC curve plots detecting the true signal (sensitivity) against the false signal (specificity). The area under the ROC curve gives model's ability to discriminate between meeting or missing earnings benchmark. In literature, BIC is used to compare logistic models (Cameron & Trivedi, 2010; Green, 2012). The model with lower BIC is preferred.

The results show that higher discretionary accruals (income-increasing accruals) increase the probability of meeting management earnings forecasts. This implies that discretionary accruals are useful in detecting earnings management, supporting hypothesis one (H1). The positive and statistically significant change in the odds ratio (odds ratio – 1) ranges from 9.646 using *r_TAXyi* as a proxy for BTDs to 9.275 using model 1, both significant at 1% level. The change in odds ratio for the proxies of BTDs is negative, varying from -0.057 (*R_TAXyi*) to -0.290 (*r_TAXy*) and significant at 1% level. These findings imply that firms with larger book income relative to tax income (lower ranks of *TAX*) are more likely to meet the earnings benchmarks. In accordance with hypothesis 2 (H2), each of the ranked *TAX* is incrementally useful in detecting earnings management to meet management earnings forecasts.

Consistent with my expectations, companies with positive EPS (*Profit*) and larger firms (*Size*) appear to be more likely to meet the earnings forecasts showing positive and significant change in odds ratio. Furthermore, firms that plan to issue new shares in the subsequent quarter (*Issue*), companies with higher litigation risk (*Litig*) and a range forecasts (*Range*) appear to be more likely to meet their earnings targets. *Issue, Litig*, and *Range* show a positive and significant effect on the probability of meeting management earnings forecasts. The positive change in odds for cash flow volatility (*CFOVol*) implies that firms also manage cash flows (real earnings management, such as an increase in sales or a reduction in discretionary expenses) to meet the earnings benchmarks. However, longer forecast periods (*Horizon*) have a negative impact on the probability of meeting management earnings forecasts showing negative change in odds.

The area under the ROC curve is a measure of discrimination assessing model's ability to classify the observations correctly in firms that meet/beat (*Meet* = 1) or miss (*Meet* = 0) the management earnings forecasts. If BTDs are incrementally useful to discretionary accruals in detecting earnings management, the measure of discrimination should increase. Using model 1, the area under the ROC curve is 0.687. Including the proxies for BTDs, the measure slightly increases. Under model 2, the area under the ROC varies between 0.689 and 0.688. The area under the ROC curve is nearly 70%, which indicates an appropriate discrimination (Hosmer & Lemeshow, 2004). Moreover, BIC is lower for model 2 indicating that the model including both discretionary accruals and BTDs is considered to be better. Overall, the results indicate that book-tax differences are incrementally useful to discretionary accruals in detecting earnings management supporting the hypothesis two (H2).

4.3.1 Sensitivity Analysis

Analyzing the relationship between meeting management earnings forecasts using accrual-based earnings management and insider trading, Kraft, Lee, and Lopatta (2014) report that their results are sensitive to the extent of management earnings forecast errors. I follow their methodology and use subsamples to analyze the information content of discretionary accruals and BTDs for earnings management when firms miss or beat management earnings forecasts by maximum of 5, 10, or 15 cents (*Meet*5, *Meet10*, or *Meet15*, respectively). Since the different proxies for ranked *TAX* show comparable results, Table 5 presents the results using *r_TAXyi*. The findings are comparable when I use *r_TAXy*, *R_TAXi*, or *R_TAXyi*.

Using *Meet10* and *Meet15* as dependent variables, the results support the findings above that *DiscAcc* and BTDs tend to be useful in detecting earnings management to meet management earnings forecasts. Using model 2, the change in odds for *DiscAcc* (*r_TAXyi*) is 3.340 and 5.479, respectively (-0.181 and -0.238, respectively). However, I find no significant change in odds for *DiscAcc* and *r_TAXyi* using *Meet5*. Untabulated results show that ranked *TAX* by year (*r_TAXy* and *R_TAXy*) show a negative (-0.137 and -0.031, respectively) and significant (sig = 0.096 and sig = 0.086, respectively) change in odds ratio. Overall, the results imply that book-tax differences are incrementally useful to discretionary accruals in detecting earnings management to meet the earnings benchmarks. However, the findings show that earnings management tends to be sensitive to the extent of management earnings forecasts supporting the results of Kraft, Lee, and Lopatta (2014). The area under the ROC curve including both discretionary accruals and BTDs is slightly larger than for discretionary accruals only. Comparing the information criterion, BIC for model 2 is smaller only using *Meet15*. Overall, these results imply that the information content of discretionary accruals and BTDs is greater for larger *MngError*.

