

Book-tax differences: are they affected by equity-based compensation?

Chunwei Xian

Northeastern Illinois University, Chicago, Illinois, USA

Fang Sun

Queens College, City University of New York, Flushing, New York, USA, and

Yinghong Zhang

*Department of Accounting,
University of Central Oklahoma, Edmond, Oklahoma, USA*

Abstract

Purpose – This study aims to investigate the moderating effect of equity-based compensation on the sources of book-tax differences. The authors investigate whether equity-based compensation affects the association between book-tax differences and tax planning, and the association between book-tax differences and earnings management.

Design/methodology/approach – The authors use a sample of 9,024 firm-year observations (913 firms) spanning the period 1992-2011, obtained from ExecuComp and Compustat. They estimate cross-sectional regressions of the proxy for tax planning, discretionary accruals and their interactions with equity-based compensation on book-tax differences.

Findings – The authors find that tax planning-related book-tax differences increase as the equity-based pay of executives does, and that earnings management-related book-tax differences decrease as the equity-based pay of executives increases. The results are robust across three alternative measures of tax planning.

Originality/value – Equity-based compensation plays an important role in managerial discretion on tax planning and earnings management. The findings suggest that, although equity incentives promote a high level of both tax planning and earnings management, they motivate managers to constrain the level of earnings management to avoid larger book-tax differences.

Keywords Earnings management, Book-tax differences, Equity-based compensation, Tax planning
Paper type Research paper

1. Introduction

This study investigates the moderating effect of equity-based compensation on the association between book-tax differences and tax planning, and on the association between book-tax differences and earnings management. Tax planning and earnings management activities are considered two types of managerial actions that can significantly affect book-tax differences. Equity-based pay is believed to effectively mitigate the conflicts that arise between shareholders and executives by providing a portion of firm wealth to executives (Hall and Murphy, 2002). Prior studies indicate that

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larger book-tax differences occur when executives are granted more stock options or restricted stock (Mills and Newberry, 2001; Frank *et al.*, 2009; Desai and Dharmapala, 2006). However, a high level of book-tax differences may be very costly to firms if investors see it as a signal of low earnings persistency that may decrease firm value. Indeed, Hanlon (2005) finds that investors of firms with large book-tax differences lower their expectation on earnings persistency. Investors judge book-tax differences according to their source when they assess firm value. For example, Blaylock *et al.* (2012) demonstrate that earning response coefficients are higher for firms whose book-tax differences likely arise from tax-planning activities, while earning response coefficients are lower for firms whose book-tax differences likely arise from earnings management activities. Overall, if book-tax differences are earnings management-related, they may signal low quality, but if they are tax planning-related, investors may view the differences more favorably. Therefore, managers need to trade-off tax planning and earnings management activities, which may result in large book-tax differences. In this study, we investigate whether equity-based pay promotes a higher level of tax planning-related book-tax differences and constrains the level of earning management related to book-tax differences.

Book-tax differences have increased dramatically over the past 19 years[1], as the growing divergence between financial reporting income and taxable income draws attention from government agencies and academics. Basically, book-tax differences arise from the incongruence between tax laws and accounting standards. Plesko (2000) asserts that the divide between tax and financial reporting is attributable to the utilization of tax-planning activities[2]. However, Phillips *et al.* (2003) and Hanlon (2005) argue that the expanding book-tax gap arises from earnings management. In general, managerial behavior to minimize corporate tax obligations can increase cash flow and after-tax income. Firm market value is positively associated with the level of tax planning in firms with strong corporate governance (Desai and Dharmapala, 2009)[3]. Tucker and Zarowin (2006) find that the extent of earnings smoothing increases with future earnings response coefficients if discretionary accruals reflect managers' evaluation of future earnings. However, a high degree of earnings management often signals potential financial problems and prior studies show that it is usually associated with a higher probability of bankruptcy, higher borrowing costs and higher earnings volatility (Ibrahim, 2009; McNichols and Wilson, 1988; Meek *et al.*, 2007).

Consistent with prior studies (Jensen and Meckling, 1976; Smith and Stulz, 1985), we assume that equity-based compensation motivates executives to work for the benefit of shareholders. We expect a higher level of tax planning-related book-tax differences in companies that grant their chief executive officers (CEOs) more stock options or restricted stock because tax-planning activities generally increase firm value. But if equity-based compensation of executives effectively aligns the interests of both executives and shareholders, opportunistic behaviors can be reduced. In our test settings, this means that equity-based compensation can reduce the positive correlation between book-tax differences and earnings management.

To investigate the moderating effect of equity-based compensation on the association between tax planning and book-tax differences and on the association between earnings management and book-tax differences, we use 9,024 firm-year observations from Compustat and ExecuComp databases for the period 1992-2011. We regress the book-tax differences on the proxy for tax planning, the proxy for earnings

management and their interactions with equity-based compensation. We include control variables shown to have an association with book-tax differences in prior studies. We use three alternative proxies for tax-planning activities: discretionary permanent differences from the Frank *et al.* (2009) model, the generally accepted accounting principles (GAAP) effective tax rate and the cash effective tax rate. We use discretionary accruals from the performance-adjusted Jones model to proxy the degree of earnings management. The control variables include the variables of firm-specific characteristics such as intangible assets, profitability, foreign income and leverage.

