

Chun, Hong Min; Shim, Junyong

## Article

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## A Comparison of Investors' and Analysts' Biases in Interpreting Book-Tax Difference: Evidence from Korean Stock Market

Hongmin Chun<sup>a</sup>, Junyong Shim<sup>b</sup>

<sup>a</sup>Associate Professor, Chungbuk National University School of Business, Cheongju, Korea.

<sup>b</sup>PhD, Korea University Business School, Seoul, Republic of Korea.

### ABSTRACT

This study examines and compares investors' and analysts' biases in interpreting book-tax difference (hereafter BTD). The empirical results of using 1,544 Korean firm-year observations from 2001 to 2008 are as follows. First, we find that BTD is negatively associated with the value-price (V/P) ratio. This result implies that investors have more optimistic biases than analysts do in interpreting BTD. Second, for high institutional ownership sample, the negative association between BTD and V/P ratio would disappear. This empirical result suggests that sophisticated institutional investors understand the meaning of BTD better than general investors. Third, for lower analyst following sample, there was no significant association between BTD and V/P ratios. This implies that higher analyst following reduces biases in analysts' earnings forecasts. This study adds to the growing body of evidence that is related to the efficiency of analysts' earnings forecasts. It is the first empirical study to show that investors do not fully incorporate the meaning of BTD into their stock pricing compared with analysts' earnings forecasts.

*Keywords:* Book-tax difference, Investors, Analysts, Analyst following, Market inefficiency

## I. Introduction

This study examines whether investors' optimistic biases in interpreting book-tax difference (hereafter, BTD) differ from those of analysts. The objectives of financial reporting and tax reporting are different, as are the methods of measuring net income in financial reporting and taxable income in tax reporting.<sup>1)</sup>

Therefore, BTD can arise from the unbiased application of two different sets of reporting rules designed to meet different objectives (Weber 2009).

Managers usually have economic incentives to increase financial reporting income, while they have opposed incentives to decrease taxable income reported to the tax authorities (Scholes, Wolfson, and Wilson 1992; Erickson, Hanlon, and Maydew 2004; Graham, Harvey, and Rajgopal 2005). Thus,

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† Hongmin Chun

Associate Professor, Chungbuk National University School of Business, Cheongju, Republic of Korea

Tel. +82-43-261-2349 E-mail: [hmchun@cbnu.ac.kr](mailto:hmchun@cbnu.ac.kr)

1) Net income of financial reporting is determined under the accounting standard, while taxable income of tax reporting is

subject to tax law. In Korean practice, after firms close financial accounting records at the end of each fiscal year, they reconcile financial accounting results to taxable income by applying Corporate Tax Act of Korea. However, the details of reconciliation are not disclosed, so to compute BTDs we estimate taxable income following prior literature and deduct from the accounting income.

BTD can result either from managers' using discretion to manage book income in ways that do not increase tax income or using tax-planning and sheltering strategies to reduce taxable income without decreasing book income.<sup>2)</sup> To summarize, BTD might provide useful information for evaluating and predicting firm performance.

Existing studies on finance and accounting offer various empirical results about the inefficiency of stock markets. In particular, there have been continuous discussions over the existence and causes of market anomaly where future stock returns might be predicted through variables related with finance and accounting information, such as unexpected earnings, accruals, and growth rate of long term operating assets (Bernard and Thomas 1989, 1990; Sloan 1996; Xie 2001; Fairfield, Whisenant, and Yohn 2003). Lev and Nissim (2004) expanded prior studies and reported that the investors failed to reflect BTD properly to predict future returns for the U.S. firms.

In the meantime, prior studies on finance and accounting also empirically analyzed whether analysts, who are also considered as the information intermediaries of the stock market, can effectively interpret the financial accounting information (Abarbanell and Bushee 1997; Bradshaw, Richardson, and Sloan 2001; Ahmed, Nainar, and Zhou 2005). Moreover, Weber (2009) concluded from his empirical analysis of the U.S. firms that investors properly reflect BTD under a good information environment, while analysts overly reflect BTD in future earnings forecasts.

Even though prior studies imply that both investors and analysts have systematic biases in interpreting BTD, there are a few studies that compare the degree

of systematic biases between investors and analysts. Investors are the main supplier of firms' financial resources, and analysts play a role in overcoming the information asymmetry between managers and outside investors by predicting and analysing firms' performance using both public and private sources of information (Healy and Palepu 2001; Barth and Hutton 2004). Therefore, investors might refer to analysts' reports when making investment decisions. Under such a condition, by comparing the systematic biases in interpreting BTD between investors and analysts, it is possible to examine whether analysts are playing a role in mitigating information asymmetry.

This study compares investors' and analysts' systematic biases in interpreting BTD. If analysts' earnings forecasts have smaller systematic biases than investors' interpretation of BTD on future earnings, then they can contribute towards enhancing stock market efficiency by mitigating overreaction of investors on BTD. In relation to this, several previous studies claimed that analysts recognize the influence of unexpected earnings (Abarbanell and Bernard 1992) and accruals (Elgers, Lo, and Pfeiffer 2003) on the future earnings more precisely than investors.

However, Liu (2003), Kang and Yoo (2007) and Chun and Yoo (2015) said that analysts have greater systematic biases than investors in interpreting accounting information (accruals, real earnings management). Considering mixed results of prior studies, it remains an open empirical question how the systematic biases of analysts in interpreting BTD of earnings forecasts differ from those of investors. In addition, as far as we know, no prior study has been performed in Korea or any other country regarding this issue. This study performs an empirical analysis that relatively compares biases between investors and analysts in interpreting the effect of BTD on future earnings. In addition, we benefit from Korean data for the following reason. All the listed firms in Korea are required to disclose their information to the public simultaneously or before they provide the information to some selected market participants, such as analysts and institutional investors. Hence, this Reg FD environment enables us to fairly examine

2) Using the real tax reconciliation data, Jung et al. (2006) found that Korean firms records more additions than deductions while reconcile their accounting incomes to taxable incomes. They insist that this is the characteristic of Corporate Tax Act of Korea. In this case BTDs mostly are negative. However, Korean firms may use various tax benefits regulated by the Restriction of Special Taxation Act of Korea which are determined and revised in accordance with the government's economic policy. So, Korean firms with positive BTDs may be the firms that applies tax benefits aggressively.

and compare BTD information on future earnings provided investors with the information provided by analysts.

Using a sample containing 1,544 firm-year observations from 2001 to 2008 on listed companies, we find the following empirical results. First, comparing the magnitude of systematic biases between investors and analysts in interpreting BTD, we find that BTD is significantly and negatively associated with the value-price (V/P) ratio. It implies that investors, on average, have more optimistic biases in interpreting BTD than analysts. Second, for the higher institutional ownership sample, no significant association between BTD and V/P ratio is found, while for the lower institutional ownership sample BTD has a significantly negative association with V/P ratio. This result suggests that sophisticated investors, such as institutional investors and analysts, understand the meaning of BTD better than normal investors. Third, there was no significant association between BTD and V/P ratios for lower analyst following sample, while we found a significant and negative association between BTD and V/P ratios for higher analyst following sample. This means that more analyst following reduces biases in analysts' earnings forecasts and supports the finding that analysts play an important role in mitigating information asymmetry.

Based upon the empirical results, the contributions of this study are as follows. To our knowledge, this is the first empirical study that compares the magnitude of systematic biases between investors and analysts in interpreting BTD and finds that investors are more optimistically biased than analysts in interpreting BTD. Based on the finding that institutional investors have different systematic biases from normal investors and higher analyst following lowers systematic biases, this study suggests the evidence that analysts might help to alleviate investors' optimistic biases in interpreting BTD. Prior studies just examine investors with BTD (Lev and Nissim 2004) or analysts with BTD (Weber 2009). Therefore, this study might be a first attempt to compare empirically investors' and analysts' relative inefficiencies in interpreting BTD

information when investors make investments or analysts release the future earnings forecasts. In addition, this study also provides additional evidence on the previous finance and accounting studies on whether analysts' earnings forecasts mitigate the inefficiency of the stock market towards BTD.