Table 4. Logistic regression, meeting management earnings forecasts and BTDs

Dependent variable	Meet	Meet	Meet	Meet	Meet
	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Independent variables	*p*-value	*p*-value	*p*-value	*p*-value	*p*-value
DiscAcc	10.275***	10.696***	10.946***	10.867***	10.825***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
r_TAXy		0.710***			
		(0.000)			
r_TAXyi			0.716***		
			(0.000)		
R_TAXi				0.935***	
				(0.000)	
R_TAXyi					0.943***
					(0.000)
Profit	2.514***	2.842***	2.852***	2.844***	2.784***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	1.050***	1.044***	1.044***	1.043***	1.045***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Issue	2.530***	2.319***	2.327***	2.342***	2.373***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Litig	1.224***	1.205***	1.203***	1.203***	1.205***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CFOVol	7.148***	6.139***	6.197***	6.368***	6.495***

	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Range	1.096**	1.103**	1.104**	1.103**	1.104**
	(0.031)	(0.021)	(0.020)	(0.022)	(0.021)
Horizon	0.934***	0.932***	0.932***	0.932***	0.933***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.072***	0.082***	0.078***	0.084***	0.082***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	16,224	16,224	16,224	16,224	16,224
Year dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Likelihood ratio	1665	1689	1692	1690	1685
Area under ROC	0.687	0.688	0.689	0.688	0.688
BIC	-136,596	-136,611	-136,614	-136,612	-136,607
chi-square test indep.var.	229.0	252.7	255.3	253.9	248.7
chi-square test indep.var. *p*-value	0.000	0.000	0.000	0.000	0.000
chi-square test year dummies	811.4	810.5	809.6	778.0	805.2
chi-square test year dummies_*p*-value	0.000	0.000	0.000	0.000	0.000
chi-square test indstr. dummies	248.1	247.7	264.4	265.1	262.1
chi-square test indstr. dummies_*p*-value	0.000	0.000	0.000	0.000	0.000

Note. Table 4 provides the logistic regression results of models 1 and 2. The dependent variable *Meet* equals 1 if the firm meets or beats the management earnings forecast, 0 otherwise. Other variables are as defined in Table 1. A Chi-square test for the joint significance of independent variables, year dummies and industry dummies is performed separately. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate p-value<0.01, p<0.05, and p<0.1, respectively.

Table 5. Logistic regression, meeting management earnings forecasts and BTDs, sensitivity analysis

Dependent variable	Meet5		Meet10		Meet15	
Independent variables	Odds ratio *p*-value	Odds ratio *p*-value	Odds ratio *p*-value	Odds ratio *p*-value	Odds ratio *p*-value	Odds ratio *p*-value
DiscAcc	2.487	2.565	4.118**	4.340**	6.013***	6.479***
	(0.248)	(0.233)	(0.046)	(0.039)	(0.007)	(0.005)
r_TAXyi		0.895		0.819***		0.762***
		(0.188)		(0.008)		(0.000)
Profit	1.858***	1.938***	1.848***	1.994***	1.944***	2.154***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	1.057***	1.055***	1.109***	1.106***	1.125***	1.120***
	(0.001)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
Issue	0.570**	0.555**	0.787	0.750	1.200	1.125
	(0.027)	(0.021)	(0.300)	(0.216)	(0.422)	(0.606)
Litig	1.090	1.084	0.994	0.986	1.001	0.988
	(0.189)	(0.217)	(0.926)	(0.810)	(0.992)	(0.834)
CFOVol	2.463	2.352	3.734**	3.443**	4.397***	3.911***
	(0.140)	(0.162)	(0.017)	(0.026)	(0.005)	(0.010)
Range	1.078	1.082	1.085	1.091*	1.091*	1.098*
	(0.185)	(0.167)	(0.109)	(0.088)	(0.073)	(0.053)
Horizon	0.938***	0.937***	0.971	0.970	0.964*	0.964*
	(0.007)	(0.007)	(0.165)	(0.161)	(0.074)	(0.071)
Constant	0.731	0.751	0.274**	0.287**	0.147***	0.158***
	(0.646)	(0.676)	(0.028)	(0.034)	(0.000)	(0.001)
Observations	10,208	10,208	12,595	12,595	13,641	13,641
Year dummies	YES	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES	YES
Likelihood ratio	342.0	343.7	624.6	631.5	833.5	847.8
Area under ROC	0.613	0.613	0.637	0.638	0.651	0.653
BIC	-81,899	-81,891	-103,819	-103,816	-113,286	-113,291
chi-square test indep.var.	117.3	119.0	172.2	178.9	193.9	207.7