This study adds to the literature on the link between tax planning and executive compensation practices by examining the moderating effect of equity-based compensation on the book-tax differences related to tax planning and earnings management. Prior studies document the positive effect of equity-based compensation on tax-planning activities, but they do not examine whether the association between book-tax differences and tax-planning activities is also affected by equity-based compensation. Studies also find that the level of earnings management is positively related to managers' equity incentives (Cheng and Warfield, 2005). Thus, equity-based compensation is positively associated with book-tax differences because equity-based compensation encourages both tax planning and earnings management. Large book-tax differences can easily draw attention from regulators, auditors and investors and analysts, and this may impose significant costs on companies. Because of the costs of large book-tax differences for firms, we predict that managers will trade-off tax planning and earnings management to avoid large book-tax differences. These external users of financial reporting review differently on book-tax differences arising from tax planning and those from earnings management. It is important, then, to investigate what factors impact the associations between book-tax differences and the two major sources: tax planning and earnings management.

We have two key findings. First, our empirical results indicate that book-tax differences more likely arise from tax-planning activities when corporations reward their CEOs with more equity-based compensation. This means that equity-based compensation motivates executives to engage in tax-planning activities that also benefit shareholders. Second, our results document the negative moderating effect of equity-based compensation on the relationship between book-tax differences and discretionary accruals. The negative moderating effect indicates that equity incentives effectively deter opportunistic behaviors by executives to increase personal benefits and sacrifice shareholder wealth.

The remainder of the study is organized as follows: in the next section, we review the literature and develop hypotheses; in the third section, we explain our sample selection criteria and descriptive statistics. The fourth section describes our empirical models, and the fifth section reports the results from the main regressions. The sixth section summarizes our findings.

2. Literature review and development of hypotheses

This paper focuses on two types of managerial actions that often result in book-tax differences: tax-planning activities and earnings management activities. In general, tax-planning behavior tends to manage earnings downward, whereas earnings management behavior tends to manage earnings upward. Book-tax differences are positively associated with tax-planning activities, as many tax-planning activities can

reduce taxable income without affecting book income (Shevlin, 2002; Plesko, 2004; McGill and Outslay, 2004). Wilson (2009) and Frank *et al.* (2009) find evidence of a positive association between book-tax differences and the degree of tax-sheltering activities that firms engage in. Studies also document that book-tax differences are positively associated with the level of earnings management (Phillips *et al.* 2003; and Hanlon, 2005). Phillips *et al.* (2003) evaluate the usefulness of book-tax differences in detecting earnings management compared to various accrual measures. Mills and Newberry (2001) find that the magnitude of book-tax differences is positively associated with earnings management incentives such as financial distress and bonus thresholds.

Large book-tax differences are not always a signal of low earnings quality. This depends on whether they are more earnings management-related or tax planning-related. Blaylock *et al.* (2012) study the earnings persistence and earnings response coefficients in firm years with large positive book-tax differences and report that earnings persistence and earnings response coefficients are higher for firms with a higher level of tax planning and that they are lower for firms with a higher level of earnings management. Thus, book-tax differences that arise from tax-planning strategies are more likely to increase firm value. But book-tax differences that arise from earnings management are more likely to have negative consequences to shareholders, such as increasing finance cost and decreasing earnings persistence.

This study investigates the moderating effect of equity-based pay on the association among book-tax differences, tax-planning activities and earnings management activities. While prior studies indicate that equity incentives can motivate executives to work on tax planning which subsequently contributes to the long-term value of corporations (Desai and Dharmapala, 2006; Rego and Wilson, 2012), researchers find that the tendency of earnings management is higher when executives are granted a larger proportion of equity-based pay (Meek *et al.*, 2007; Cheng and Warfield, 2005). However, a large difference in book income and tax income may signal a “red flag” for the corporate management team, especially if the team manages accounting earnings to maximize their own benefits at the expense of shareholders. For example, The existence of a high level of book-tax differences may attract the scrutiny of the Securities and Exchange Commission and other regulators (Cloyd, 1995; Mills, 1998; Badertscher *et al.*, 2009). Therefore, managers need to consider the consequences of large book-tax differences and adjust their involvement in tax planning and earnings management.

The literature on executive compensation demonstrates that equity incentives work more effectively than cash compensation to reduce conflicts of interest between executives and shareholders. Equity-based compensation motivates executives to behave in a manner beneficial to shareholders by directly linking corporate performance and the personal wealth of executives (Hall and Murphy, 2002). Book-tax differences that likely arise from tax-planning activities are usually viewed positively by investors (Blaylock *et al.*, 2012). As tax-planning activities can benefit shareholders, we argue that tax-planning strategies will be more aggressive in those firms that provide more equity-based compensation to their managers. That is, a larger portion of book-tax differences comes from tax-planning activities when equity-based pay is higher.

On the contrary, if a strong association between book-tax differences and earnings management exists, the large book-tax differences may easily draw the attention of regulators and result in lower firm market value. In these scenarios, the cost of earnings management may exceed the benefits and could potentially be harmful to shareholders.

We expect that firms will have fewer earnings management-related book-tax differences when they grant more equity-based pay to managers. In other words, equity-based pay has a negative moderating effect on the positive relation between the earnings management and book-tax differences. Overall, executives with more equity-based pay may engage in more tax planning to increase firm value and may be less likely to engage in earnings management that only increases their own wealth and hurts investors in the long run.