The remainder of this paper is organized as follows. Chapter 2 establishes the research hypothesis after summarizing prior studies and Chapter 3 describes a specific methodology for the empirical analysis and the research sample. Chapter 4 sums up the empirical results and Chapter 5 finally suggests the conclusion.

## II. Prior studies and hypotheses development

### A. Studies on BTD (book-tax difference)

BTD results from various sources such as not only the difference between accounting standards and tax law but also earnings management or tax planning (Graham, Raedy, and Shackelford 2012). The existing studies on BTD mainly analyze about whether BTD has information regarding future firms' performance and how market participants react to BTD.

Using the U.S firms as a sample, Phillips, Pincus, and Rego (2003) reported that BTD is a sophisticated measurement that helps finding earnings management behavior. It is also found that BTD is significantly associated with earnings persistence and quality in a sense that it provides useful information about firms' future performance (Hanlon 2005). Further, Lev and Nissim (2004) claimed that investors overly reacted to BTD. Meanwhile, based on a study by Lev and Nissim (2004), Weber (2009) performed an empirical analysis on whether analysts, the sophisticated participants in the capital market, appropriately reflect BTD in their earnings forecast. Weber (2009) found that BTD is positively associated with analysts' earnings forecast error and claimed that this result implies analysts misunderstand BTD.

Prior studies using Korean firms also present a similar result. Hong and Kim (2016) reported that the investors overestimate accounting earnings of firms with large BTB in Korea, and concluded that these investors misunderstand firms' tax information and optimistically expect firms' future performance. Oh and Ki (2012) found that analysts in Korea usually do not reflect tax expense in their earnings forecast for firms with large BTB. It implies that analysts might have difficulties in understanding the meaning of BTB.

## B. Studies on relative inefficiency of investors and analysts

Prior studies mentioned that investors and analysts are systematically biased in interpreting some financial accounting information (Abarbanell and Bushee 1997; Fairfield and Yohn 2001; Mendenhall 1991; Bradshaw, Richardson, and Sloan 2001; Ahmed, Nainar, and Zhou 2005). Accordingly, some studied relative comparison of the systematic biases between the two groups. Above all, Abarbanell and Bernard (1992) claimed that investors were more systematically biased to interpret unexpected earnings than analysts. This is because post earnings announcement drift caused by insignificant reaction from the investors on unexpected earnings cannot be fully explained with the immaterial reaction from the analysts on the information concerned. However, Liu (2003) claimed that revisions of analysts on earnings forecasts occurred later than those of investors in the process to revise the systematic biases on unexpected earnings and made a different suggestion that investors are less systematically biased than analysts in interpreting unexpected earnings.

Moreover, the empirical result of a study conducted by Elgers, Lo, and Pfeiffer. (2003) revealed that investors overreact to accruals more than analysts in interpreting its effect on the future earnings. On the contrary, Kang and Yoo (2007) identified a potential error in the methodology in the study by

Elgers, Lo, and Pfeiffer (2003) and arrived at the opposite conclusion with another empirical result using a different methodology.

There are similar studies that present inconsistent empirical results on the relative inefficiency of the systematic biases that investors and analysts have in interpreting the financial accounting information. Thus, it turned out to be a difficult task to conduct empirical analysis for inferring the relative inefficiency of systematic biases in interpreting the effect of BTB on firms' future performance.

## C. Hypotheses

According to prior studies, the stock price or the earnings forecasts of analysts neither fully contain the financial accounting information efficiently, nor fully reflect the information of BTB which includes both financial and tax accounting information efficiently. This is because both investors and analysts have systematic biases, especially optimistic biases, in interpreting and reflecting accounting information for predicting future firm performance.

In this context, this study focuses on the information of BTB and compares the systematic biases of investors with that of the analysts in interpreting BTB. Until now, there has been no study that compared the relative inefficiency of systematic biases of investors and analysts in interpreting the impact of BTB on future earnings. In this regard, this study verifies it through null hypothesis on BTB as below.

Hypothesis: There is no significant difference between the systematic biases of investors and analysts in interpreting the effect of BTB on future earnings.

If analysts have smaller biases than investors for interpreting the impact of BTB on the future earnings, then investors have better use analysts' forecasts rather than predict firm performance by themselves. And investors can reduce the systematic biases by relying on the information offered by the analysts. In this

point, it is expected that the verification of our null hypothesis will be able to make a critical academic and practical suggestion on whether analysts can play a significant role of information intermediary for improving the efficiency of the stock market.

### III. Research design and variable measurement

#### A. BTD measure

BTD can be increased by either an opportunistic increase of financial income (earnings management) or an intentional decrease of taxable income (tax avoidance). In this regard, Hanlon (2005) and Lev and Nissim (2004) analyzed the link between BTB and future returns in order to understand whether these issues represent earnings management behaviour of managers. The authors found that rBTD, which is a quintile rank variable of BTB, predicts future negative abnormal returns (Lim 2011). In this study, we use rBTD in such a context and calculate total rBTD for each firm in the sample for each year over the sample period. We use EBT as earnings before tax and TI as taxable income, which is estimated as  $(CTE/r)$ . In  $CTE/r$ ,  $r$  stands for Korean statutory corporate tax rate and CTE is current tax expense that is computed in the following manner: tax expenses + changes in deferred tax assets – changes in deferred tax liabilities. The estimates of taxable income from financial statement disclosure are subject to some known estimation errors (Hanlon 2003; Weber 2009). However, since taxable income is not publicly available to market participants, estimation of taxable income would be the only way to capture real taxable income.

$$BTD_{it} = EBT_{it} - TI_{it} \quad (1)$$

where,

*BTD*: book-tax difference;

*EBT*: earnings before tax;

*TI*: taxable income.

According to prior literature, aggregate differences between book and taxable income vary over time (e.g., Plesko 2000; Hanlon and Shevlin 2005; Weber 2009), and thus it is important to ensure that time-specific macro level factors do not unduly influence results. Therefore, our analysis are based on decile ranks of BTB, denoted by rBTD. Using a relative measure also has several advantages. First, current tax expenses for firms with tax losses might be valued as zero or affected by the amount of taxable income from prior years, if they are available to obtain a tax refund through a tax loss carry back. In this case, the true amount of taxable income is measured with error for these firms. However, the effects of this error can be mitigated by the use of rank variable. Second, the use of rank variable helps to avoid overweighting outlying observations, which can be common with financial ratios. Hence, in the regression analysis, we use rBTD as the independent variable meaning the BTB information.

#### B. V/P measure

First, the RIVC model assumes that the residual income is constant beyond two-years-ahead (Ali, Hwang, and Trombley 2003; Frankel and Lee 1998; Lee, Myers, and Swaminathan 1999; Liu, Nissim, and Thomas 2002). We compute the future book values by using the ex-ante clean surplus relation in which the book value in the future year equals the beginning book value and the estimated earnings less the estimated dividends. The following is the appropriate equation.

$$V_{RIVC} = bv_t + \sum_{s=1}^2 \left( \frac{E_t(\text{eps}_{t+s} - r_t \times bv_{t+s-1})}{(1 + r_t)^s} \right) + \frac{E_t(\text{eps}_{t+2} - r_t \times bv_{t+1})}{r_t \times (1 + r_t)^2} \quad (2)$$

where,

*BV<sub>t</sub>*: book value of equity per share at time  $t$ ;

$EPS_t$ : the earnings per share during time  $t$ ;  
 $r_t$ : the cost of equity capital at time  $t$ .