chi-square test indep.var. *p*-value	0.000	0.000	0.000	0.000	0.000	0.000
chi-square test year dummies	118.1	117.8	238.4	237.6	336.1	334.5
chi-square test year dummies_*p*-value	0.000	0.000	0.000	0.000	0.000	0.000
chi-square test indstr. dummies	53.66	67.04	94.36	105.7	130.7	141.3
chi-square test indstr. dummies_*p*-value	0.000	0.000	0.000	0.000	0.000	0.000

Note. Table 5 provides the logistic regression results of models 1 and 2. The dependent variable *Meet5*, *Meet10, and Meet15* equal 1 if the firm meets or beats the management earnings forecast by maximum of 5, 10, and 15 cents, respectively, and 0 otherwise. Other variables are as defined in Table 1. A Chi-square test for the joint significance of independent variables, year dummies and industry dummies is performed separately. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate *p*-value<0.01, *p*<0.05, and *p*<0.1, respectively.

4.3.2 Supplemental Analysis

Management earnings forecasts and tax avoidance.

Prior literature analyzes tax avoidance in different settings (see Hanlon & Heitzman, 2010, for literature review). Hanlon and Heitzman (2010) note that there is no universally accepted definition of tax avoidance. Following Dyreng, Hanlon, and Maydew (2008), I define tax avoidance broadly as (legal and illegal) strategies to minimize taxes, such as tax favored activities, transactions with explicit intent to decrease taxes or engaging in lobbying activities.

Desai and Dharmapala (2006) develop a metric for aggressive tax avoidance practices that is estimated as residuals by regressing BTDs on total accruals. The residuals reflect the component of BTDs that is not attributable to total accruals. This study calculates quarterly discretionary BTDs. Desai and Dharmapala (2006) state that they use ordinary least squares (OLS) regression, while Hoi, Wu, and Zhang (2013) use panel-data model with fixed-effects. I follow Hoi, Wu, and Zhang (2013), and use the within estimator to calculate the discretionary BTDs from the following panel regression with robust standard errors.

$$BT_{iq}=\beta_1 \frac{TotAcc_{iq}}{Assets_{i,q-1}}+\mu_i+\varepsilon_{iq} \quad (4a)$$

where *BT* is book-tax differences calculated as the difference between income before extraordinary items (Compustat item "IBCQ") and taxable income (as described in section 3.1.) scaled by lagged total assets (Compustat item "ATQ"). μ is the average value of the residual for firm *i* over the sample period; and ε is the deviation of the residual in quarter *q* from firm *i*'s average residual.

Desai and Dharmapala (2006) argue that the component of *BT*, which is attributable to total accruals reflects BTDs resulting from earnings management. The remaining part of *BT*, which is not determined by total accruals reflects firms' tax avoidance activity. My argumentation differs from Desai and Dharmapala (2006). In this study, total accruals are decomposed in normal and discretionary accruals and the latter is used as a proxy for earnings management. Therefore, book-tax differences can be decomposed in normal BTDs, the degree of *BT* resulting from earnings management and from tax avoidance. The component determined by total accruals reflects the normal and the part of BTDs resulting from earnings management. The residual from equation 4 (i.e. regression of *BT* on total accruals) comprises tax avoidance (*TaxAvoid*) as suggested by Desai and Dharmapala (2006). *TaxAvoid* is the combined residual from the panel regression (4a) using fixed effects.

$$TaxAvoid_{iq}=\mu_i+\varepsilon_{iq} \quad (4b)$$

In general, the degree of BTDs that is attributable to earnings management can be estimated by regressing *BT* on *DiscAcc*. These two proxies are highly correlated and would bias the results using model 2 because it requires to include both *DiscAcc* and a proxy for BTDs (Note 10). Therefore, I estimate the discretionary BTDs, which are beyond the normal part of BTDs. The normal part of BTDs is attributable to normal accruals (*NormAcc*) that are estimated using equation 1. Regressing *BT* on *NormAcc*, the residuals reflect discretionary BTDs that comprise earnings management and tax avoidance activity (*DiscBTD*).