Therefore, we state our hypotheses in the alternative form:

H1a. The tax planning-related book-tax differences are greater when CEO equity-based compensation is higher.

H1b. The earnings management-related book-tax differences are smaller when CEO equity-based compensation is higher.

3. Methodology

We estimate the following Models 1-3 to test the hypotheses[4]. We regress book-tax differences on the proxy for tax-planning activities, the proxy for earnings management and their interactions with equity-based compensation. We have three alternative measures that capture tax-planning activities: DISPERM, ETR and CETR. We use discretionary accruals to proxy the extent of earnings management. The control variables include the variables of firm-specific characteristics such as profitability, foreign income and leverage:

$$\begin{aligned}
 BTD_{i,t} = & \beta_0 + \beta_1 DISPERM_{i,t} + \beta_2 DISPERM \times EQUITYMIX_{i,t} + \beta_3 DA_{i,t} \\
 & + \beta_4 DA \times EQUITYMIX_{i,t} + \beta_5 EQUITYMIX_{i,t} + \beta_6 PPE_{i,t} \\
 & + \beta_7 INTANG_{i,t} + \beta_8 FI_{i,t} + \beta_9 NOL_{i,t} + \beta_{10} DEBT_{i,t} + \beta_{11} ROA_{i,t} \\
 & + \beta_{12} RD_{i,t} + \beta_{13} MB_{i,t} + \beta_{14} TA_{i,t} + yearummies + industryummies + \varepsilon_{i,t}
 \end{aligned} \quad (1)$$

$$\begin{aligned}
 BTD_{i,t} = & \beta_0 + \beta_1 ETR_{i,t} + \beta_2 ETR \times EQUITYMIX_{i,t} + \beta_3 DA_{i,t} \\
 & + \beta_4 DA \times EQUITYMIX_{i,t} + \beta_5 EQUITYMIX_{i,t} + \beta_6 PPE_{i,t} \\
 & + \beta_7 INTANG_{i,t} + \beta_8 FI_{i,t} + \beta_9 NOL_{i,t} + \beta_{10} DEBT_{i,t} + \beta_{11} ROA_{i,t} \\
 & + \beta_{12} RD_{i,t} + \beta_{13} MB_{i,t} + \beta_{14} TA_{i,t} + yearummies + industryummies + \varepsilon_{i,t}
 \end{aligned} \quad (2)$$

$$\begin{aligned}
 BTD_{i,t} = & \beta_0 + \beta_1 CETR_{i,t} + \beta_2 CETR \times EQUITYMIX_{i,t} + \beta_3 DA_{i,t} \\
 & + \beta_4 DA \times EQUITYMIX_{i,t} + \beta_5 EQUITYMIX_{i,t} + \beta_6 PPE_{i,t} \\
 & + \beta_7 INTANG_{i,t} + \beta_8 FI_{i,t} + \beta_9 NOL_{i,t} + \beta_{10} DEBT_{i,t} + \beta_{11} ROA_{i,t} \\
 & + \beta_{12} RD_{i,t} + \beta_{13} MB_{i,t} + \beta_{14} TA_{i,t} + yearummies + industryummies + \varepsilon_{i,t}
 \end{aligned} \quad (3)$$

where the subscript i stands for the companies, and the subscript t stands for the years (Table I).

3.1 Dependent variable

As Manzon and Plesko (2002), Wilson (2009) and Lisowsky (2010) do, we calculate total book-tax difference (BTD) as pre-tax book income minus estimated taxable income scaled by the beginning balance of total assets, where estimated taxable income equals

Variables	Definition
BTD	The book-tax difference, which is calculated as pre-tax book income minus estimated taxable income scaled by the beginning balance of total assets, where estimated taxable income = (current federal tax expenses + current foreign income tax expense)/statutory tax rate; $\text{Compustat}\{PI - [(TXFED + TXFO)/STR]\} / \text{lag}(AT)$
DISPERM	The discretionary permanent difference from Frank et al. (2009) model
ETR	The GAAP effective tax rate, which is calculated as total income tax expense divided by pre-tax income ($\text{Compustat}\{TXT/PI\}$)
CETR	The cash effective tax rate, which is calculated as cash taxes paid divided by pre-tax income ($\text{Compustat}\{TXPD/PI\}$)
DA	The absolute value of discretionary accruals from the performance-modified Jones model (Jones, 1991 ; Kothari et al. 2005)
EQUITYMIX	The sum of granted stock options (Black and Scholes value) and restricted stock divided by the total CEO compensation
PPE	Net value of property, plant and equipment ($\text{Compustat}\{PPE\}$) scaled by the beginning balance of total assets
INTANG	Intangible assets ($\text{Compustat}\{INTAN\}$) scaled by the beginning balance of total assets
FI	A dummy variable coded as one if the firm has foreign income ($\text{Compustat}\{PIFO\}$); and zero otherwise
NOL	A dummy variable coded as one if the loss carryforward ($\text{Compustat}\{TLCF\}$) is positive at the beginning of the fiscal year; and zero otherwise
DEBT	Total liabilities ($\text{Compustat}\{DLTT\}$ and $\text{Compustat}\{DLC\}$) scaled by the beginning balance of total assets
ROA	Income before extraordinary items ($\text{Compustat}\{IB\}$) divided by the beginning balance of total assets
RD	Research and development expense ($\text{Compustat}\{XRD\}$) divided by the beginning balance of total assets
MB	The ratio of market value of equity to book value of equity at the beginning of the fiscal year ($\text{Compustat}\{CSHO * PRCC_F / CEQ\}$)
TA	The natural logarithm of total assets at the beginning of the fiscal year ($\text{Compustat}\{AT\}$).