Second, the RIVI model assumes that the return on equity (ROE) proceeds linearly towards the industry median ROE by the twelfth year and thereafter the residual income becomes a constant perpetuity (Gebhardt, Lee, and Swaminathan 2001; Lee, Myers, and Swaminathan 1999; Liu, Nissim, and Thomas 2002). The following is the equation.

$$V_{RIVI} = bv_t + \sum_{s=1}^2 \left( \frac{E_t(eps_{t+s} - r_t \times bv_{t+s-1})}{(1+r_t)^s} \right) + \sum_{s=3}^{11} \frac{[E_t(ROE_{t+s} - r_t)] \times bv_{t+s-1}}{(1+r_t)^s} + \frac{[E_t(ROE_{t+12} - r_t)] \times bv_{t+11}}{r_t \times (1+r_t)^{11}} \quad (3)$$

where,

$ROE_t$  is the return on equity in time  $t$ .

Third, the RIVG model assumes that the residual income beyond two years ahead increases eternally by the annual rate of the risk-free rate minus 3%, which is the long-term inflation rate (Claus and Thomas 2001).

$$V_{RIVG} = bv_t + \sum_{s=1}^2 \left( \frac{E_t(eps_{t+s} - r_t \times bv_{t+s-1})}{(1+r_t)^s} \right) + \frac{E_t(eps_{t+2} - r_t \times bv_{t+1}) \times (1+g)}{(r_t - g) \times (1+r_t)^2} \quad (4)$$

where,

$g$  is the long-term growth rate.

According to the conventional multiple valuation approach, a value driver is converted into an equity value estimate through the multiplication of the corresponding valuation multiple, as follows.<sup>3)4)</sup>

$$AEV_{i,t} = (P/X)_{Com\ i,t} \times X_{i,t} \quad (5)$$

where,

$AEV_{i,t}$ : the adjusted equity value estimate for firm  $i$  in year  $t$ ;

$(P/X)_{Com\ i,t}$ : the harmonic mean of the ratio of stock price ( $P$ ) to value driver ( $X$ ) of the comparable firms for firm  $i$  in year  $t$ .  
 $X$  is the corresponding value driver of firm  $i$  in year  $t$ .

Following Liu, Nissim, and Thomas(2002), we use the harmonic mean of the V/P ratio from the RIVC, RIVI, and RIVG models respectively.<sup>5)</sup> We use adjusted equity value as an adjusted V/P ratio and use the arithmetic average of three adjusted V/P ratios as the dependent variable in this study.

## C. Regression equation

To examine the association between rBDT and value/price (V/P) ratio, we conduct the regression given below. Prior studies have used V/P ratio to investigate the relative inefficiency between analysts and investors towards accounting variables (Chun

on the method in Liu, Nissim, and Thomas (2002).

- 4) For all of the valuation models, we estimate the future dividend pay-out ratio by dividing actual dividends by earnings for the most recent year. In the case of the firms having negative earnings, we divide dividends for the most recent year by analysts' one or two-year-ahead earnings forecast to derive the future dividend pay-out ratio. If both earnings forecasts are still negative, we assume the future dividend pay-out ratio to be zero. If the estimated dividend pay-out ratio is larger than 0.5, we assume the payout ratio to be 0.5. The resulting beta estimate is used in conjunction with the realized ten-year Treasury bill rates as risk-free rates and 5% at the market risk premium. (Kang and Yoo 2007)
- 5) Unadjusted estimates of equity values are biased upward on average. The average bias is obtained by applying the multiple valuation approach rather than by changing the assumption in our implementations. After selecting comparable firms from the same industry as the valued firms, we compute the valuation multiple as the out-of-sample harmonic mean of the comparable firms' ratios of stock prices to the unadjusted equity value estimates (Jorjensen, Yoo, and Lee 2011). Finally, multiplication of the multiple by the valued firms' corresponding unadjusted equity value estimates yields the adjusted equity value.

3) If you want to know more about value driver method, please see Liu, Nissim, and Thomas (2002). There is detailed information

and Yoo 2015; Kang and Yoo 2007). From this perspective, we use “V”, which is derived from intrinsic value, while “P” is stock price. Then,

$$\begin{aligned} \text{Log}(V_t) = & \alpha_0 + \text{Log}(IV_t) + \alpha_1 \text{ rBTD}_t + \alpha_2 \text{ SUE}_t + \alpha_3 \\ & \text{ACC}_t + \alpha_4 \text{ GRLTNOA}_t + \varepsilon \end{aligned} \quad (6)$$

$$\begin{aligned} \text{Log}(P_t) = & \gamma_0 + \text{Log}(IV_t) + \gamma_1 \text{ rBTD}_t + \gamma_2 \text{ SUE}_t \\ & + \gamma_3 \text{ ACC}_t + \gamma_4 \text{ GRLTNOA}_t + \varepsilon \end{aligned} \quad (7)$$

where,

$\text{Log}(IV_t)$  is the true intrinsic value based on the information available at time  $t$ .

In equations (6) and (7), the magnitudes of the rBTD coefficients can be interpreted as the magnitude of the valuation biases. For example, if investors fully incorporate rBTD information into their valuations, then it would not cause stock prices to diverge from their true intrinsic values. In other words, the coefficient of rBTD in equation (7) should be zero. As the magnitude of the rBTD coefficient increases, the divergence between stock price and intrinsic value becomes greater under the same level of rBTD. Thus, we can determine whether the intrinsic value estimates based on analysts' earnings forecasts are less (or more) biased than the stock prices in valuing rBTD. Since the intrinsic value is unobservable, this determination is achieved by taking the difference of equations (6) and (7) to cancel out the intrinsic value. Thus, the final equation, which we use as the main regression, is as follows.

$$\begin{aligned} \text{Log}(V_t/P_t) = & \alpha_0 + (\alpha_1 - \gamma_1) \text{ rBTD}_t + (\alpha_2 - \gamma_2) \text{ SUE}_t \\ & + (\alpha_3 - \gamma_3) \text{ ACC}_t \\ & + (\alpha_4 - \gamma_4) \text{ GRLTNOA}_t + \varepsilon \end{aligned} \quad (8)$$

If analysts' earnings forecasts are less biased than stock prices in interpreting rBTD, then the V/P ratio should successfully indicate the market's mispricing of rBTD. If this is the case, then a lower level V/P ratio will indicate the market's overpricing of rBTD. Since a higher level of rBTD indicates the market's overpricing of rBTD, the V/P ratio should be negatively correlated with rBTD. However, if analysts' earnings

forecasts are more biased than stock prices in interpreting rBTD, then the V/P ratio will be positively related with rBTD (Kang and Yoo 2007). To examine the association between rBTD and V/P ratio, we conduct the following regression.

$$\begin{aligned} \text{AVER}(V_t/P_t) = & \beta_0 + \beta_1 \text{ rBTD}_t + \beta_2 \text{ BETA}_t + \beta_3 \text{ BM}_t \\ & + \beta_4 \text{ LNSIZE}_t + \beta_5 \text{ DM}_t + \beta_6 \text{ IDRISK}_t \\ & + \beta_7 \text{ EDISP}_t + \beta_8 \text{ GRLTNOA}_t + \beta_9 \text{ SUE}_t \\ & + \beta_{10} \text{ CHSAL}_t + \beta_{11} \text{ ACC}_t \\ & + \text{Year Dummies} + \text{Industry Dummies} \\ & + \varepsilon \end{aligned} \quad (9)$$

where,

- rBTD*: the decile rank of rBTDs computed from equation (1) divided by lagged total assets;
- BETA*: the systematic risk estimated by regressing at least 30 prior monthly stock returns up to 60 prior monthly returns against the corresponding market index;
- BM*: the book value of equity divided by the market value of equity;
- LNSIZE*: log of total assets as on April of each year;
- DM*: the book value of liability divided by the market value of equity;
- IDRISK*: the idiosyncratic risk, which is measured as the variance of residuals from the regressions of *BETA* estimation;
- EDISP*: the dispersion of analysts' earnings forecasts, which is measured as the standard deviation of the one-year-ahead analysts' earnings forecasts scaled by the absolute mean of these forecasts;
- GRLTNOA*: the growth in long-term net operating assets, scaled by average total assets;
- SUE*: the standardized unexpected quarterly earnings, which is equal to the current fourth quarter's actual earnings minus the prior fourth quarter's actual earnings, divided by the standard deviation of the unexpected quarterly earnings over the prior seven quarters;
- CHSAL*: annual growth rate of net sales;
- ACC*: accruals (income before tax minus operating cash flows) scaled by average total assets;



