Exploring Book-Tax Differences, Analyst Coverage, and Forecast Optimism: An Empirical Study

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This research explores the relationship between book-tax differences (BTD) and the coverage of financial analysts, as well as how these two factors relate to optimistic forecasts. By evaluating how BTD affects analyst coverage, this research expands on earlier studies and finds a negative link. Additionally, it demonstrates that greater BTD indicates a higher probability of earnings manipulation, leading analysts to have a more pessimistic view of their predictions for such organizations. This research contributes to a better understanding of financial markets by shedding light on analyst behavior, financial reporting, and the complex dynamics underlying BTD in determining analyst estimates.

Keywords: book-tax difference (BTD), analyst coverage, earnings management, forecast optimism

INTRODUCTION

The purpose of this research is to investigate whether financial analysts' coverage incorporates information reflected in BTD, measured by the ratio of taxable income to book income. In addition, this research examines the association between forecast optimism and BTD. Specifically, this research investigates whether BTD is associated with analyst coverage and forecast errors.

Bhushan (1989) proposes that analyst coverage is viewed as a proxy for the equilibrium total expenditure, which depends on the interaction between the aggregate demand and supply of analyst services in the market for analyst services for a specific firm. The effect of BTD on analyst coverage can thus be examined in terms of their influence on the aggregate demand or supply functions for analyst services.

On the other hand, Bradshaw, Richardson and Sloan (2001) directly examine the published opinions of auditors and sell-side analysts to see if they provide investors with information concerning the future earnings problems experienced by firms with high accruals. Their evidence indicates that investors do not appear to anticipate future earnings problems. Our research extends this literature by asking whether analysts utilize the BTD information in following stocks and forecasting. In addition, this research jointly tests for an association between forecast optimism, BTD, and analyst coverage.

This article contributes to several lines of existing research. First, this article improves our understanding of the economics underlying analyst coverage of firms with respect to BTD. Using the number of analysts following a firm as a proxy for the total resources spent on private information acquisition about the firm, this research extends the simple framework proposed in Bhushan (1989) to

examine how BTD influences analyst coverage. This research also contributes to the series of inquiries investigating whether analysts' earnings forecasts reflect various types of prior information efficiently. The joint test employed in this article recognizes the link between analyst coverage and forecast optimism, and it mitigates the simultaneous equations bias mentioned in Ackert and Athanassakos (2003). The extension supplements the three-equation framework of Ackert and Athanassakos (2003) to model analyst's optimism, analyst coverage, and BTD.

The main results show that larger BTD reflects a higher risk of earnings management. This research documents a weak and positive association between analyst coverage and book-tax income differences. The results also reveal that analysts' forecast of subsequent earnings are relatively less optimistic for firms with lower ratio of taxable income to book income, indicating that analysts are less optimistic for firms with larger BTD. The results are also robust with respect to attempts to control firm complexity and the increased risk associated with a firm reporting high accrual levels.

The remainder of this article proceeds as follows. The next section reviews highlight of the relevant literature and develops testable hypotheses. The third section describes the sample and research design used in the regression tests. The fourth section presents descriptive statistics and primary regression results. The fifth section provides the results of several sensitivity tests. The sixth section discusses some caveats, and the seventh concludes the main findings.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Considering the financial analysts' role in the collection and dissemination of information about firms, Bhushan (1989) is among many others who investigate the information acquisition issue of analyst coverage. Theoretical modeling of analyst coverage of firms leaves many unexplored areas. Bhushan (1989) examines the factors that lead to differences in analyst coverage. He proposes a simple model of analyst coverage to generate some economic intuition about analyst coverage. In his model, analyst coverage is viewed as a proxy for the equilibrium total expenditure, which depends on the interaction between the aggregate demand and supply of analyst services in the market for analyst services for that firm. Hence, he suggests several variables, such as the ownership structure of the firm, firm size, return magnitude of the firm, and the correlation between the firm's return and the market return, which are likely to influence the extent of analyst coverage - either through their effect on aggregate demand or supply of analyst services. The effect of BTD on analyst coverage can thus be examined in terms of its influence on the aggregate demand or supply functions for analyst services. Barth et al. (2001) finds that R&D is likely to influence the extent of analyst coverage through the effect on aggregate demand, i.e., R&D is positively related to analyst coverage.

Also, ownership structure of the firm, firm size and firm's return are frequently postulated to be important factors that affect analyst coverage of firms. This research considers additional firm characteristics that can also influence the aggregate demand or supply function, as well as the nature of these influences.

Prior research reveals BTD has critical larger information asymmetry about earnings quality. For example, Mills and Newberry (2001) report evidence that the magnitude of BTD is positively associated with financial reporting incentives such as prior earnings patterns, financial distress, and bonus thresholds.

Information asymmetry produces a demand for private information. This assumes that private information is useful in making more precise forecasts of future earnings and more accurate recommendations. Thus, private information is more valuable for firms with larger BTD. Meanwhile, analysts are likely to find that an accurate recommendation about a larger firm is more valuable than about a smaller firm. This is because the profits that the investor can generate by trading in a larger firm are likely to be higher than trading in a smaller firm. In other words, the larger the firm size, the higher the aggregate demand for analyst services.