Table I.
Variable definition

the sum of current federal tax expenses, current foreign income tax expenses, divided by the statutory tax rate. Accounting income includes the income from controlled foreign subsidiaries, but taxable income generally excludes income from foreign subsidiaries until a company's dividends are repatriated. We estimate foreign income as current foreign income tax expenses divided by the US statutory tax rate, and we calculate taxable income by including both foreign and domestic income. The taxable income measure is limited and very likely underestimated because the foreign statutory tax rate is generally lower than the US statutory tax rate. To control for the effect of foreign income on the BTD, we include the foreign income (FI) control variable in our regression models later. We use BTD instead of temporary differences because many tax shelter activities, which we consider a basic tax-planning strategy, generate permanent differences, an important part of tax planning-related differences. [Hanlon \(2005\)](#) and [Blaylock et al. \(2012\)](#) investigate whether temporary book-tax differences provide information about earnings persistence. They exclude permanent differences in their

main test because some permanent differences (e.g. tax-exempt interest and the dividend received deduction) do not reflect the quality of earnings related to accrual accounting (Hanlon, 2005)[5].

3.2 Testing variables

3.2.1 Measures of tax planning. We employ three proxies for the level of tax-planning activities. Our first proxy, DISPERM, captures the discretionary permanent differences using the Frank *et al.* (2009) model[6]. We first regress total permanent differences (PERMDIFF) on non-discretionary items known to cause permanent differences (e.g. intangible assets) but are probably not related to tax-planning activities. We estimate Model 4 for each of the two-digit Standard Industrial Classification (SIC) industry groups for each year from 1992 to 2011. All variables are scaled by the balance of total assets at the beginning of the fiscal year. Discretionary permanent differences (DISPERM) are the residuals from the annual cross-sectional regressions of Model 4. We use the discretionary permanent differences to proxy the level of tax planning. The higher residual indicates a higher tax-planning involvement. As discussed by Frank *et al.* (2009), this measure of tax planning has several advantages over alternative measures. First, we control for factors that are probably unrelated to tax planning, such as goodwill and other intangible assets that generate permanent differences because of variations between the financial and tax rules. Studies document that the changes in net operating loss carryforward (ΔNOL) often impact book-tax differences (e.g. Miller and Skinner, 1998; Schrand and Wong, 2003; Frank and Rego, 2006) but are not typically associated with tax planning. Last, this measure is statistically better than the tax avoidance measure used by Desai and Dharmapala (2006) in predicting tax shelter activity (Frank *et al.* 2009):

$$\frac{PERMDIFF_{it}}{TA_{i,t-1}} = \alpha_0 \left(\frac{1}{TA_{i,t-1}} \right) + \alpha_1 \left(\frac{INTANG_{it}}{TA_{i,t-1}} \right) + \alpha_2 \left(\frac{UNCON_{it}}{TA_{i,t-1}} \right) + \alpha_3 \left(\frac{MI_{it}}{TA_{i,t-1}} \right) + \alpha_4 \left(\frac{CSTE_{it}}{TA_{i,t-1}} \right) + \alpha_5 \left(\frac{\Delta NOL_{it}}{TA_{i,t-1}} \right) + \alpha_6 \left(\frac{LAGPERM_{it}}{TA_{i,t-1}} \right) + \varepsilon_{it} \quad (4)$$

Where:

- $PERMDIFF_{it}$ = total book-tax differences less temporary book-tax differences for firm i in year t $\{BI_{it} - [(CFTE_{it} + CFOR_{it})/STR_t] - (DTE_{it}/STR_t)\}$ [7];
- $TA_{i,t-1}$ = total assets (Compustat AT) for firm i at the beginning of fiscal year t ;
- $INTANG_{it}$ = goodwill and other intangibles (Compustat INTAN) for firm i in year t ;
- $UNCON_{it}$ = income (loss) reported under the equity method (Compustat ESUB) for firm i in year t ;
- MI_{it} = income (loss) attributable to minority interest (Compustat MII) for firm i in year t ;
- $CSTE_{it}$ = current state income tax expense (Compustat TXS) for firm i in year t ;
- ΔNOL_{it} = change in net operating loss carryforwards (Compustat TLCF) for firm i in year t ;

$LAGPERM_{it}$ = one-year lagged $PERMDIFF$ for firm i in year t ; and
 ε_{it} = discretionary permanent difference ($DISPERM_{it}$) for firm i in year t .