We include the following control variables for this regression. We use beta (*BETA*), firm size (*SIZE*), and the book value of equity divided by the market value of equity (*BM*) as the control variables (Fama and French 1996). To control the financial leverage effect, we control for leverage ratio (*DM*), following Modigliani and Miler (1958); in addition, while *BETA* indicates a systematic risk, an idiosyncratic risk represents an unsystematic risk (Malkiel and Xu 1997). Prior research (Gode and Mohanram 2003) considered an idiosyncratic risk as a component of the entire set of risk proxies, and thus we control the idiosyncratic risk (*IDRISK*). The dispersion in analysts' earnings forecasts can capture the information risks (Botosan and Plumlee 2005) and/or earnings variability (Gebhardt, Lee, and Swaminathan 2001); that is, *EDISP* can display the uncertainty regarding future firm performance due to either the vague information environment or the fundamental cash flow risk (Botosan and Plumlee 2005).

In addition, we control for the market anomaly variable, which can directly affect future stock returns, unexpected earnings (*SUE*), accruals (*ACC*), the growth rate of long-term operating assets (*GRLTNOA*), and change of sales (*CHSAL*) (e.g., Bernard and Thomas 1989, 1990; Fairfield, Whisenant, and Yohn 2003; Xie 2001). Finally, we include year dummies and industry dummies to control the influence of year by year effect and industry specific effect.

#### D. Sample selection

The empirical analysis is based on a sample of Korean listed firms from 2001 to 2008. We extract accounting and stock return data from the Korea Information Service Value database (KISvalue) and analysts' earnings forecast data from the FnGuide database. At the end of each year, we select firm-years that satisfy the following criteria.<sup>6)</sup>

- (1) Availability of financial statement data required

for the computation of the main variables.

- (2) Availability of stock price means for one-year-ahead, two-years-ahead, and three-years-ahead analysts' earnings forecasts from the FnGuide.
- (3) Availability of all risk proxies.
- (4) The firms are non-financial.
- (5) Fiscal year-end is December.
- (6) One-year-ahead and two-years-ahead analyst's earnings forecasts are positive.
- (7) The book value of equity is positive.

This process yields a final sample of 1,544 firm-year observations (500 unique firms) from Korea Stock Exchange (KSE) and KOSDAQ firms between 2001 and 2008.

## IV. Empirical results

### A. Data description

The descriptive statistics of the final sample are reported in Table 1. The mean values of the intrinsic value derived from the RIVC, RIVI, and RIVG models scaled by stock price are 1.025, 1.029, and 1.029, respectively; in addition, the harmonic average value of the V/P ratio is 1.027. We conclude that when the V/P ratio is higher than one, the present stock price is undervalued in the stock market. This analysis is conducted in a "relative" sense by examining the cross-sectional association between the V/P ratios and rBTD. Thus, we consider only the relative magnitudes of the V/P ratios as the signal from analysts' earnings forecasts about the market's mispricing. The descriptive statistics also report the distribution of the control variables as follows.

### B. Univariate analysis

Table 2 shows the Pearson correlation coefficients

6) To mitigate the effect of outliers, regressors are winsorized at 1% and 99% of the pooled distribution.

7) The number of unique firms in our sample equals to 500.

**Table 1.** Descriptive Statistics

This table presents the distributions of main variables used in this study. *AVERV/P*: Arithmetic average of  $V_{RIVC} / P$ ,  $V_{RIVI} / P$ ,  $V_{RIVG} / P$ .  $V_{RIVC} / P$ ,  $V_{RIVI} / P$ ,  $V_{RIVG} / P$ : The intrinsic value estimate, which are derived through the RIVC, RIVI, RIVG model, respectively, scaled by stock price. See the main text for the details of the implementation of each valuation model. *BTDS*: The book-tax difference computed as earnings before tax minus taxable income, where taxable income is current tax expenses (tax expenses plus changes in deferred tax assets minus changes in deferred tax liabilities) divided by Korean statutory corporate tax rate. *rBTD*: The decile rank of *BTDS*, which is valued from 0 to 1. *BETA*: The systematic risk estimated by regressing at least 30 prior monthly stock returns up to 60 prior monthly returns against the corresponding market index. *LNSIZE*: Log of market value of equity as of April of each year. *BM*: The book value of equity divided by market value of equity. *DM*: The book value of liability divided by market value of equity. *IDRISK*: The idiosyncratic risk, which is measured as the variance coefficient of residuals from the regressions of *BETA* estimation. *EDISP*: The dispersion of analysts' earnings forecasts, which is measured as the standard deviation of the one-year-ahead analysts' earnings forecasts scaled by the absolute mean of these forecasts. *GRLTNOA*: The growth in long term net operating assets, scaled by average total assets. *SUE*: The standardized unexpected quarterly earnings, which is equal to the current fourth quarter's actual earnings minus the previous fourth quarter's actual earnings divided by the standard deviation of the unexpected quarterly earnings over the previous seven quarters. *CHSAL*: Annual growth rate of net sales. *ACC*: Accruals scaled by average total assets.

Variables	N. of Sample <sup>7)</sup>	MEAN	STD.	MIN	Median	MAX
<i>AVERV/P</i>	1,543	1.027	0.529	0.192	0.922	3.125
$V_{RIVC} / P$	1,543	1.025	0.501	0.230	0.932	2.709
$V_{RIVI} / P$	1,543	1.029	0.619	0.176	0.895	3.672
$V_{RIVG} / P$	1,543	1.029	0.541	0.171	0.918	2.996
<i>BTDS</i>	1,543	0.023	0.071	-0.222	0.013	0.307
<i>rBTD</i>	1,543	0.500	0.289	0.010	0.500	0.990
<i>BETA</i>	1,543	0.985	0.382	0.186	0.960	2.133
<i>BM</i>	1,543	1.157	0.941	0.147	0.877	5.193
<i>LNSIZE</i>	1,543	26.760	1.568	24.193	26.469	30.760
<i>DM</i>	1,543	1.165	1.551	0.042	0.638	8.944
<i>IDRISK</i>	1,543	0.024	0.020	0.004	0.018	0.133
<i>EDISP</i>	1,543	0.161	0.272	0.000	0.094	1.978
<i>GRLTNOA</i>	1,543	0.149	0.213	-0.353	0.113	0.998
<i>SUE</i>	1,543	0.100	1.391	-2.790	0.108	3.182
<i>CHSAL</i>	1,543	0.134	0.256	-0.595	0.088	1.215
<i>ACC</i>	1,543	-0.024	0.083	-0.263	-0.028	0.234

among the main variables. The main variable average V/P ratio is positively associated with *rBTD*. However, the relation is not statistically significant. The independent variable *rBTD* is negatively associated with *BETA*, *GRLTNOA*, *SUE*, *CHSAL*, and *ACC* and positively associated with *BM*, *DM*, and *EDISP*. Further, the dependent variable average V/P ratio is positively associated with *DM*, *CHSAL*, and *ACC* and negatively associated with *BETA*, *BM*, *LNSIZE*, and *EDISP*. In the next section, we conducted multivariate regression analyzes to examine the overall association between *rBTD* and average V/P ratio.