$$BT_{iq}=\beta_1 NormAcc_{iq}+\mu_i+\varepsilon_{iq} \quad (5a)$$

$$DiscBTD_{iq}=\mu_i+\varepsilon_{iq} \quad (5b)$$

I suppose that greater earnings management and firm's tax avoidance activity result in larger BTDs that are positively associated with the probability of meeting management earnings forecasts. Using *TaxAvoid*, I analyze whether firms with greater tax avoidance activity are more likely to meet management earnings forecasts (Panel A of Table 6). Using *DiscBTD*, I investigate whether firms with larger BTDs resulting from earnings management and tax avoidance activity are associated with higher probability of meeting management earnings forecasts (Panel B of Table 6). Overall, a positive relationship between the proxies above and *Meet* would support hypothesis two (H2) that BTDs are incrementally useful in detecting earnings management.

Investigating *TaxAvoid* [*DiscBTD*], panel A [panel B] of table 6 shows positive and significant change in odds ratio for *DiscAcc* using *Meet* and *Meet15* (5.750 and 3.294, respectively) [3.621 and 2.517, respectively]. These findings support the hypothesis two (H2). Using model 2, I find a positive (change in odds ratio: 4.503, 1.323, and 2.043), and significant (sig = 0.000, sig = 0.055, and sig = 0.008) relationship between *TaxAvoid* and *Meet*, *Meet10*, and *Meet15*, respectively. These results imply that firms with a more aggressive tax activity are more likely to meet management earnings forecasts. The change in odds ratio for *DiscBTD* is positive (change in odds ratio: 4.037, 1.037, and 1.645) and significant (sig = 0.000, sig = 0.106, and sig = 0.021) for *Meet*, *Meet10*, and *Meet15,* respectively. As expected, higher discretionary book-tax differences increase the probability of meeting management earnings forecasts. This implies that BTDs are incrementally useful in detecting earnings management as suggested in H2. Using both model 1 and model 2 both show that the results tend to be sensitive to the extent of *MngError*. Restricting the sample to *MngError* not more than 5 cents, the proxies of interest are not associated with the probability of meeting management earnings forecasts. However, comparing *r_TAXyi*, *TaxAvoid*, and *DiscBT* as measures to detect earnings management, the metrics show similar results. The mean comparison test that analyzes differences in predicted probability of meeting the earnings benchmark using *r_TAXyi*, *TaxAvoid*, and *DiscBT*, shows no statistical difference between the proxies. This indicates that no one measure appears to be significantly more appropriate to detect earnings management.

Table 6. Logistic regression, meeting management earnings forecasts and tax avoidance

Panel A					
Dependent variable	Meet		Meet5	Meet10	Meet15
	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Independent variables	*p*-value	*p*-value	*p*-value	*p*-value	*p*-value
DiscAcc	10.275***	6.750***	2.004	3.138	4.294**
	(0.000)	(0.002)	(0.386)	(0.114)	(0.032)
TaxAvoid		5.503***	2.002	2.323*	3.043***
		(0.000)	(0.168)	(0.055)	(0.008)
Profit	2.514***	2.341***	1.805***	1.786***	1.858***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	1.050***	1.049***	1.056***	1.108***	1.124***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Issue	2.530***	2.693***	0.579**	0.811	1.253
	(0.000)	(0.000)	(0.032)	(0.366)	(0.324)
Litig	1.224***	1.214***	1.086	0.990	0.995
	(0.000)	(0.000)	(0.207)	(0.868)	(0.936)
CFOVol	7.148***	8.715***	2.671	4.149**	5.037***
	(0.000)	(0.000)	(0.110)	(0.010)	(0.002)
Range	1.096**	1.096**	1.078	1.085	1.090*
	(0.031)	(0.031)	(0.185)	(0.110)	(0.075)
Horizon	0.934***	0.934***	0.938***	0.971	0.965*
	(0.000)	(0.000)	(0.008)	(0.172)	(0.078)
Constant	0.072***	0.077***	0.752	0.283**	0.154***
	(0.000)	(0.000)	(0.676)	(0.032)	(0.001)
Observations	16,224	16,224	10,208	12,595	13,641
Year dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Likelihood ratio	1665	1683	343.9	628.3	840.6
Area under ROC	0.687	0.688	0.614	0.638	0.652
BIC	-136,596	-136,605	-81,892	-103,813	-113,284
chi-square test indep.var.	229.0	242.5	118.9	175.1	199.3
chi-square test indep.var. *p*-value	0.000	0.000	0.000	0.000	0.000
chi-square test year dummies	811.4	793.7	114.1	231.7	326.9
chi-square test year dummies_*p*-value	0.000	0.000	0.000	0.000	0.000