In addition to the discretionary permanent differences, we employ two effective tax rates to measure the level of tax planning, ETR and CETR, commonly used to evaluate the tax-planning level in prior studies (Callihan, 1994; Mills *et al.*, 1998; Yin, 2003; Chen *et al.*, 2010; Dyreng *et al.*, 2010). The first ratio, ETR, also called the GAAP ETR, is the ratio of total income tax expense to pre-tax income [8]. The numerator, total income tax expense, includes both current tax expenses and deferred tax expenses. Thus, it does not reflect temporary differences of tax income and book income and only reflects permanent book-tax differences. The second ratio is the cash effective tax rate, CETR, calculated as cash taxes paid divided by pre-tax income. Unlike the GAAP ETR, CETR reflects actual cash tax payments. Tax-planning activities can often defer cash tax payments. Generally, the more a firm engages in tax-planning activities, the lower its effective tax rates (both ETR and CETR). These two measures are inverse measures of tax planning.

3.3 Measure of earnings management

The absolute value of discretionary accruals (DA) is calculated from the performance-modified Jones model by Kothari *et al.* (2005). The discretionary accruals are the residuals from running the cross-sectional modified Jones models by two-digit SIC industry and year. *H1b* expects negative signs on the interaction term of DA and EQUITYMIX in our testing models (1–3), which indicates that book-tax differences are less likely related to earnings management when executives receive more equity-based compensation.

3.4 Measure of equity-based compensation

One of our main testing variables is EQUITYMIX, the sum of granted stock options and restricted stock divided by total CEO compensation. It measures the weight of equity-based compensation, including stock options and restricted stock, in total CEO compensation. EQUITYMIX is calculated by using the ExecuComp variables. Equity-based pay is the sum of ExecuComp item “Option_Awards_BLK_VALUE” and ExecuComp item “RSTKGRNT”. Total CEO compensation is ExecuComp item “TDC1” which is composed of salary, bonus, total value of restricted stock granted, total value of stock options granted, long-term incentive payouts and all other total. The stock options are valued by the Black and Scholes (1973) method. Equity-based compensation is often considered a more effective incentive than cash compensation for two reasons:

- (1) the stock options and restricted stock are considered as long-term pay because they usually have a three- to five-year vesting period. Studies demonstrate that long-term pay works more effectively than cash compensation to discourage opportunistic behaviors (Hall and Murphy, 2002; Bryan *et al.*, 2000; Kwon and Yin, 2006).
- (2) CEOs share the risk of operational performance when their ownership increases, aligning the interests of shareholders and executives. Consistent with Desai and Dharmapala (2006), we expect a positive sign on EQUITYMIX in all three models; firms will have a larger book-tax difference if they pay executives more equity-based compensation.

H1a predicts that the association between book-tax differences and tax planning increases with the CEO's equity-based compensation. Executives with high equity-based pay tend to engage in tax-planning activities, resulting in higher book-tax differences. Generally, the more tax-planning activities a firm has, the higher the DISPERM difference. But the more tax-planning activities a firm has, the lower the ETR and CETR. Therefore, *H1a* predicts a positive sign on the interaction term DISPERM*EQUITYMIX in Model 1, whereas *H1a* predicts a negative sign on the interaction terms CETR*EQUITYMIX in Model 2, and ETR*EQUITYMIX in Model 3.

H1b, which expects a negative sign on the interaction term $DA \times EQUITYMIX$ in all three models, investigates the moderating effect of equity-based compensation on the relationship between book-tax differences and earning management. Earning management-related book-tax differences create negative images with regard to investor perspective on earnings quality. High equity incentives can reduce interest conflicts, and thus, executives are less likely to become involved with earning management activities that result in higher book-tax differences.

3.5 Control variables

We include the variables of firm-specific characteristics such as profitability, foreign income and leverage. These factors usually have an impact on book-tax differences, but they are not subject to managerial discretions on tax planning or earnings management. We control for these variables to ensure that our results are not driven by factors related to corporate opportunities to get involved in tax shelters.

We expect positive signs on both PPE and INTANG in the three models. The tax treatments on plant assets and intangible assets are usually different from financial accounting standards. Firms with more long-term assets generate a lower effective tax rate due to a high volume of depreciation expenses (Mills *et al.*, 1998). Firms with more investment opportunities can engage in tax-planning activities through their operations and investment strategies.

We expect that a larger book-tax difference exists for firms with foreign operations (FI). Firms with foreign operations have greater opportunities to avoid income tax through relocation of operations, repatriation and transfer pricing (Phillips, 2003; Rego, 2003). For instance, they can reduce effective tax rates by shifting operating income to foreign countries with low income tax rates. We include the NOL variable because a firm's positive balance of a loss carryforward can be used to reduce the amount of taxable income, as a loss carryforward produces a "tax shelter" for a corporation. Thus, we predict a positive relation between book-tax differences and NOL.

DEBT captures the extent of the tax shield of debt, as interest expenses are deductible (Armstrong *et al.*, 2012). DEBT is also associated with a firm's tax-planning strategies because risk-taking CEOs may be more likely to engage in aggressive tax-planning strategies. Therefore, we expect companies with higher leverage to have a higher book-tax difference. We control for ROA because prior studies find that more profitable companies are more likely to engage in tax-sheltering activities (Wilson, 2009; Lisowsky, 2010). We expect that more profitable companies will have larger book-tax differences. Increasing expenses in RD can often generate research and development tax credits; thus, we expect a positive relation between RD and book-tax differences. MB is a proxy for growth opportunities, expected to be positively related to book-tax differences. Growing firms, which are often in the earlier stages of the business life cycle,

typically have more tax incentives from tax authorities, for example, Amazon and Tesla Motors. TA is the measurement for a firm's size. We control for the effect of firm size because larger firms tend to involve more efforts on tax planning due to the benefits of economies of scale (Rego, 2003).