### C. Multivariate analysis

Table 3 shows the result from the regression of average V/P ratio and three individual V/P ratios computed from RIVC, RIVI, and RIVG models on *rBTD*. The regression coefficient of *rBTD* is  $-0.109$  ( $-0.123$ ,  $-0.067$ ,  $-0.136$ ), which is significant at 1% level except for the result using V/P ratio from RIVI model. This result overall rejects hypothesis 1, and implies that there exists difference between the systematic biases of investors and analysts in interpreting *BTD*. The negative coefficient of *rBTD* means that the larger the *BTD*, the lesser the V/P

**Table 2.** Univariate Correlations

This table presents Pearson correlations among the variables for the pooled sample. See the note of Table 1 for the definitions of the variables. Bold text indicates the significance at 5% level or better based on two tailed test.

	<i>AVERV/P</i>	<i>rBTD</i>	<i>BETA</i>	<i>BM</i>	<i>LNSIZE</i>	<i>DM</i>	<i>IDRISK</i>	<i>EDISP</i>	<i>GRLTNOA</i>	<i>SUE</i>	<i>CHSAL</i>
<i>rBTD</i>	0.002										
<i>BETA</i>	<b>-0.368</b>	<b>-0.120</b>									
<i>BM</i>	<b>-0.346</b>	<b>0.192</b>	<b>-0.203</b>								
<i>LNSIZE</i>	<b>-0.406</b>	0.048	-0.047	0.035							
<i>DM</i>	<b>0.227</b>	<b>0.210</b>	-0.026	<b>0.686</b>	<b>0.254</b>						
<i>IDRISK</i>	-0.013	-0.022	<b>0.288</b>	0.025	<b>-0.262</b>	<b>0.104</b>					
<i>EDISP</i>	<b>-0.132</b>	<b>0.190</b>	<b>0.165</b>	<b>0.078</b>	<b>0.175</b>	<b>0.208</b>	<b>0.051</b>				
<i>GRLTNOA</i>	0.013	<b>-0.166</b>	<b>0.150</b>	<b>-0.236</b>	-0.005	<b>-0.059</b>	0.036	-0.024			
<i>SUE</i>	0.049	<b>-0.190</b>	-0.050	-0.040	-0.013	-0.025	0.038	<b>-0.206</b>	<b>0.050</b>		
<i>CHSAL</i>	<b>0.062</b>	<b>-0.171</b>	<b>0.096</b>	<b>-0.176</b>	<b>-0.130</b>	<b>-0.074</b>	<b>0.087</b>	<b>-0.108</b>	<b>0.426</b>	<b>0.131</b>	
<i>ACC</i>	<b>0.061</b>	<b>-0.185</b>	0.005	<b>-0.066</b>	<b>-0.140</b>	<b>-0.131</b>	0.009	<b>-0.156</b>	<b>-0.244</b>	<b>0.116</b>	<b>0.139</b>

ratio, so that investors overestimate the performance of firms with larger BTD than analysts. This empirical result implies that analysts have better understanding of BTD than investors, and they might be able to play a role in mitigating information asymmetries caused by BTD.<sup>8)</sup>

In addition, we tested whether there exists difference among the investors. For the additional test, we divided the sample into two groups by institutional ownership. We classify firm-years with institutional ownership of over 5% as high institutional ownership subsample and others as low institutional subsample. Usually, institutional investors are regarded as more sophisticated investors because they have larger size and more ability to analyze firms' financial status than normal investors.

The first two columns of table 4 show the results. The coefficient of *rBTD* was not significant in the higher institutional ownership sample, while the coefficient of *rBTD* was significant at 5% level and negative in the lower institutional ownership sample. These results suggest that institutional investors and analysts do not differ in interpreting BTD. However, normal investors

overestimate the value of firms with larger BTD, which is consistent with the result of table 3.

We performed another additional test by dividing the sample into two groups by analyst following. Higher analyst following means that the firm receives more attention and is analyzed more by outside investors. Therefore, more information is available for such firms. In this case, the systematic biases in earnings forecast and price might differ between firms with higher analyst following and lower analyst following. We classify firm-years with more than the median value of analyst following which is equal to 5 as high analyst following and others as low analyst following.

The third and fourth columns of table 4 show the results of two regressions for the higher analyst following group and the lower analyst following group. In the higher analyst following group, the regression result remained consistent with table 3, but in the lower analyst following group, the coefficient of *rBTD* was not significant. It implies that the systematic biases included in earnings forecasts are lower for the firms with higher analyst following so that the V/P ratio is lower for firms with larger BTD. However, for firms with lower analyst following, the level of systematic biases included in earnings forecasts and the ones included in stock price might not differ.

8) To check robustness of our test, we performed regressions by using year and industry fixed model with firm level cluster. Unstipulated results show that the coefficient of *rBTD* was all negative and significantly as -0.089, -0.095, -0.074, and -0.098, respectively for average V/P ratio, and three V/P ratios.

**Table 3.** Regression of the Average *V/P* ratios on *rBTD*

This table presents the results of regressions of the ratio of intrinsic value estimates based on analysts' earnings forecasts relative to stock price (*AVERV/P*) on the *rBTD* with a set of control variables. T-statistics in parentheses are adjusted for firm-level clustering to correct for serial correlation within a cluster (a firm). See the note of Table 1 for the definitions of the variables. \*\*\*, \*\*, \* indicate, respectively, the significance level at the 1%, 5% and 10% level or better. The regression equations are as follows.

$$AVER V_t / P_t (V_{RIVC}/P, V_{RIV}/P, V_{RIVG}/P) = \beta_0 + \beta_1 rBTD_t + \beta_2 BETA_t + \beta_3 LNBM_t + \beta_4 LNSIZE_t + \beta_5 LNDM_t + \beta_6 IDRISK_t + \beta_7 EDISP_t + \beta_8 GRLTNOA_t + \beta_9 SUE_t + \beta_{10} CHSAL_t + \beta_{11} ACC_t + Year \& Industry Dummies + \varepsilon$$

VARIABLES	(1) <i>Aver V/P</i>	(2) <i>V<sub>RIVC</sub>/P</i>	(3) <i>V<sub>RIV</sub>/P</i>	(4) <i>V<sub>RIVG</sub>/P</i>
<i>rBTD</i>	-0.109** [-2.442]	-0.123*** [-2.799]	-0.067 [-1.354]	-0.136*** [-2.843]
<i>BETA</i>	-0.693*** [-17.998]	-0.567*** [-15.138]	-0.853*** [-19.051]	-0.659*** [-15.303]
<i>LNBM</i>	0.153*** [4.543]	0.109*** [3.366]	0.323*** [8.097]	0.027 [0.727]
<i>LNSIZE</i>	-0.105*** [-9.600]	-0.107*** [-9.600]	-0.091*** [-8.421]	-0.118*** [-9.339]
<i>LNDM</i>	0.103*** [5.675]	0.105*** [5.881]	0.092*** [4.516]	0.112*** [5.546]
<i>IDRISK</i>	2.489*** [3.396]	2.013*** [2.806]	3.172*** [3.809]	2.282*** [2.837]
<i>EDISP</i>	-0.164*** [-2.711]	-0.208*** [-3.752]	-0.038 [-0.496]	-0.245*** [-4.016]
<i>GRLTNOA</i>	0.187** [2.401]	0.158** [2.247]	0.242** [2.460]	0.162** [2.136]
<i>SUE</i>	0.025*** [3.241]	0.024*** [3.092]	0.029*** [3.241]	0.024*** [2.742]
<i>CHSAL</i>	0.099 [1.506]	0.097 [1.567]	0.107 [1.417]	0.094 [1.346]
<i>ACC</i>	0.271 [1.551]	0.335** [1.990]	0.129 [0.655]	0.349* [1.880]
Constant	4.191*** [13.917]	4.202*** [13.813]	3.799*** [12.796]	4.573*** [13.102]
Year Dummy	Included			
Industry Dummy				
Observations	1,543	1,543	1,543	1,543
R-squared	0.455	0.410	0.500	0.372