It is also possible that if increased BTD is associated with increased information asymmetry, then the cost of information acquisition and hence, the cost of providing analyst services, may increase with the BTD. That is, for an elastic demand for analyst services, the association between the cost of providing analyst services and BTD will weaken the positive association between BTD and the equilibrium total

expenditures that result from the aggregate demand effect. Thus, it is an empirical issue to examine the effects of BTD on either the aggregate demand or supply. Ceteris paribus, the aggregate demand for analyst services is likely to be a decreasing function of BTD. This leads to a positive relation between total equilibrium expenditure on information acquisition and BTD. Therefore, the first hypothesis in this article is:

Hypothesis # 1: *There is negative association between BTD and Analyst coverage.*[1].

Fama (1965) asserts that if financial markets are "efficient", security prices fully reflect all available information and therefore are unbiased in the sense that they reflect the collective beliefs of all investors about future prospects, which is so-called: the "Efficient Market Hypothesis (EMH)". Market efficiency has important implications for the accounting profession, so the EMH has been utilized in most capital market research in accounting that tests market efficiency with respect to accounting information (Kothari 2001). Obviously, cross-sectional tests of return predictability or of market anomalies are sample tests of market efficiency. Cross-sectional tests of return predictability, or the market anomalies literature, examine whether the cross-section of returns on portfolios formed periodically using fundamental analysis of accounting ratios (e.g., accounting accruals, BTD) are consistent with a model of expected returns, like the Capital Asset Pricing Model (CAPM). Specifically, Sloan (1996) and Xie (2001) investigate the market's mispricing of earnings and accounting accruals. Sloan (1996) suggests that stock prices are found to act as if investors "fixate" on earnings, failing to fully reflect information contained in the accrual and cash flow components of current earnings until that information impacts future earnings. Xie (2001) finds that the overpricing of total accruals documented by Sloan (1996) is due largely to abnormal accruals. Using similar tests to Sloan (1996), Hanlon (2005) investigates whether stock prices reflect different investor expectations about future earnings based on the level of BTD. Her results indicate that investors overestimate the persistence of the accrual component of earnings, which is consistent with prior research examining broad cross-sections of firm-years (e.g., Sloan 1996). In addition, Lev and Nissim (2004) document that "while market efficiency with respect to taxable income information clearly improved over the sample period, not all of the forward-looking information in the tax fundamentals was captured in contemporaneous stock prices in the 1990s". Motivated by the empirical debate on market efficiency, this research, thus, investigates whether financial analysts signal the implications of BTD to investors efficiently, considering the monitoring and informational roles with respect to their recommendations, and whether they play a role in the apparent mispricing.

Most research into analysts' optimism bias examines properties of consensus sell-side analysts' forecasts, because these forecasts are publicly available. Many studies report evidence that analysts' forecasts are optimistic (Barefield and Comiskey 1975; Abarbanell 1991; Ali et al. 1992; Brown 1997; Lim 1998; Richardson et al. 1999; Easterwood and Nutt 1999). A number of studies show, however, that analysts' forecasts are inefficient in the sense that they do not fully incorporate past information available at the time of the forecast (Lys and Sohn 1990; Abarbanell 1991). Lev and Nissim (2004) report the ratio of taxable income to book income reflects information about firms' operating performance. Further, in his preliminary study of analysts' role in the apparent mispricing of BTD, Weber (2005) extends Hanlon (2005) and Lev and Nissim (2004) and concludes, from deflated forecast errors, that analysts' errors in predicting subsequent earnings are more optimistic for firm-years with large BTD. But "it seems to have lower forecast errors with respect to deferred tax expense" (Hanlon and Krishnan, 2006, page 3).

Conversely, despite the apparently compelling evidence, the regression results in Weber (2005) should be carefully explained. First, the Institutional Brokers Estimate System (I/B/E/S) receives analyst forecasts after discontinued operations, extra-ordinary charges, and other non-operating items have been backed out. This often results in a discrepancy when companies report non-operating items. I/B/E/S adjusts reported earnings to match analysts' forecasts on both an annual and quarterly basis. This is why I/B/E/S actuals may not agree with other published actuals, i.e., *Compustat*. Second, "the coverage of I/B/E/S has improved dramatically through the years and the degree of optimism has declined steadily in 1990s (Kothari, 2001, see evidence in; Richardson et al., 1999)." The evidence of optimism may, however, be related to the

coverage of firms in the database. Finally, the forecast of EPS at any point in time cannot replace the importance of non-EPS measures. Undeflated forecast errors could be more suitable in research with respect to the ratio of book-tax differences considering that trading profits realized at sell recommendations may provide a more powerful indication of investment timing than EPS forecasting. This research revisits that claim and investigates whether financial analysts signal the implications of BTD to investors efficiently. It extends the above literature by asking whether analysts utilize the BTD information in forecasting, and examines this question by testing for an association between BTD and forecast errors.

Bradshaw, Richardson and Sloan (2001) directly examine the published opinions of auditors and sell-side analysts to see if they provide investors with information concerning the future earnings problems experienced by firms with high accruals. Their evidence documents that the forecasts provide investors with information concerning the future earnings problems experienced by firms with high accruals. Further, Lev and Nissam (2004) suggest that BTD reflects both accruals and information about operating performance.