4. Sample selection and data description

We start with a sample of 35,673 observations (company-years) in ExecuComp that reports total compensation data for CEOs for the period 1992-2011. We exclude companies in financial services (with two-digit SIC codes 60-69). We then merge this sample with Compustat and eliminate companies with incomplete data. We remove the firm-years with negative book-tax differences because the motivation to have a positive book-tax difference may be different from the motivation to have a negative book-tax difference. Our final sample includes 913 companies covering 9,024 company-years for the period 1992-2011. To remove the effect of outliers, we winsorize all the continuous variables at 1 and 99 per cent levels.

Table II presents descriptive statistics for CEO total compensation, equity-based compensation and other firm characteristics. The statistics in Panel A of Table II show that the mean and median of book-tax differences are \$200,298 and \$30,737, respectively. After the log transformation, the distribution of book-tax differences is less skewed, with a mean of 0.041 and a median of 0.030. The mean and median of discretionary permanent differences (DISPERM) are 0.008 and 0.001, respectively, comparable to prior studies (Frank *et al.*, 2009; Rego and Wilson, 2012). The mean and median of GAAP effective tax rates (ETR) is 0.308, indicating that one-third of pre-tax income is income tax expenses on financial reporting. The mean and median of cash effective tax rates (CETR) is 0.258, which indicates that taxes actually paid by firms account for one-quarter of pre-tax income. The mean of discretionary accruals equals to 0.077 with a lower quartile 0.025 and an upper quartile 0.092, comparable to the data of Meek *et al.* (2007). On average, total assets are \$5,829 million and the mean ROA is 0.095. On average, 21.9 per cent of a firm's total assets are financed with debt. The statistics in Panel B show that the mean value for the total CEO compensation and equity-based compensation are \$4,760,000 and \$1,846,000, respectively. On average, 30.6 per cent of total CEO compensation is composed of equity-based pay, with the upper quartile of 51.1 per cent.

Table III presents the Pearson and Spearman correlations among the variables. Seven correlation coefficients are greater than 0.3. Among these relatively high correlation coefficients, the Pearson correlation coefficient between book-tax difference (BTD) and ROA is 0.447, which indicates that more profitable companies have a higher level of book-tax income differences. The Pearson and Spearman correlation coefficients between ROA and MB are 0.429 and 0.566, respectively, showing that a firm with more investment opportunities tends to have a greater return-on-asset ratio. The Pearson correlation between BTD and DISPERM is 0.315, indicating that book-tax differences are greater in firms with high tax-planning levels. The Spearman correlation between BTD and CETR is -0.375 , showing that book tax differences are negatively correlated with the cash effective tax rate, an inverse measure of tax-planning activities.

The correlation coefficients among the three proxies for tax planning, DISPERM, ETR and CETR, are all significant at the 0.01 level ($p < 0.01$). The Pearson

Variable	Mean	SD	Lower quartile	Median	Upper quartile
<i>Panel A: Corporate financial characteristics</i>					
BTD (scaled by total assets)	0.041	0.040	0.015	0.030	0.053
BTD1 (thousand dollars)	200.298	791.242	9.990	30.737	104.309
DISPERM	0.008	0.043	-0.007	0.001	0.016
ETR	0.308	0.199	0.281	0.345	0.380
CETR	0.258	0.161	0.188	0.269	0.337
DA	0.077	0.097	0.025	0.052	0.092
EQUITYMIX	0.306	0.274	0.000	0.266	0.511
PPE	0.286	0.225	0.119	0.223	0.389
INTANG	0.235	0.235	0.043	0.171	0.358
FI	0.625	0.484	0.000	1.000	1.000
NOL	0.402	0.490	0.000	0.000	1.000
DEBT	0.219	0.195	0.038	0.198	0.331
ROA	0.095	0.063	0.052	0.081	0.121
RD	0.033	0.051	0.000	0.009	0.047
MB	3.422	2.888	1.744	2.595	3.970
TA	7.135	1.512	6.043	7.022	8.096
Total assets (million dollars)	5829.328	24046.935	470.854	1258.996	3788.144
<i>Panel B: Components of executive compensation (thousand dollars)</i>					
TOTALPAY	4760.572	6456.273	1354.964	2922.454	5781.181
EQUITYPAY	1846.750	4556.058	0.000	699.078	1994.039
TOTAL_ALT1	2953.082	5917.032	0.000	0.000	3961.635
RSTKGRNT	205.081	1303.832	0.000	0.000	0.000
EQUITYMIX	0.306	0.274	0.000	0.266	0.511

Notes: This panel reports the descriptive statistics of corporate financial characteristics for 9,024 firm-year observations from 1992 to 2011. Variable definitions can be found in Table I. Total book-tax differences are measured in thousand dollars and total assets are measured in million dollars. To alleviate outlier problems, we winsorize observations with continuous variables at the bottom 1% and the top 1% levels; This panel reports the descriptive statistics of CEO compensation for 9,024 firm-year observations from 1992 to 2011. *TOTALPAY* is the total CEO compensation. *EQUITYPAY* is the sum of stock options and restricted stock granted to the CEO. *TOTAL_ALT1* is the Black and Scholes value of stock options granted to the CEO. *RSTKGRNT* is the restricted stock granted to the CEO. All of the four compensation variables are measured in thousand dollars. To alleviate outlier problems, we winsorize observations with continuous variables at the bottom 1% and the top 1% levels.