chi-square test indstr. dummies	248.1	256.9	66.56	104.1	138.7
chi-square test indstr. dummies_p-value	0.000	0.000	0.000	0.000	0.000

Note. Panel A of Table 6 provides the logistic regression results of models 1 and 2 estimating tax avoidance (*TaxAvoid*) based of total accruals. The dependent variable *Meet* equals 1 if the firm meets or beats the management earnings forecast, 0 otherwise. The dependent variable *Meet5*, *Meet10*, *and Meet15* equal 1 if the firm meets or beats the management earnings forecast by maximum of 5, 10, and 15 cents, respectively, and 0 otherwise. Other variables are as defined in Table 1. A Chi-square test for the joint significance of independent variables, year dummies and industry dummies is performed separately. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate *p*-value<0.01, *p*<0.05, and *p*<0.1, respectively.

Table 6. Continued, meeting management earnings forecasts and discretionary BTDs

Panel B					
Dependent variable	Meet		Meet5	Meet10	Meet15
	Odds ratio	Odds ratio	Odds ratio	Odds ratio	Odds ratio
Independent variables	*p*-value	*p*-value	*p*-value	*p*-value	*p*-value
DiscAcc	10.275***	4.621**	1.874	2.744	3.517*
	(0.000)	(0.017)	(0.453)	(0.179)	(0.075)
DiscBTD		5.037***	1.661	2.037	2.645**
		(0.000)	(0.316)	(0.106)	(0.021)
Profit	2.514***	2.340***	1.817***	1.792***	1.864***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	1.050***	1.049***	1.056***	1.109***	1.125***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Issue	2.530***	2.707***	0.577**	0.809	1.252
	(0.000)	(0.000)	(0.031)	(0.363)	(0.325)
Litig	1.224***	1.216***	1.088	0.991	0.997
	(0.000)	(0.000)	(0.201)	(0.883)	(0.953)
CFOVol	7.148***	8.611***	2.609	4.078**	4.947***
	(0.000)	(0.000)	(0.118)	(0.011)	(0.003)
Range	1.096**	1.096**	1.078	1.085	1.090*
	(0.031)	(0.032)	(0.185)	(0.110)	(0.074)
Horizon	0.934***	0.934***	0.938***	0.971	0.965*
	(0.000)	(0.000)	(0.008)	(0.174)	(0.080)
Constant	0.072***	0.077***	0.745	0.281**	0.152***
	(0.000)	(0.000)	(0.666)	(0.031)	(0.001)
Observations	16,224	16,224	10,208	12,595	13,641
Year dummies	YES	YES	YES	YES	YES
Industry dummies	YES	YES	YES	YES	YES
Likelihood ratio	1665	1681	343.0	627.3	838.9
Area under ROC	0.687	0.688	0.613	0.638	0.652
BIC	-136,596	-136,602	-81,891	-103,812	-113,282
chi-square test indep.var.	229.0	240.8	118.2	174.2	198.0
chi-square test indep.var. *p*-value	0.000	0.000	0.000	0.000	0.000
chi-square test year dummies	811.4	795.1	115.0	232.7	328.1
chi-square test year dummies_*p*-value	0.000	0.000	0.000	0.000	0.000
chi-square test indstr. dummies	248.1	257.2	66.54	104.1	138.6
chi-square test indstr. dummies_*p*-value	0.000	0.000	0.000	0.000	0.000

Note. Panel B of Table 6 provides the logistic regression results of models 1 and 2 estimating discretionary BTDs (*DiscBTD*) based of calculated normal accruals. The dependent variable *Meet* equals 1 if the firm meets or beats the management earnings forecast, 0 otherwise. The dependent variable *Meet5*, *Meet10*, *and Meet15* equal 1 if the firm meets or beats the management earnings forecast by maximum of 5, 10, and 15 cents, respectively, and 0 otherwise. Other variables are as defined in Table 1. A Chi-square test for the joint significance of independent variables, year dummies and industry dummies is performed separately. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate *p*-value<0.01, *p*<0.05, and *p*<0.1, respectively.