In addition, some studies examine the properties of financial analysts' forecasts of earnings per share (EPS). On average, analysts issue optimistic EPS forecasts (Barefield and Comiskey 1975; Abarbanell 1991; Ali et al. 1992; Brown 1997; Lim 1998; Richardson et al. 1999; Easterwood and Nutt 1999). Schipper (1991) suggests that analysts have incentives to issue optimistic forecasts because of the relationships between the analyst, the brokerage firm, and the client firm. Despite their cognitive bias or optimism, financial analysts, as information intermediaries, may publish useful opinions about firms. This is evidenced by both investor demand and research reports. Section 501 of the SOX--the most significant securities law changes since passage of the original federal securities laws in 1933 and 1934-- defines the codes of conduct for securities analysts and requires disclosure of knowable conflicts of interest. It significantly reforms Wall Street practices. For example, Regulation Analyst Certification provides that analysts must certify that (a) they believe in the report and recommendations they are making, and (b) no part of their compensation is linked to specific recommendations or views. Thus, the question of whether optimism bias is caused by analysts' various incentives is likely to be minor and is beyond the scope of this article.

A substantial literature provides evidence that BTD indicates higher information asymmetry about earnings quality, and it is logic to conjecture that concerning the future earnings problems experienced by firms with large BTD, analysts are less likely to issue optimistic EPS for these firms.

This leads to H2, the second hypothesis in this research:

Hypothesis # 2: *There is negative association between BTD and optimistic forecast errors.*[2].

SAMPLE AND RESEARCH DESIGN

Sample

The sample is comprised of 1,790 firms. For each firm, this research requires financial, ownership and analyst data availability to compute the dependent and independent variables. Analyst information is gathered from *I/B/E/S*. For a firm-year observation to be included in the analysis, data must be provided in *I/B/E/S* and in the *Compustat Industrial Quarterly* and *Board Analyst* databases for the control variables. The data on ownership are extracted and collected from the 2005 Board Analyst/Corporate Library. Since 2005 is the most recent year for which statistics are available, it has been chosen that year as the historical statistical period or this research.

For analysts to conceivably base their coverage and forecasts on firms' BTD, they must be able to observe the BTD. Using forecasts and coverage data subsequent to the most recent available financial reports, this research employs this timeline in the text. This timeline applies to all the variables in the models.

Research Design

Hypothesis 1: Analyst Coverage and BTD

Based on the results of Bhushan (1989) and Barth et al. (2001), This research estimates the level of analyst coverage using the following model.

$$NAF = \alpha_0 + \alpha_1 INSIDERS\% + \alpha_2 INSTITUTION\% + \alpha_3 SIZE + \alpha_4 RETURN1 + \alpha_5 RETURN5 + \alpha_6 R\_RD + \alpha_7 TBI + \varepsilon \quad (1)$$

where NAF is the number of analysts following the stock; INSIDERS% is the estimated percentage of outstanding shares held by top management and directors, as reported in the company's most recent proxy statement in the statistical period; INSTITUTION% is the percent of outstanding shares held by institutions; SIZE is the natural logarithm of market value measured by the most recently reported total number of shares outstanding multiplied by the most recent quarter-end market price; RETURN1 is the percentage change in price over most recent year (4 quarters), corrected for stock splits and dividends; RETURN5 is the percentage change in price over most recent 5-year period (20 quarters), corrected for stock splits and dividends; R_RD is the ratio of R&D expense (quarterly item #4) to total operating expenses (quarterly items #1 + #4) in the latest quarter; and TBI is the ratio of taxable income to book income, which is TBI is defined as quarterly items [(#6-#35)/0.35*0.65-#8)/#8], which is same as in Lev and Nissim (2004).

Bhushan (1989) chooses these variables based on a simple model of analyst coverage. In his model, analyst coverage is viewed as a proxy for the equilibrium total expenditure, which depends on the interaction between the aggregate demand and supply of analyst services, in the market for analyst services for that firm. Hence, he suggests several variables such as, the ownership structure of the firm, firm size, return magnitude of the firm, and the correlation between the firm's return and the market return, which are likely to influence the extent of analyst coverage-- either through its effect on aggregate demand, or supply, of analyst services. Thus, this research includes SIZE to control for size. This research includes the estimated percentage of outstanding shares held by top management and directors, as reported in the company's most recent proxy statement in the sample period, and the percentage of outstanding shares held by institutions. As a measure for ownership structure of the firm, this research also includes percentage change in price over most recent year(s) (4 quarters or 20 quarters), corrected for stock splits and dividends, as a proxy of return magnitude. Barth et al. (2001) finds that R&D is likely to influence the extent of analyst coverage through the effect on aggregate demand. Following Barth et al. (2001), this research includes a measure of the firm's R&D. Since BTD may vary across industries due to differences in capital intensity or magnitude of intangible capital (e.g., Mills and Newberry 2001; Hanlon 2003), this research uses an industry-ranked ratio of R&D expense as a control variable for any effect of industry on analyst coverage to test hypotheses 1 and 2.

Hypothesis 2: Forecast Optimism and BTD

In order to test H2, whether BTD is associated with forecast optimism, this research estimates forecast optimism using the following model based on the results of Ackert and Athanassakos (2003), as well as the ratio of taxable income to book income.

$$OPT = \alpha_0 + \alpha_1 INSTITUTION\% + \alpha_2 SIZE + \alpha_3 RETURN1 + \alpha_4 R\_RD + \alpha_5 TBI + \varepsilon \quad (2)$$

Note that:

$$OPT = \frac{(FEPS - EPS)}{|EPS|}$$

FEPS is the consensus forecast of earnings per share and EPS $_{is}$ the actual earnings per share. All other variables have been defined in formula (1).