Table II.
Descriptive statistics

correlation coefficient and the Spearman correlation coefficient between ETR and CETR are 0.454 and 0.483, respectively, indicating that the GAAP effective tax rates are highly correlated with cash effective tax rates in our sample. The Pearson correlation coefficient and the Spearman correlation coefficient between DISPERM and ETR are -0.094 and -0.222, respectively. The Pearson correlation coefficient and the Spearman correlation coefficient between DISPERM and CETR are -0.128 and -0.110, respectively. These correlation coefficients indicate that firms with high discretionary permanent differences have relatively lower ETR and CETR.

	BTD	DISPERM	ETR	CETR	DA	EQUITYMIX	PPE	INTANG	FI	NOL	DEBT	ROA	RD	MB	TA
BTD															
DISPERM	0.186														
ETR	-0.291	-0.222													
CETR	-0.375	-0.110	0.483												
DA	0.131	0.036	-0.038	-0.088											
EQUITYMIX	0.033	0.060	-0.015	-0.086	0.041										
PPE	-0.020	-0.045	0.120	0.109	-0.081	0.009									
INTANG	-0.008	-0.087	0.008	-0.085	-0.026	0.029	-0.385								
FI	0.069	0.132	-0.274	-0.088	-0.029	0.042	-0.219	0.167							
NOL	0.082	0.031	-0.172	-0.166	0.001	-0.027	-0.190	0.189	0.233						
DEBT	-0.077	-0.094	0.095	-0.007	-0.140	0.068	0.260	0.286	0.010	0.058					
ROA	0.337	0.226	-0.074	0.035	0.203	0.034	-0.004	-0.114	-0.009	-0.074	-0.305				
RD	0.197	0.218	-0.365	-0.192	0.149	0.135	-0.283	-0.004	0.352	0.102	-0.225	0.204			
MB	0.190	0.134	-0.058	-0.035	0.191	0.136	-0.027	-0.027	0.061	-0.032	-0.055	0.566	0.224		
TA	-0.048	0.026	-0.087	-0.049	-0.173	0.110	0.045	0.225	0.296	0.159	0.352	-0.212	-0.075	0.041	

Notes: The sample size is 9,024 observations. Upper (lower) diagonal reports Pearson (Spearman) correlations, and all bolded correlations are significant at $p < 0.01$ (two-tailed test)

Table III.
Pearson and Spearman correlation

5. Empirical results

Table IV shows the ordinary least square (OLS) regression results for Models 1-3 for the CEO sample. The results provide supportive evidence for *H1a* and *H1b*. The first column shows the results of Model 1, where we use DISPERM to proxy the level of tax planning. The result on the interaction term (DISPERM*EQUITYMIX) is positively significant, consistent with *H1a*, which says that the link between book-tax differences and the level of tax-planning activities is positively associated with the CEO's equity-based pay. The second column presents the results of Model 2. We use ETR to proxy the level of tax planning. The coefficients on ETR and the interaction term (ETR*EQUITYMIX) are both negative and significant. Because ETR is a reverse measure of tax planning, our findings suggest that the book-tax difference and the magnitude of tax planning are more positively associated when CEO equity-based pay is higher. Similarly, we obtain consistent results in the third column. The negative and significant coefficient on the interaction term (ETR*EQUITYMIX) shows that the effective cash tax rates (CETR) are more negatively associated with the book-tax differences in companies that give their CEOs more equity-based pay. As CETR is also a reverse measure of tax planning, this result is consistent with *H1a* that CEO equity-based pay increases the tax planning-related book-tax differences. Overall, *H1a* receives strong support from the data analysis. Consistent with *H1b*, the coefficients of the interaction term (DA*EQUITYMIX) are negative and significant in all three models, demonstrating that equity incentives decrease the extent of book-tax difference related to earning management. The coefficient on EQUITYMIX in Model 1 is insignificant. The coefficient on EQUITYMIX is positive and significant (p -value < 0.001) in Models 2 and 3, indicating that larger book-tax differences occur when executives are rewarded more stock options or restricted stock[9].

In general, the results for control variables are consistent with prior studies (Desai and Dharmapala, 2006; Chen *et al.*, 2010; Frank *et al.*, 2009). Among the results for the control variables, PPE is positively associated with book-tax differences in all three models, consistent with Chen *et al.* (2010). INTANG is not significant in the first two models and is marginally significant in Model 3. FI is positively related to book-tax differences in Models 2 and 3, a finding similar to those of Phillips (2003) and Lisowsky (2010), which document that the likelihood of using tax shelters is positively related to foreign-source income. NOL is positively related to the level of book-tax differences in all three models, as the positive loss carryforward can increase book-tax difference when corporate taxable income is positive. DEBT is positively related to the level of book-tax differences in all three models, consistent with Atwood *et al.* (1998), who find that the more financing activities, the more chances to engage in tax shelter activities. ROA is positively related to the level of book-tax differences in all three models. Finally, firm size is marginally negatively related to book-tax differences in Model 1 and is not significant in Models 2 and 3, possibly because the measure of book-tax differences is already scaled by the beginning balance of total assets.