To sum up, we found that investors estimate the future performance of firms with larger *BTD* more optimistically than the analysts. However, there exists difference among investors in interpreting *BTD* and by the level of interests from analysts. Institutional

investors, the more sophisticated investors, do not differ from analysts in interpreting *BTD*. In addition, it was found that higher analyst following lowers the biases included in earnings forecasts. Overall, our empirical results suggest that analysts might play

**Table 4.** Separate Regressions of the Average  $V/P$  ratios on  $r\text{BD}$  by the Level of Institutional Ownership and Analyst Following

This table presents the results of regressions of the ratio of intrinsic value estimates based on analysts' earnings forecasts relative to stock price ( $AVER/P$ ) on the  $r\text{BD}$  with a set of control variables according to level of institutional ownership and analyst following. T-statistics in parentheses are adjusted for firm-level clustering to correct for serial correlation within a cluster (a firm). The observation is classified as high institutional ownership if it has institutional ownership over 5%, and classified as low institutional ownership, otherwise. The observation is classified as high analyst following if analyst following is above median value which equals to 5 and classified as low analyst following, otherwise. See the note of Table 1 for the definitions of the variables. \*\*\*, \*\*, \* indicate, respectively, the significance level at the 1%, 5% and 10% level or better. The regression equations are as follows.

$$AVER/P_i = \beta_0 + \beta_1 r\text{BD}_i + \beta_2 BETA_i + \beta_3 LNBM_i + \beta_4 LNSIZE_i + \beta_5 LNDM_i + \beta_6 IDRISK_i + \beta_7 EDISP_i + \beta_8 GRLTNOA_i + \beta_9 SUE_i + \beta_{10} CHSAL_i + \beta_{11} ACC_i + \text{Year \& Industry Dummies} + \varepsilon$$

VARIABLES	(1)	(2)	(3)	(4)
	<i>Aver V/P</i>	<i>Aver V/P</i>	<i>Aver V/P</i>	<i>Aver V/P</i>
	Institutional Ownership		Analyst Following	
	High	Low	High	Low
<i>rBD</i>	-0.079 [-0.975]	-0.118** [-2.309]	-0.210*** [-3.908]	-0.091 [-1.266]
<i>BETA</i>	-0.689*** [-9.315]	-0.683*** [-15.616]	-0.516*** [-11.656]	-0.827*** [-13.875]
<i>LNBM</i>	0.165*** [2.838]	0.148*** [3.746]	0.225*** [5.688]	0.088 [1.646]
<i>LNSIZE</i>	-0.126*** [-5.744]	-0.101*** [-8.514]	-0.065*** [-5.281]	-0.186*** [-7.217]
<i>LNDM</i>	0.048 [1.322]	0.118*** [5.690]	0.082*** [3.805]	0.107*** [3.863]
<i>IDRISK</i>	4.008** [2.121]	2.411*** [3.072]	1.356 [1.045]	3.252*** [3.501]
<i>EDISP</i>	-0.154* [-1.717]	-0.171** [-2.386]	-0.158*** [-2.685]	-0.080 [-0.665]
<i>GRLTNOA</i>	0.268* [1.929]	0.151 [1.587]	0.149** [2.119]	0.240* [1.691]
<i>SUE</i>	0.032** [2.351]	0.024*** [2.647]	0.011 [1.419]	0.040*** [2.997]
<i>CHSAL</i>	0.169 [1.403]	0.083 [1.098]	0.121** [2.369]	0.068 [0.580]
<i>ACC</i>	0.375 [0.962]	0.222 [1.185]	0.157 [0.760]	0.243 [0.896]
Constant	4.422*** [6.953]	4.098*** [12.497]	3.175*** [8.858]	6.219*** [9.350]
Year Dummy	Included		Included	
Industry Dummy	Included		Included	
Observations	360	1,183	760	685
R-squared	0.559	0.457	0.498	0.394

a role in mitigating the inefficiency of the stock market.

#### D. Robustness test

BTD is computed by firms so firm specific

characteristic may affect the results. To control firm specific characteristics we regressed model (9) again using firm-fixed effect model. Table 5 shows the results. The regression coefficients of rBTD against average V/P ratio and three individual V/P ratios computed from RIVC, RIVI, and RIVG models are

**Table 5.** Robustness Test: Regression of the V/P ratios on BTDS with firm-fixed effect model

This table presents the results of regressions of the ratio of intrinsic value estimates based on analysts' earnings forecasts relative to stock price ( $AVERV/P$ ) on the  $rBTD$  with a set of control variables. T-statistics in parentheses are adjusted for firm-level clustering to correct for serial correlation within a cluster (a firm) with year and firm fixed effects. See the note of Table 1 for the definitions of the variables. \*\*\*, \*\*, \* indicate, respectively, the significance level at the 1%, 5% and 10% level or better. The regression equations are as follows.

$$AVER V_i / P_i (V_{RIVC}/P, V_{RIVI}/P, V_{RIVG}/P) = \beta_0 + \beta_1 rBTD_i + \beta_2 BETA_i + \beta_3 LNBM_i + \beta_4 LNSIZE_i + \beta_5 LNDM_i + \beta_6 IDRISK_i + \beta_7 EDISP_i + \beta_8 GRLTNOA_i + \beta_9 SUE_i + \beta_{10} CHSAL_i + \beta_{11} ACC_i + \text{Year \& Industry Dummies} + \varepsilon$$

VARIABLES	(1) <i>Aver V/P</i>	(2) <i>V<sub>RIVC</sub>/P</i>	(3) <i>V<sub>RIVI</sub>/P</i>	(4) <i>V<sub>RIVG</sub>/P</i>
<i>rBTD</i>	-0.089* [-1.799]	-0.095** [-1.990]	-0.074 [-1.280]	-0.098* [-1.859]
<i>BETA</i>	-0.596*** [-11.765]	-0.483*** [-9.915]	-0.749*** [-12.020]	-0.555*** [-10.036]
<i>LNBM</i>	-0.038 [-0.519]	-0.046 [-0.680]	0.088 [0.963]	-0.157* [-1.939]
<i>LNSIZE</i>	-0.047 [-0.684]	-0.015 [-0.247]	-0.081 [-0.868]	-0.045 [-0.650]
<i>LNDM</i>	0.175*** [3.228]	0.181*** [3.633]	0.153** [2.131]	0.191*** [3.486]
<i>IDRISK</i>	-0.334 [-0.258]	-0.443 [-0.366]	-0.104 [-0.062]	-0.454 [-0.356]
<i>EDISP</i>	-0.065 [-0.890]	-0.092 [-1.385]	0.014 [0.142]	-0.117 [-1.603]
<i>GRLTNOA</i>	0.026 [0.323]	0.012 [0.158]	0.059 [0.586]	0.007 [0.092]
<i>SUE</i>	0.016** [2.023]	0.013* [1.735]	0.020** [2.324]	0.014* [1.651]
<i>CHSAL</i>	0.138** [2.035]	0.133** [2.148]	0.159** [2.041]	0.123* [1.659]
<i>ACC</i>	-0.082 [-0.435]	-0.030 [-0.167]	-0.174 [-0.793]	-0.042 [-0.213]
Constant	2.856 [1.597]	1.958 [1.224]	3.782 [1.561]	2.826 [1.567]
Year Dummy Industry Dummy	Included			
Observations	1,543	1,543	1,543	1,543
R-squared	0.240	0.200	0.292	0.180

respectively  $-0.089$ ,  $-0.095$ ,  $-0.074$ , and  $-0.098$ , which are significant except for the result using V/P ratio from RIVI mode. This is consistent with the results of table 3.

Prior research pointed that analysts' earnings forecast contains optimistic biases, so that researchers should be careful when to interpret the results using analysts' earnings forecasts (Hail and Luez 2006).