DESCRIPTIVE STATISTICS AND REGRESSION RESULTS

Descriptive Statistics

Table 1 presents the industry composition of the sample firms. Relative to the population of the sample firms, this research has an overrepresentation of manufacturing components (SIC codes of 20-39), but the other industry classifications have similar representative properties.

TABLE 1
INDUSTRY DISTRIBUTION FOR SAMPLE FIRMS

2-digit SIC Code	Industry	Frequency	Percent
1-9	Agriculture, Forestry, And Fishing	3	.2
10-14	Mining	61	3.4
15-17	Construction	25	1.4
20-39	Manufacturing	732	40.9
40-48	Transportation, Communications	97	5.4
49	Electric, Gas, And Sanitary Services	89	5.0
50-51	Wholesale Trade	52	2.9
52-59	Retail Trade	151	8.4
60-67	Finance, Insurance, And Real Estate	308	17.2
70-89	Services	272	15.2
	Total	1790	100.0

Table 2 presents descriptive statistics for the sample firms. The table reveals that public listed firms have a large percentage of outstanding shares held by intuitions (the median value is 77%). The median percentage of outstanding shares held by top management and directors is 5%. The median number of analyst coverage is 8. The median percentage change in price over most recent year (4 quarters) is 8%. These firms appear, however, to have a higher median percentage change (65%) in price over the most recent five-year period (60 quarters). In addition, the ratio of taxable income to book income in the entire sample appears in a normal range (the median value is 1). Thus, the ratio of taxable income to book income appears reasonable. The range of the ratio of taxable income to book income for the sample is from 0 to 2.98. The book-tax difference measure is not identical to total absolute boob-tax differences, but it is a robust relative measure, indicating the difference between taxable income and book income[3].

Consistent with previous research, Table 2 presents the mean OPT for the sample firms as positive (0.04), suggesting that analysts were optimistic on average when predicting earnings. But it may not to be true for most of the sample firms. The median OPT is -0.03.

TABLE 2
DESCRIPTIVE STATISTICS

	Valid N	Minimum	Maximum	Median	Mean	Std. Deviation
OPT	1774	-21.00	17.00	-0.03	0.04	1.03
NAF	1790	1.00	38.00	8.00	9.11	7.11
INSIDERS%	1786	.000	1.00	.05	.112	.17
INSTITUTION%	1629	.051	1.00	.77	.73	.20
SIZE	1788	17.17	26.67	21.33	21.47	1.45
R_R&D	1468	1.35	5.00	2.85	2.95	.70
TBI	1541	0.00	2.98	1.00	0.61	0.92

	Valid N	Minimum	Maximum	Median	Mean	Std. Deviation
RETURN1	1758	-.82	33.53	.08	.13	.88
RETURN5	1619	-1.00	22.57	.65	1.10	2.15

Note: Observations with negative earnings have been excluded for TBI.

Where OPT= Optimistic EPS Forecast Error, i.e., $OPT = \frac{(FEPS-EPS)}{|EPS|}$

NAF is the number of analysts following the stock; INSIDERS% is the estimated percentage of outstanding shares held by top management and directors, as reported in the company's most recent proxy statement in the statistical period; INSTITUTION% is the percent of outstanding shares held by institutions; SIZE is the natural logarithm of market value measured by the most recently reported total number of shares outstanding multiplied by the most recent quarter-end market price; RETURN1 is the percentage change in price over most recent year (4 quarters), corrected for stock splits and dividends; RETURN5 is the percentage change in price over most recent 5-year period (20 quarters), corrected for stock splits and dividends; R_RD is the ratio of R&D expense (quarterly item #4) to total operating expenses (quarterly items #1 + #4) in the latest quarter; and TBI is the same ratio of taxable income to book income ass previously defined.

Table 3 presents Pearson correlations for models (1) & (2). Panel A documents that all independent variables of model (1), except RETURN1, are significantly correlated with the dependent variable. However, RETURN1 and RETURN5 are the most highly correlated except the correlation between SIZE and NAF[4], with correlation of 0.40 (significant at $p \leq 0.01$), suggesting that the two measures are not merely substitutes for each other. Panel B shows pair-wise correlation coefficients for all variables in model (2). The results are similar to model (1). Most of the independent variables are significantly correlated with the dependent variable, providing univariate indication of their importance. Some significant correlations between the independent variables suggest that it is important to estimate the separate effects of each one on the dependent variables.

To ensure that multicollinearity is not a problem, this research calculated variance inflation factors (VIF) for each model. The range of the VIFs is 1.004 to 1.257, suggesting a multicollinearity problem does not exist.

TABLE 3
CORRELATIONS OF MODEL (1) & (2)

Panel A

	NAF	INSIDERS %	INSTITUTION %	SIZE	R_R&D	TBI	RETURN1	RETURN5
NAF	1.00 -							
INSIDERS%	-0.17 (0.00)	1.00 -						
INSTITUTION %	0.17 (0.00)	-0.23 (0.00)	1.00 -					
SIZE	0.70 (0.00)	-0.18 (0.00)	0.12 (0.00)	1.00 -				
R_R&D	0.14 (0.00)	-0.06 (0.02)	-0.02 (0.24)	0.06 (0.03)	1.00 -			
TBI	0.02 (0.27)	-0.01 (0.31)	0.00 (0.49)	-0.01 (0.40)	-0.03 (0.17)	1.00 -		
RETURN1	-0.03 (0.16)	-0.01 (0.35)	0.12 (0.00)	0.20 (0.00)	-0.10 (0.00)	0.05 (0.04)	1.00 -	
RETURN5	-0.08 (0.00)	0.07 (0.01)	0.06 (0.02)	0.06 (0.02)	-0.11 (0.00)	0.01 (0.37)	0.40 (0.00)	1.00 -