Table 7. Logistic regression, meeting management earnings forecasts and financial crisis

Panel A			
Dependent variable	Meet	Meet	Meet
	Odds ratio	Odds ratio	Odds ratio
Independent variables	*p*-value	*p*-value	*p*-value
DiscAcc	13.981***	11.429***	9.513***
	(0.000)	(0.000)	(0.002)
Crisis	6.520***	7.808***	7.814***
	(0.000)	(0.000)	(0.000)
Crisis x DiscAcc	0.255	0.033**	0.011***
	(0.348)	(0.024)	(0.005)
r_TAXyi	0.659***		
	(0.000)		
Crisis x r_TAXyi	1.598***		
	(0.002)		
TaxAvoid		2.472**	
		(0.037)	
Crisis x TaxAvoid		84.123***	
		(0.000)	
DiscBTD			2.265*
			(0.060)
Crisis x DiscBTD			82.279***
			(0.000)
Controls	YES	YES	YES
Observations	16,224	16,224	16,224
Likelihood ratio	1702	1704	1702
Area under ROC	0.6888	0.6889	0.6888
BIC	-136,565	-136,567	-136,565
chi-square test indep.var.	298.3	290.6	289.1
chi-square test indep.var. p-value	0.000	0.000	0.000
chi-square test year dummies	472.1	462.3	462.6
chi-square test year dummies_*p*-value	0.000	0.000	0.000
chi-square test indstr. dummies	263.5	256.3	256.6
chi-square test indstr. dummies_*p*-value	0.000	0.000	0.000
odds ratio for Crisis=1	8.243	8.022	8.069
odds ratio for Crisis=1 *p*-value	0.000	0.000	0.000

Note. Panel A of table 7 provides the logistic regression results of model 3 analyzing the impact of the financial crisis. The dependent variable *Meet* equals 1 if the firm meets or beats the management earnings forecast, 0 otherwise. Other variables are as defined in Table 1. A Chi-square test for the joint significance of independent variables, year dummies and industry dummies is performed separately. The *odds ratio for Crisis = 1* is calculated for median *DiscAcc* and median *r_TAXyi*, *TaxAvoid*, and *DiscBTD*. All continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * indicate *p*-value<0.01, *p*<0.05, and *p*<0.1, respectively.

Table 7. Continued, descriptive statistics for the pre-crisis and crisis-period

Panel B							
	Meet				Meet		
Crisis	0	1	Total	Crisis	0	1	Total
0	5,387	6,993	12,380	0	44%	56%	100%
1	886	2,958	3,844	1	23%	77%	100%
Total	6,273	9,951	16,224				

crisis-period, 2008-2010							
	Mean	Std Dev	Median	Min	Max	n	
TAX	0.768	1.072	0.811	-2.988	6.353	3,844	***
Taxable	86.8	223.4	18.0	0.0	1,764.2	3,844	*
IncomeXTR	79.4	406.6	12.3	-6,820.0	5,022.0	3,844	***
MngError	0.020	0.102	0.020	-1.050	0.470	3,844	***
DiscBTD	0.003	0.047	0.010	-0.787	0.227	3,844	***
TaxAvoid	0.004	0.045	0.009	-0.809	0.260	3,844	***
DiscAcc	0.000	0.030	0.000	-0.234	0.191	3,844	
r_TAXyi	0.5	0.3	0.5	0.1	1.0	3,844	
pre-crisis period, 1995-2007							
	Mean	Std Dev	Median	Min	Max	n	
TAX	0.877	0.977	0.957	-2.988	6.353	12,380	***
Taxable	81.5	206.2	17.6	0.0	1,764.2	12,380	*
IncomeXTR	62.4	254.6	10.8	-4,802.5	4,926.0	12,380	***
MngError	-0.048	0.167	0.005	-1.100	0.470	12,380	***
DiscBTD	-0.001	0.050	0.007	-1.316	0.308	12,380	***
TaxAvoid	-0.001	0.049	0.005	-1.281	0.310	12,380	***
DiscAcc	0.000	0.028	0.000	-0.291	0.212	12,380	
r_TAXyi	0.5	0.3	0.5	0.1	1.0	12,380	

Note. Panel B of table 7 provides descriptive statistics for the crisis-period (2008-2010) and the pre-crisis period (1995-2007). The variables are as defined in Table 1. I compare the differences between the two subgroups using a *t*-test on mean. ***, **, and * indicate the the two-tailed *p*-value<0.01, *p*<0.05, and *p*<0.1, respectively.