**Table 6.** Robustness test to Noise in Analyst Forecasts

This table presents the results of regressions of the ratio of intrinsic value estimates based on analysts' earnings forecasts relative to stock price ( $AVERV/P$ ) on the  $rBTD$  with a set of control variables to consider noise in analyst forecasts. Forecast optimism bias is calculated by analysts' one-year-ahead forecasts minus actual earnings, scaled by lagged total assets. T-statistics in parentheses are adjusted for firm-level clustering to correct for serial correlation within a cluster (a firm). See the note of Table 1 for the definitions of the variables. \*\*\*, \*\*, \* indicate, respectively, the significance level at the 1%, 5% and 10% level or better. The regression equations are as follows.

$$AVER V_t / P_t (V_{RIVC}/P, V_{RIV}/P, V_{RIVG}/P) = \beta_0 + \beta_1 rBTD_t + \beta_2 BETA_t + \beta_3 LNBM_t + \beta_4 LNSIZE_t + \beta_5 LNDM_t + \beta_6 IDRISK_t + \beta_7 EDISP_t + \beta_8 GRLTNOA_t + \beta_9 SUE_t + \beta_{10} CHSAL_t + \beta_{11} ACC_t + Year \& Industry Dummies + \varepsilon$$

VARIABLES	Forecast Optimism Bias Less than $J$ th Percentile		
	$Aver V/P$ $J=95\%$	$Aver V/P$ $J=75\%$	$Aver V/P$ $J=50\%$
$rBTD$	-0.113** [-2.519]	-0.141*** [-2.797]	-0.140** [-2.360]
$BETA$	-0.686*** [-17.741]	-0.664*** [-16.350]	-0.661*** [-13.514]
$LNBM$	0.164*** [4.672]	0.183*** [4.496]	0.179*** [3.966]
$LNSIZE$	-0.098*** [-9.031]	-0.088*** [-7.889]	-0.078*** [-6.144]
$LNDM$	0.109*** [5.885]	0.100*** [4.679]	0.113*** [4.702]
$IDRISK$	2.081*** [2.659]	1.545** [1.972]	1.430 [1.465]
$EDISP$	-0.161*** [-2.645]	-0.121* [-1.859]	-0.168*** [-3.154]
$GRLTNOA$	0.129* [1.734]	0.107 [1.238]	0.042 [0.401]
$SUE$	0.024*** [3.017]	0.013 [1.491]	-0.003 [-0.275]
$CHSAL$	0.118* [1.945]	0.101 [1.455]	-0.019 [-0.228]
$ACC$	0.273 [1.514]	0.485** [2.229]	0.521* [1.851]
<i>Constant</i>	4.019*** [13.226]	3.782*** [11.975]	3.553*** [9.858]
Year Dummy Industry Dummy	Included		
Observations	1,466	1,157	771
R-squared	0.472	0.461	0.475

To mitigate this concern, we first excluded the top 5%, 25% and 50% of firm-year observations in the forecast optimism bias distribution. Using the forecast optimism bias distribution, we again separated the

**Table 7.** Robustness test to control discretionary accruals

This table presents the results of regressions of the ratio of intrinsic value estimates based on analysts' earnings forecasts relative to stock price ( $AVERV/P$ ) on the  $rBTD$  with a set of control variables.  $DAKW$ ,  $DAPAE$  is discretionary accruals derived by Kothari et al. (2005) and Pae (2005) respectively. T-statistics in parentheses are adjusted for firm-level clustering to correct for serial correlation within a cluster (a firm). See the note of Table 1 for the definitions of the variables. \*\*\*, \*\*, \* indicate, respectively, the significance level at the 1%, 5% and 10% level or better. The regression equations are as follows.

$$AVER V_i / P_i (V_{RIVC}/P_i, V_{RIV}/P_i, V_{RIVG}/P_i) = \beta_0 + \beta_1 rBTD_i + \beta_2 BETA_i + \beta_3 LNBM_i + \beta_4 LNSIZE_i + \beta_5 LNDM_i + \beta_6 IDRISK_i + \beta_7 EDISP_i + \beta_8 GRLTNOA_i + \beta_9 SUE_i + \beta_{10} CHSAL_i + \beta_{11} ACC_i + \beta_{12} DAKW(DAPAE)_i + Year \& Industry Dummies + \varepsilon$$

VARIABLES	<i>Aver V/P</i>	<i>Aver V/P</i>
<i>rBTD</i>	-0.109** [-2.445]	-0.107** [-2.406]
<i>BETA</i>	-0.698*** [-17.976]	-0.693*** [-17.950]
<i>LNBM</i>	0.149*** [4.414]	0.153*** [4.527]
<i>LNSIZE</i>	-0.105*** [-9.539]	-0.105*** [-9.583]
<i>LNDM</i>	0.110*** [5.884]	0.103*** [5.680]
<i>IDRISK</i>	2.438*** [3.328]	2.501*** [3.403]
<i>EDISP</i>	-0.164*** [-2.716]	-0.163*** [-2.685]
<i>GRLTNOA</i>	0.182** [2.354]	0.188** [2.402]
<i>SUE</i>	0.026*** [3.308]	0.025*** [3.158]
<i>CHSAL</i>	0.093 [1.403]	0.103 [1.479]
<i>ACC</i>	0.794** [2.567]	0.246 [1.259]
<i>DAKW</i>	-0.516** [-1.997]	
<i>DAPAE</i>		0.062 [0.284]
<i>Constant</i>	4.217*** [13.936]	4.186*** [13.858]
Year Dummy	Included	
Industry Dummy		
Observations	1,543	1,543
R-squared	0.457	0.455



sample and the regressed model (9). Table 6 shows the results. All the regression results using 95%, 75%, and 50% still showed significantly negative coefficient for rBTD. This is consistent with the results of table 3.

Blaylock, Shevlin, and Wilson (2012) pointed large BTD can come from both earnings management and tax planning. In addition, they distinguished the sample with large BTD caused by earnings management by using discretionary accruals. If earnings management by discretionary accruals affect the magnitude of BTDs, then the results of our analysis may be distorted. To control the effect of discretionary accruals, we performed regression of model (9) by adding discretionary accruals as another control variable. Table 7 shows the results. The regression results are consistent with table 3, regardless of controlling discretionary accruals suggested in either Kothari, Leone, and Wasley (2005) or Pae (2005).

## V. Conclusion

This study compared investors' optimistic biases in interpreting BTD with those of analysts. Our findings by regressing V/P ratio on BTD are as follows.

First, comparing the magnitude of systematic biases in interpreting BTD between investors and analysts, we find that BTD is significantly and negatively associated with V/P ratio. This implies that investors have more optimistic biases in interpreting BTD than analysts.

Second, in higher institutional ownership sample no significant association between BTD and V/P ratio is found, while in lower institutional ownership sample BTD has a significantly negative association with the V/P ratio. This result suggests that sophisticated investors, such as institutional investors and analysts, understand the meaning of BTD better than normal investors.

Finally, there is no significant association between BTD and V/P ratio for lower analyst following sample,

while we find a significant and negative association between the BTD and V/P ratio for higher analyst following sample. It implies that higher analyst following reduces biases in analysts' earnings forecasts and supports that the analysts play an important role in mitigating information asymmetry.

The contributions of our study are as follows. First, to the best of our knowledge, this is the first empirical study to compare the magnitude of systematic biases in interpreting BTD between investors and find that investors are more optimistically biased than analysts in interpreting BTD. The finding that systematic biases of institutional investors are different from those of normal investors provides evidence that analysts might help to alleviate investors' optimistic biases in interpreting BTD. Second, this study also provides additional evidence to support the finding of previous finance and accounting studies on whether analysts' earnings forecasts mitigate the inefficiency of the stock market towards BTD.

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## References

- Abarbanell, J., & V. Bernard. (1992). Tests of Analysts' Overreaction/underreaction to Earnings Information as an Explanation for Anomalous Stock Price Behavior. *Journal of Finance*, 47(3), 1181-1207.
- Abarbanell, J., & B. Bushee. (1997). Fundamental Analysis, Future Earnings and Stock Prices. *Journal of Accounting Research*, 35(1), 1-24.
- Ahmed, A., S. Nainar, & J. Zhou. (2005). Do Analysts' Forecasts Fully Reflect the Information in Accruals? *Canadian Journal of Administrative Sciences*, 22(4), 329-342.