Panel B

	OPT	NAF	INSTITUTION %	SIZE	R_R&D	TBI	RETURN1	RETURN5
OPT	1.00 -							
NAF	-0.23 (0.21)	1.00 -						
INSTITUTION %	0.11 (0.35)	0.16 (0.00)	1.00 -					
SIZE	-0.05 (0.04)	0.69 (0.00)	0.11 (0.00)	1.00 -				
R_R&D	-0.04 (0.06)	0.14 (0.00)	-0.01 (0.32)	0.06 (0.03)	1.00 -			
TBI	0.37 (0.00)	0.02 (0.24)	0.00 (0.47)	-0.01 (0.44)	-0.03 (0.16)	1.00 -		
RETURN1	-0.04 (0.07)	-0.04 (0.08)	0.12 (0.00)	0.19 (0.00)	-0.10 (0.00)	0.05 (0.03)	1.00 -	
RETURN5	-0.02 (0.27)	-0.08 (0.00)	0.06 (0.03)	0.06 (0.02)	-0.10 (0.00)	0.01 (0.35)	0.40 (0.00)	1.00 -

Regression Results

Tests of Hypotheses 1

Table 4 presents the main results for H1 using the estimation of model (1). As predicted, the data reveal that larger ratio of taxable income to book income is positively associated with wider analyst coverage (Coefficient = 0.01, marginally significant at $p \leq 0.10$). The coefficient is positive and marginally significant, indicating that there is weak evidence, which is consistent with larger BTD reflecting information that represents a higher risk of earnings management, thus the cost of providing analyst services is an increasing function of BTD. This implies, for an elastic demand for analyst services, the positive association between the cost of providing analyst services and BTD will weaken the aggregate demand effect and cause that the aggregate supply effect outweighs the aggregate demand effect. However, the analyst is likely to find an item of private information about a larger firm with higher ratio of taxable income to book income more valuable than the item of information about a smaller firm with lower ratio taxable income to book income (Coefficient = 0.01, significant at $p \leq 0.01$ for size variable). Examining the regression for simplicity, all the control variables are significant in the predicted direction, except INSIDERS% which is insignificant, but in the predicted direction. For example, the percent of outstanding shares held by institutions (INSTITUTION%), the industry-ranked ratio of R&D expense (R-RD), and size (SIZE) are all significant and positive, indicating that larger firms with bigger R&D budgets and more institutional investors will have wider analyst coverage. Higher market returns (RETURN1 and RETURN5) are negatively associated with analyst coverage. Since private information is less valuable for firms with higher returns and lower magnitude, the result indicates that the aggregate demand for analyst services is lower for firms with lower return magnitude.

TABLE 4
REGRESSION OF ANALYST COVERAGE ON THE RATIO OF BOOK-TAX DIFFERENCES AND CONTROL VARIABLES

$$NAF = \alpha_0 + \alpha_1 \text{INSIDERS\%} + \alpha_2 \text{INSTITUTION\%} + \alpha_3 SIZE + \alpha_4 \text{RETURN1} + \alpha_5 \text{RETURN5} + \alpha_6 \text{R\_RD} + \alpha_7 \text{TBI} + \varepsilon$$

	Expected sign	Coefficient	t-statistic	p-value
Intercept		-70.34	-30.43	0.00
Explanatory variables:				
INSIDERS%	-	-0.49	-0.51	0.61
INSTITUTION%	+	4.27	5.25	0.00
SIZE	+	3.52	34.64	0.00
R_R&D	+	0.85	3.87	0.00
TBI	+	0.01	1.68	0.09
RETURN1	+/-	-3.35	-7.07	0.00
RETURN5	+/-	-0.19	-2.67	0.01

N=1193; F-value:196.76 ($p \leq 0.000$); adjusted R square = 53.8%; Durbin-Watson statistic = 1.55

To ensure that the results for the main variable of interest, BTD, are not sensitive to the industry-ranked ratio of R&D expense, this research also estimates model (1) using the unranked value of R&D expense (untabulated). In this specification, the results show that the coefficient on the book-tax difference variable continues to be positive and marginally significant (Coefficient = 0.01, significant at $p \leq 0.10$). The R&D variable is also positive and significant (Coefficient = 2.75, significant at $p \leq 0.01$). Seemingly bigger R&D budgets are associated with wider analyst coverage consistent with analysts being aware of the implications of R&D for future growth information.

Tests of Hypotheses 2

Table 5 reports OLS estimates of model (2). As predicted the data reveal that analysts' forecast of subsequent earnings are relatively less optimistic for firms with lower ratio of taxable income to book income (Coefficient = 0.01, significant at $p \leq 0.01$), indicating that larger TBI are positively associated with forecast errors. The results show that analysts are less optimistic for firms with larger BTD. Further, inconsistent with the expectations, analysts are less optimistic for firms with larger budgets for R&D (Coefficient = -0.06, marginally significant at $p \leq 0.10$) and higher return (Coefficient = -0.14, marginally significant at $p \leq 0.10$), indicating that actual growth exceeds expected growth. Examining the regression for simplicity, all the other control variables are in the predicted direction and significant, except INSTITUTION%, which is positively associated with OPT.