Management earnings forecasts and financial crisis.

I perform additional analysis, in which I analyze the influence of the financial crisis on meeting management earnings forecasts. The financial crisis of 2008 caused economic and social costs, uncertainty in capital markets and might have changed managers' disclosure behavior or their activities to meet earnings benchmarks. I suppose that firms are more likely to meet management earnings forecasts in order to increase trust in firm's performance and financial stability. I include an indicator variable (*Crisis*) to indicate firm-years during the financial crisis. *Crisis* equals one for the fiscal years 2008-2010, and zero otherwise. I interact *Crisis* with *DiscAcc* and the proxies for BTDs to draw conclusions about the effect of the financial crisis on *Meet* using the following logistic regression.

Model 3:

$$log\left(\frac{Prob(event)}{Prob(noevent)}\right)=Meet_q=\alpha_0+\alpha_1 DiscAcc_q+\alpha_2 Crisis_q+\alpha_3 Crisis_q\times DiscAcc_q+\alpha_4 A_q$$
$$+\alpha_5 Crisis_q\times A_q+\sum Controls+\varepsilon_q \quad (6)$$

where *A* is *r_TAXyi*, *TaxAvoid*, or *DiscBTD*. The control variables (*Controls*) are the same as described above. Because the indicator variable *Crisis* is interacted with continuous variables, I must classify a specific value of *r_TAXyi*, *TaxAvoid*, and *DiscBTD* to estimate the impact of the financial crisis (i.e. odds ratio) on the probability of meeting management earnings forecasts (Hosmer & Lemeshow, 2004). I calculate the odds ratio for the median of continuous variables (Note 11). For instance, median *r_TAXyi* is 0.5. The effect of the financial crises (*Crisis* = 1) is estimated by the exponentiated sum of coefficients for *Crisis* and the interaction term multiplied by the median *r_TAXyi* $\left[exp(\beta_{Crisis}+0.5\times\beta_{Crisis\times r\_TAXyi})\right]$.

The results of panel A of table 7 show a positive odds ratio for *Crisis* (8.243, 8.022, and 8.069) analyzing *r_TAXyi*, *TaxAvoid*, or *DiscBTD*, respectively, all significant at 1% level. This indicates that firms are more likely to meet management earnings forecasts during the financial crisis. Reasons for this finding may be that managers disclose more pessimistic forecasts or use more extensively earning management to ensure that they meet their earnings targets, and therefore, to avoid negative market reactions. To analyze the differences in the two sub-periods, I report descriptive statistics for the pre-crisis period (1995-2007) and the crisis-period (2008-2010) in panel B of table 7.

The descriptive statistics show an increase of 36% of firms that meet the earnings benchmark during the financial crisis (77%) in comparison to companies that meet the targets in the pre-crisis period (56%). Moreover, mean and median *MngError* is higher during the financial crisis (0.020 and 0.020, respectively) in comparison to the pre-crisis period (-0.048 and 0.005, respectively). Higher positive management earnings forecast errors indicate that managers disclose pessimistic earnings forecasts during the financial crisis. Interesting is that during the financial crisis firms, report higher estimated taxable income (86.8) and higher income before extraordinary items [*IncomeXTR*] (79.4). However, mean and median *DiscAcc* are 0.000 in both sub-periods. I find higher mean and median *DiscBTD* (0.003 and 0.010, respectively) and *TaxAvoid* (0.004 and 0.009, respectively) for the period 2008-2010. In the pre-crisis period, mean (median) *DiscBTD* is -0.001 (0.007) and mean (median) *TaxAvoid* is -0.001 (0.005). Overall, these findings indicate more pessimistic earnings forecasts and more earnings management activities during the time of financial crisis. However, investigating *Meet5*, *Meet10*, and *Meet15*, the results are similar as reported above. Using *Meet5*, the proxies for earnings management and *Crisis* are not significant, while using *Meet10* and Meet15 show weaker results than presented in table 7. Overall, these findings indicate sensitivity to the extent of management earnings forecast errors.