- Ali, A., L. Hwang, & M. Trombley. (2003). Residual-income-based Valuation Predicts Future Stock Returns: Evidence on Mispricing vs. Risk Explanations. *The Accounting Review*, 78(2), 377-396.
- Barth, M. E., & A. P. Hutton. (2004). Analyst Earnings Forecast Revisions and the Pricing of Accruals. *Review of Accounting Studies*, 9(1), 59-96.
- Bernard, V., & J. Thomas. (1989). Post-earnings-announcement Drift: Delayed Price Response or Risk Premium. *Journal of Accounting Research*, 27(Supplement), 1-36.
- Bernard, V., & J. Thomas. (1990). Evidence That Stock Prices Do Not Fully Reflect the Implications of Current Earnings for Future Earnings. *Journal of Accounting and Economics*, 13(4), 305-340.
- Blaylock, B., T. Shevlin, & R. Wilson. (2012). Tax avoidance, large positive temporary book-tax differences, and earnings persistence. *The Accounting Review*, 87(1), 91-120.
- Botosan, C., & M. Plumlee. (2005). Assessing Alternative Proxies or the Expected Risk Premium. *The Accounting Review*, 80(1), 21-53.
- Bradshaw, M., S. Richardson, & R. Sloan. (2001). Do Analysts and Auditors Use Information in Accruals? *Journal of Accounting Research*, 39(1), 45-74.
- Claus, J., & J. Thomas. (2001). Equity Premia as Low as Three Percent?: Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Markets. *Journal of Finance*, 56(5), 1629-1666.
- Chun, H., & Y., Yoo. (2015). A Comparison of Investors' and Analysts' Biases in Interpreting Real Earnings Management. *Korean Accounting Review*, 40(5), 35-71.
- Elgers, P., M. Lo, & R. Pfeiffer. (2003). Analysts' vs. Investors' Weightings of Accruals in Forecasting Annual Earnings. *Journal of Accounting and Public Policy*, 22(3), 255-280.
- Erickson, M., M. Hanlon, & E. Maydew. (2004). How much will firms pay for earnings that do not exist? Evidence of taxes paid on allegedly fraudulent earnings. *The Accounting Review*, 79(2), 387-408.
- Fairfield, P., S. Whisenant, & T. Yohn. (2003). Accrual Earnings and Growth: Implications for Future Profitability and Market Mispricing. *The Accounting Review*, 78(1), 353-371.
- Fairfield, P., & T. Yohn. (2001). Using Asset Turnover and Profit Margins to Forecast Changes in Profitability. *Review of Accounting Studies*, 6(4), 371-385.
- Fama, E., & K. French. (1996). Multifactor Explanations of Assets Pricing Anomalies. *Journal of Finance*, 51(1), 55-84.
- Frankel, R., & C. Lee. (1998). Accounting Valuation, Market Expectation and Cross-sectional Stock Returns. *Journal of Accounting and Economics* 25(3), 283-319.
- Gebhardt, W., C. Lee, & B. Swaminathan. (2001). Toward An Implied Cost of Capital. *Journal of Accounting Research*, 39(1), 135-176.
- Gode, D., & P. Mohanram. (2003). Inferring the Cost of Capital Using the Ohlson-Juettner Model. *Review of Accounting Studies*, 8(4), 399-431.
- Graham, J., C. Harvey, & S. Rajgopal. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics*, 40(1), 3-73.
- Graham, J., J. Raedy, & D. Shackelford. (2012). Research in Accounting for Income Taxes. *Journal of Accounting and Economics*, 53, 412-434.
- Hanlon, M. (2005). The Persistence and Pricing of Earnings, Accruals and Cash Flows When Firms have Large Book-Tax Difference. *The Accounting Review*, 80(1), 137-166.
- Hail, L., & C. Leuz. (2006). International differences in cost of equity capital: Do legal institutions and securities regulations matter? *Journal of Accounting Research*, 44, 485-531.
- Healy, P. M., & K. G. Palepu. (2001). Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review of the Empirical Disclosure Literature. *Journal of Accounting and Economics*, 31(1-3), 405-440.
- Hong, Y., & K. Kim. (2016). Earnings Persistence and Investors' Assessments of the Persistence for the Earning Management and Tax Avoidance Firms with Large Positive Book-Tax Differences. *Korean Accounting Journal*, 25(1), 381-421.
- Jorgensen, B., Y. Yoo, & Y. Lee. (2011). The Valuation Accuracy of Equity Value Estimates Inferred from Conventional Empirical Implementations of the Abnormal Earnings Growth Model: U.S. Evidence. *Journal of Business, Finance and Accounting*, 38(3-4), 446-471.
- Jung, W., K., J. Kap., Kim, & H., Roh. (2006). Book-Tax Difference of Korean Firms Examined Using Actual Tax-Reconciliation Data. *Korean Accounting Review*, 31(4), 203-238.
- Kang, T., & Y. Yoo. (2007). A Comparison of Analysts' and Investors' Biases in Interpreting accruals: A Valuation Approach. *Journal of Accounting, Auditing and Finance*, 22(3), 382-422.
- Kothari, S., A. Leone, & C. Wasley. (2005). Performance Matched Discretionary Accrual Measures. *Journal of Accounting and Economics*, 39, 163-197.
- Lee, C., J. Myers, & B. Swaminathan. (1999). What Is the Intrinsic Value of the Dow? *Journal of Finance*, 54(5), 1693-1741.
- Lev, B., & D. Nissim. (2004). Taxable Income, Future Earnings, and Equity Values. *The Accounting Review*, 79(4), 1039-1074.
- Lim, D. (2011). Tax Avoidance, Cost of Debt and Shareholder Activism: Evidence from Korea. *Journal of Banking and Finance*, 35(2), 456-470.
- Liu, J. (2003). *Market and Analyst Reactions to Earnings News: An Efficiency Comparison*. The University of California, Los Angeles.
- Liu, J., D. Nissim, & J. Thomas. (2002). Equity Valuation Using Multiples. *Journal of Accounting Research*, 40(1), 135-171.

- Malkiel, B., & Y. Xu. (1997). Risk and Return Revisited. *Journal of Portfolio Management*, 23(Spring), 9-14.
- Mendenhall, R. (1991). Evidence on the Possible Under-weighting of Earnings-related Information. *Journal of Accounting Research*, 29(1), 170-179.
- Modigliani, F., & M. Miller. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review*, 48(3), 261-297.
- Oh, K., & E. Ki. (2012). An Empirical Analysis for Determinants of Analysts' Corporate Tax Forecast and its Relevance in Capital Market. *Korean Journal of Taxation Research*, 29(2), 137-163.
- Pae, J. (2005). Expected Accrual Models: The Impact of Operating Cash Flows and Reversals of Accruals. *Review of Quantitative Finance and Accounting*, 24, 5-22.
- Phillips, J., M. Pincus, & S. Rego. (2003). Earnings management: New evidence based on deferred tax expense. *The Accounting Review*, 78(2), 491-521.
- Plumlee, M. (2003). The Effect of Information Complexity on Analysts' Use of That Information. *The Accounting Review*, 78(1), 275-296.
- Scholes, M., G. Wilson, & M. Wolfson. (1992). Firms' responses to anticipated reductions in tax rates: the Tax Reforms Act of 1986. *Journal of Accounting Research*, 30(3), 161-185.
- Sloan, R. (1996). Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings? *The Accounting Review*, 71(3), 289-315.
- Weber, D. (2009). Do analysts and investors fully appreciate the implications of Book-tax differences for future earnings? *Contemporary Accounting Research*, 26(4), 1175-1206.
- Xie, H. (2001). The Mispricing of Abnormal Accruals. *The Accounting Review*, 76(3), 357-373.