TABLE 5
REGRESSION OF FORECAST OPTIMISM ON BOOK-TAX DIFFERENCES AND CONTROL VARIABLES

$OPT = \alpha_0 + \alpha_1$INSTITUTION% $+ \alpha_2 SIZE + \alpha_3$RETURN1 $+ \alpha_4$R_RD $+ \alpha_5$TBI $+ \varepsilon$

	Expected sign	Coefficient	t-statistic	p-value
Intercept		0.81	2.20	0.03
Explanatory variables:				
INSTITUTION%	+	0.09	0.66	0.51
SIZE	-	-0.03	-1.72	0.09
RETURN1	-	-0.14	-1.95	0.05
TBI	+	0.01	13.67	0.00
R_R&D	+	-0.06	-1.77	0.08

N=1262; F-value:39.498 (p≤0.000); adjusted R square = 13.6%; Durbin-Watson statistic = 1.726

SENSITIVITY TESTS

The Effect of Accruals

The article performs several additional sensitivity tests. First, it includes the firm's total accruals as a control variable (calculated by the natural logarithm of absolute value of total accruals) that proxies for the increased risk associated with a firm reporting high accrual levels. Therefore, this research can test whether the coefficients on TBI have the incremental effect of the book-tax differences beyond the effect of the risk associated with the firm's accrual levels.

Test results are consistent with the main results—the coefficient on TBI is positive and marginally significant (Coefficient = 0.01, significant at p≤0.10 for model (1); Coefficient = 0.10, significant at p≤0.00 for model (2)). This research also finds that larger accruals (absolute value) are negatively associated with analyst coverage and positively associated with forecast errors (in Table 6, the coefficient on accruals is -0.17, in predicted direction but not significant at p≤0.10; in Table 7, the coefficient on accruals is 0.07, significant at p≤0.00). This research also conducts tests to ensure the results on TBI are robust to the various measures of accruals by using these values scaled by total assets and finds similar results (untabulated) to those reported above.

TABLE 6
REGRESSION OF ANALYST COVERAGE ON BOOK-TAX DIFFERENCES, ACCRUALS, AND OTHER CONTROL VARIABLES

$NAF = \alpha_0 + \alpha_1$INSIDERS% $+ \alpha_2$INSTITUTION% $+ \alpha_3 SIZE + \alpha_4$RETURN1 $+ \alpha_5$RETURN5 $+ \alpha_6$R_RD $+ \alpha_7$TBI $+ \alpha_8 ACCRUALS + \varepsilon$

	Expected sign	Coefficient	t-statistic	p-value
Intercept		-73.21	-22.47	0.00
Explanatory variables:				
INSIDERS%	-	-0.67	-0.66	0.51
INSTITUTION%	+	3.71	3.82	0.00
SIZE	+	3.72	22.06	0.00
R_R&D	+	0.83	3.71	0.00
TBI	+	0.01	1.71	0.08
RETURN1	-	-3.45	-7.02	0.00
RETURN5	-	-0.19	-2.49	0.01

ACCRUALS	+	-0.17	-1.34	0.18
N=1088; F-value:154.047 (p≤0.000); adjusted R square = 53.0%; Durbin-Watson statistic = 1.960				

TABLE 7
REGRESSION OF ANALYST FORECAST OPTIMISM ON BOOK-TAX DIFFERENCES, ACCRUALS, AND OTHER CONTROL VARIABLES

$$OPT = \alpha_0 + \alpha_1 \text{INSTITUTION\%} + \alpha_2 SIZE + \alpha_3 \text{RETURN1} + \alpha_4 \text{R\_RD} + \alpha_5 \text{TBI} + \alpha_6 ACCRUALS + \varepsilon$$

	Expected sign	Coefficient	t-statistic	p-value
Intercept		1.99	3.71	0.00
Explanatory variables:				
INSTITUTION%	+	0.06	0.41	0.68
SIZE	-	-0.10	-3.45	0.00
RETURN1	-	-0.11	-1.50	0.13
TBI	+	0.10	13.01	0.00
R_R&D	-	-0.06	-1.67	0.09
ACCRUALS	+	0.07	3.20	0.00
N=1156; F-value:32.13 (p≤0.000); adjusted R square = 13.9%; Durbin-Watson statistic = 1.724				

Note: The firm's total accruals = the absolute value of difference between earnings and cash flow from operations (item8 – (item108 +item 26), scaled by total assets of the firm (item 44).

The Effect of Temporary Book-Tax Differences

Following Hanlon (2005), this research measures the deferred tax fundamental (DEF) as the negative of the ratio of the deferred tax expense to average total assets. This test reruns the regression models (1) & (2) but rather than using total book-tax differences, this test uses the variable for temporary book-tax differences only—DEF (all of which are untabulated). In the regression model (1), all of the control variables are in the predicted directions except INSIDERS%. However, all the control variables are significant, except R-R&D and INSIDERS%. In the regression model (1), only INSTITUTION% and R_R&D are significant in the predicted direction. The coefficients on DEF in the regression models (1) & (2) are in the predicted directions, which are not significant. Since DEF is a component of BTD, these results suggest that the other components of BTD (permanent differences and tax accruals) are at least as relevant as deferred taxes for predicting earnings quality. This research obtained similar results (untabulated) when deflating deterred taxes by either the market value of equity, or sales, or net income.