5. Conclusions

This paper combines the literature on earnings management, voluntary disclosures and information content of taxes by investigating the incremental usefulness of book-tax differences in detecting earnings management to meet/beat quarterly management earnings forecasts using different metrics for BTDs. Exploiting greater discretion under GAAP than under tax law, I suggest that managers increase book earnings in ways that do not affect taxable income resulting in higher book-tax differences. I hypothesize that BTDs are incrementally useful to discretionary accruals in detecting earnings management.

This paper extends the literature by decomposing of BTDs (i.e. normal, part of BTDs attributable to earnings management, and tax avoidance) and developing a measure of discretionary BTDs based on approach of Desai and Dharmapala (2006) to analyze their relationship with meeting management earnings forecasts. I also apply the methodology of Lev and Nissim (2004) to calculate the tax-to-book income ratio that comprises total book-tax differences (temporary, permanent, and tax accruals). Moreover, I analyze the impact of the financial crisis of 2008 on the probability of meeting management earnings forecasts.

Using logistic regressions, the results show that higher discretionary accruals increase the probability of meeting management earnings forecasts. I also find that larger book-tax differences are associated with higher probability of meeting earnings benchmarks. Firms with lower ranks of tax-to-book income ratio and higher discretionary BTDs are more likely to meet management earnings forecasts. These findings imply that BTDs are incrementally useful to discretionary accruals in detecting earnings management. Furthermore, aggressive tax avoidance activity is associated with higher probability of meeting management earnings forecasts. Future research should benefit by including these proxies for BTDs when analyzing earnings management. Moreover, the findings indicate that firms are more likely to meet management earnings forecasts during the financial crisis of 2008. It appears that managers disclose more pessimistic earnings forecasts and engage in activities that lead to larger discretionary BTDs and tax avoidance in the crisis-period 2008-2010. However, restricting the sample to the extent of management earnings forecast errors, the results show some sensitivity to forecast errors.

The findings of this study is subject to the following limitations. Although I find robust results, estimating taxable income using financial data can result in measurement error. Managerial incentives (e.g., insider trading) or real earnings management will likely influence the probability of meeting management earnings forecasts. An interesting issue is to analyze the nature of management earnings forecasts (optimistic vs. pessimistic forecasts) and the consequences of the financial crisis in more detail. Future research might consider these issues and shed more light on the information content of taxes by decomposing book-tax differences.

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Notes

Note 1. The verb "meet" indicates meeting and beating the earnings targets.

Note 2. Including binary variables for the fiscal quarters 2-4 reveals comparable results as for the regression with *4Fqtr*.

Note 3. Following Matsumoto (2002), if the value for the fourth quarter is given, missing values of *PPE* for quarters 1 to 3 are replaced as follows. I calculate the depreciation ratio (quarterly depreciation divided by yearly depreciation) and the year-to year change in *PPE* in the fourth quarter. In each quarter I add the amount of the year-to-year change in *PPE* multiplied by the depreciation ratio of the quarter.

Note 4. Using quarterly dummy variables, the analyses show similar results.

Note 5. In 2012, the database has been discontinued.

Note 6. Although I use quantitative EPS forecasts, I cannot rule out the possibility that the results might be biased due to the coverage of CIG.

Note 7. Using at least eight or ten two-digit SIC-quarter observations show comparable results.

Note 8. The calculated variance inflation factors (VIFs) support this suggestion. They are somewhat not higher than 1.50 (not reported here).

Note 9. Using quintile ranks of TAX for a given year or decile ranking based on two-digit SIC code show comparable results (available on request) as the findings presented below.

Note 10. Including only the fitted values for BTDs in the logistic regression ($BT_{iq} = \beta_1 DiscAcc_{iq} + \mu_i + \varepsilon_{iq}$), I find a positive and significant association with the probability of meeting management earnings forecasts (available on request). These findings imply that the component of BTDs that is attributable to earnings management increases the likelihood of meeting the earnings targets. However, analyzing the component of normal BTDs, which is attributable to *NormAcc* ($\widehat{BT} = \beta_1 NormAcc$) the logistic regression shows a negative change in odds ratio.

Note 11. Using mean *r_TAXyi*, *TaxAvoid*, or *DiscBTD* shows com.