The Effect of Alternative Estimate of Forecast Optimism

Table 8 presents the estimation of model (2) based on the alternative estimate of forecast optimism. Deflating by price is typically used in the literature on forecast optimism. Accordingly, this test considers an alternative estimate of forecast optimism deflated by stock price. Inconsistent with Table 5, This test finds that larger BTD are not significantly associated with less forecast bias. Because Weber (2005) scaled BTD to range between [0, 1], his results are largely driven by the deflator of forecast errors, such as stock price, suggesting the usefulness of the deflator appears questionable. These results suggest that differences between the findings from this research and those from Weber (2005) may be caused by the particulars of the model design.

TABLE 8
REGRESSION OF ALTERNATIVE ESTIMATE OF FORECAST OPTIMISM ON BOOK-TAX DIFFERENCES AND CONTROL VARIABLES

$OPT = \alpha_0 + \alpha_1$INSTITUTION% $+ \alpha_2 SIZE + \alpha_3$RETURN1 $+ \alpha_4$R_RD $+ \alpha_5$TBI $+ \varepsilon$

	Expected sign	Coefficient	t-statistic	p-value
Intercept		0.52	4.41	0.00
Explanatory variables:				
INSTITUTION%	+	-0.01	-0.68	0.50
SIZE	-	-0.01	-3.67	0.00
RETURN1	-	-0.01	-1.39	0.16
TBI	+	0.00	-0.19	0.84
R_R&D	-	-0.01	-1.91	0.05

N=1271; F-value:4.732 (p≤0.000); adjusted R square = 1.4%; Durbin-Watson statistic = 1.982

Note: Alternative estimate of OPT is the optimistic EPS forecast error deflated by the latest quarter-end closing stock price, i.e., $OPT = \frac{(FEPS - EPS)}{Price}$.

The Effect of Foreign Source Income

Following Hanlon and Krishnan (2006), this test estimates model (1) & (2) after excluding firms with foreign source income on the *Compustat* database in order to control for firms that may have a book-tax difference measure affected by the foreign tax credit (all of which are not tabulated). Hanlon and Krishnan (2006) also suggest excluding these firms also provides an additional test of whether the complexity of the firm. Again, the test results are consistent with the main results—the coefficient on TBI is positive and marginally significant (Coefficient = 0.01, significant at p≤0.10 for model (1); Coefficient = 0.01, significant at p≤0.00 for model (2)). Thus, it does not appear that results are driven by measurement error due to tax credits in the calculation of BTD.

Additional Sensitivity Tests of Forecast Optimism

The final sensitivity test regarding regression model (2) is a joint test. Table 9 reports sensitivity tests results. Although the prior literature has not implemented the use of a joint analysis with respect to BTD, this test examines the relation to provide further support for the conjecture that BTD provides information about a firm's earnings quality that should be useful to analysts. By regressing the forecast optimism on analyst coverage, BTD, and controls, this test modifies the original model (2) and finds that analysts are again more pessimistic about future earnings for companies with lower taxable income to book income ratios (coefficient is 0.01, significant at p≤0.01). These results are consistent with large BTD being positively associated with large forecast errors.

TABLE 9
REGRESSION OF FORECAST OPTIMISM ON BOOK-TAX DIFFERENCES, ANALYST COVERAGE, AND CONTROL VARIABLES

$OPT = \alpha_0 + \alpha_1 NAF + \alpha_2$INSTITUTION% $+ \alpha_3 SIZE + \alpha_4$RETURN1 $+ \alpha_5$RETURN5 $+ \alpha_6$R_RD $+ \alpha_7$TBI $+ \varepsilon$

	Expected sign	Coefficient	t-statistic	p-value
Intercept		0.54	1.05	0.29
Explanatory variables:				
NAF	-	-0.01	-0.29	0.77
INSTITUTION%	+	0.11	0.83	0.41
SIZE	-	-0.02	-0.75	0.45

RETURN1	-	-0.17	-2.08	0.03
RETURN5	-	-0.00	-0.01	0.99
TBI	+	0.01	13.77	0.00
R_R&D	-	-0.05	-1.30	0.19

N=1184; F-value:40.18 ($p \leq 0.000$); adjusted R square = 13.9%; Durbin-Watson statistic = 1.717

DISCUSSIONS

The results for H1 are consistent with larger BTD reflecting information that represents a higher risk of earnings management. This is associated with the cost of providing analyst services being an increasing function of BTD. That is, for an elastic demand for analyst services, the association between the cost of providing analyst services and BTD will weaken the positive association between BTD and the equilibrium total expenditures that result from the aggregate demand effect, and cause the aggregate supply effect to outweigh the aggregate demand effect. Analysts are likely to, however, find that an item of private information about a larger firm with higher ratio of taxable income to book income is more valuable than the item of information about a smaller firm with lower ratio taxable income to book income. All control variables are significant in the predicted directions, except INSIDERS%, but it has the predicted direction. For example, the percent of outstanding shares held by institutions (INSTITUTION%), the industry-ranked ratio of R&D expense (R-RD), and size (SIZE) are all significant and positive, indicating that larger firms with bigger R&D budgets and more institutional investors will have wider analyst coverage. Higher market returns (RETURN1 and RETURN5) are also negatively associated with analyst coverage. Since private information is less valuable for firms with higher returns and lower magnitude, the result indicates that the aggregate demand for analyst services is lower for firms with lower return magnitude. This research also finds that the coefficients on TBI (untabulated) are not significant in sensitivity tests of the effects of alternative estimates of temporary book-tax differences (DEF). Since DEF is a component of BTD, these results suggest that other components in BTD (permanent differences and tax accruals) are at least as relevant as deferred taxes in predicting earnings quality.

The results are also revealing that analysts' forecast of subsequent earnings are relatively less optimistic for firms with lower ratio of taxable income to book income (Coefficient = 0.01, significant at $p \leq 0.01$), indicating that larger TBI is positively associated with forecast errors. This implies that analysts are less optimistic for firms with larger BTD. In the results of estimating model (2), using the log of the absolute value of the total BTD rather than the ratio of TBI, the results show that the bigger the log of the absolute value of the total BTD, the larger the firm's forecast mistakes (Coefficient = 0.01, significant at $p \leq 0.03$). Finally, this research alters the main model (2) by regressing forecast optimism on analyst coverage, BTD and the control variables, and finds results consistent with large BTD being negatively associated with large forecast errors.

The results are also robust with respect to attempts to control firms with high accrual levels and firms that may have a book-tax difference affected by the foreign tax credit. Excluding these firms also provides an additional test of whether the complexity of the firm and the magnitude of accruals are driving the results. Again, test results are consistent with the main results—the coefficients on TBI are positive (Coefficient = 0.01, marginally significant at $p \leq 0.10$ for model (1); Coefficient = 0.10, significant at $p \leq 0.00$ for model (2)). Thus, the coefficients on TBI have the incremental effect of the book-tax differences beyond the effect of the risk associated with the firm's accrual levels. This research also finds that the results are not driven by measurement error due to tax credits in the calculation of BTD.

There are three limitations and caveats to this research. First, firm characteristics may affect both the aggregate demand and supply of analyst services. Analyst coverage is a proxy for total expenditure on analyst services. If data was also available on the prices of analyst services for firms, it is awarded to use a two-equation model to identify separately the effects of a firm characteristic on both the aggregate demand and supply of analyst services. Unfortunately, a limitation of this article is the lack of available data on the prices of analyst services. As Bhushan (1989) recognizes, his model did not reflect many of the potentially

important considerations of uncertainty, free-ridership, and the role of prices in aggregating and transmitting information. More sophisticated models in future research may be able to improve our understanding of the economics of analyst coverage and the various considerations that are involved in an analyst's choice of which firms to follow.

Another caveat of the article is that the positive association between forecast optimism and BTD could be indicative of analysts' cognitive bias. However, the question of whether such optimism bias is caused by analysts' cognitive bias, while interesting, is not relevant to the focus of this research. This research controls for numerous factors in the regressions to limit the chance that any associations are driven by the complexity of the firm. In addition, this research conducts a wide array of sensitivity tests. Overall, the results of the sensitivity tests are consistent with the hypotheses.

Finally, this research uses an alternative estimate of forecast errors to assess the potential effects of measurement error. Deflating by stock price is typical in the literature on forecast optimism (e.g., Weber, 2005). Accordingly, this research considers alternative estimates of forecast optimism deflated by stock price. Inconsistent with Weber (2005), this research finds that larger BTD is not significant associated with less forecast bias. Because Weber (2005) scaled BTD to range between [0, 1], his conclusion is largely driven by his deflator of forecast errors (e.g., stock price). These results suggest differences in the findings, from those of Weber (2005), may be caused by the particulars of the model design. Future research needs to be done to reconcile the papers.

CONCLUSION

The primary purpose of this research is to investigate whether analysts utilize the information in BTD. Specifically, this research examines whether BTD is associated with wider analyst coverage, and less forecast bias. The results show that higher BTD indicates a higher probability of earnings manipulation, leading analysts to have a more pessimistic view of their predictions for such organizations. This research contributes to a better understanding of financial markets by shedding light on analyst behavior, financial reporting, and the complex dynamics underlying BTD in determining analyst estimates. The results clarify the contentious conclusions of earlier studies as well as the requirements of disclosing significant BTD for SEC registrants[5]. The findings also support the argument that there should be more complete disclosure of the BTD providing additional information by firms through reconciliations between book income and taxable income.

ENDNOTES

1. When BTD is measured by ratio of tax income to book income, hypothesis 1 becomes: analyst coverage is positively related to the ratio of tax income to book income.
2. Forecast errors are the differences between actual earnings and consensus forecast of earnings. Meanwhile, to allow for a more intuitive interpretation of the quantitative results, this research define optimistic forecast errors (forecast optimism) as the differences between consensus forecast of earnings and actual earnings. When BTD is measured by the ratio of tax income to book income, consider forecast optimism, hypothesis 2 becomes: forecast optimism is positively related to the ratio of tax income to book income.
3. This research includes the log of the absolute value of the total book-tax differences in the sensitivity analysis. The data is consistent with the view that the larger the log of the absolute value of the total book-tax differences the larger the firm's forecast errors (Coefficient = 0.01, significant at $p \leq 0.01$).
4. The correlation between SIZE and NAF is much higher (0.70), indicating the positive relationship between firm size and analyst coverage.
5. A publicly traded company that complies with the new IRS Schedule M-3 will satisfy the requirements of disclosing significant BTD for the purposes of the reportable transaction regulations. On July 7, 2004, the Department of the Treasury and the IRS released several additional pieces of guidance relating to how BTD are reported, including a new Schedule M-3 for Form 1120.

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