6. Conclusion

Prior studies show that equity-based pay is associated with larger book-tax differences (Mills and Newberry, 2001; Frank *et al.*, 2009; Desai and Dharmapala, 2006), but companies with a high level of book-tax differences risk attract unwanted scrutiny from governmental and regulatory agencies. Therefore, managers need to trade-off tax

Dependent Variable → Independent Variable ↓	Expected sign	BTD (Model 1)		BTD (Model 2)		BTD (Model 3)	
		Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Intercept		0.002	0.40	0.003	0.56	0.006	0.97
DISPERM	+	0.096***	8.24				
DISPERM ×	+	0.150***	5.21				
ETR	-			-0.025***	-10.19		
ETR × EQUITYMIX	-			-0.023***	-3.44		
CETR	-					-0.044***	-13.83
CETR × EQUITYMIX	-					-0.039***	-4.31
DA	+	0.033***	5.47	0.030***	4.91	0.048***	7.57
DA × EQUITYMIX	+	-0.051***	-4.00	-0.044***	-3.43	-0.098***	-7.08
EQUITYMIX	+	0.002	1.00	0.010***	3.65	0.014***	4.87
PPE	+	0.010***	4.39	0.008***	3.24	0.008***	3.25
INTANG	+	0.002	1.24	0.001	0.54	0.003*	1.64
FI	+	0.001	1.14	0.002*	1.84	0.002**	2.47
NOL	+	0.005***	6.93	0.005***	6.92	0.005***	6.10
DEBT	+	0.015***	6.86	0.018***	8.24	0.014***	5.76
ROA	+	0.250***	37.51	0.287***	44.26	0.268***	38.44
RD	+	0.102***	12.01	0.118***	13.68	0.112***	12.08
MB	+	-0.001***	-3.87	-0.001***	-5.45	-0.001**	-3.95
TA	+	-0.001*	-1.76	-0.002	-0.86	-0.0001	-0.53
Year dummies	Not reported						
Industry dummies	Not reported						
Nobs		9024		9024		9024	
Adjusted R ²		0.3001		0.3068		0.3162	

Notes: This table reports the OLS regression results for Models 1-3 for CEO sample. The largest variance inflation factor is 2.115 and the largest condition index is 3.009, which shows that the regressions do not have serious multi-linearity problems. *Belsley et al. (1980)* heteroscedasticity tests show the models are not in violation of the assumption of the homoscedastic errors. *, ** and *** indicate statistical significance levels at 10, 5 and 1%, respectively, in two-tailed tests. To alleviate outlier problems, we winsorize the observations with continuous variables at the bottom 1% and the top 1% levels.

Table IV.
OLS regression
results for Models 1-3

planning and earnings management activities to avoid large book-tax differences. We focus on these two main sources of book-tax differences that managers can control because [Blaylock et al. \(2012\)](#) show that investors look beyond book-tax differences to their sources rather than focusing on the aggregate differences. Equity-based compensation aims to align the interests of executives with shareholder interests. Thus, we expect that equity-based compensation motivates executives to exert more effort in tax-planning activities and avoid higher degrees of earnings management.

Our results consistently show that the association between book-tax differences and tax planning increases with executives' equity-based compensation and that the association between book-tax differences and earnings management decreases with executives' equity-based compensation. A larger portion of book-tax differences comes from discretionary permanent book-tax differences (a proxy for the level of tax planning) when executives receive more equity-based pay. Both GAAP effective tax rates and cash effective rates are lower for firms that give more equity-based compensation to their executives. Equity-based pay thus encourages managers to make greater efforts to engage in tax-planning activities that can increase firm value by reducing tax liability and increasing cash flows.

However, when the objective of managers is to manipulate earnings to meet or beat the earnings target, the consequences of large book-tax differences are negative for corporate shareholders. Managers may be tempted to put their own benefits ahead of shareholder interests. We show that equity-based compensation reduces book-tax differences related to earnings management. These findings are robust to the alternative measure of equity incentives which incorporate CEO ownership.

Although the literature indicates that the sources of book-tax differences have an incremental effect on explaining earnings quality, no study explains managerial incentives that can influence the sources of book-tax differences. Researchers find that tax planning-related book-tax differences are positively associated with firm value while earnings management-related book-tax differences drive firm value in the opposite direction ([Desai and Dharmapala, 2009](#); [Blaylock et al., 2012](#)). Our study complements these studies by showing that equity-based compensation motivates managers to generate higher tax planning-related book-tax differences and lower earnings management-related book-tax differences by reducing effective tax rates and limiting the degree of earnings management.

Notes

1. Our data show that total book-tax differences increased from \$43 billion in 1992 to \$313 billion in 2011.
2. In many studies, such as those of [Plesko \(2000\)](#), [Desai \(2003\)](#) and [Lisowsky \(2010\)](#), tax-planning activities are called tax-sheltering activities. In our study, tax shelters, tax avoidance and tax planning are used interchangeably.
3. Our results may be biased due to omitting certain control variables. We are not able to control for firms' corporate governance practices due to a lack of data availability. Further research can explore whether stronger corporate governance might drive higher tax planning-related book-tax differences and lower earnings management-related book-tax differences.
4. We use the SAS 9.3 to estimate the various models.

5. Earnings based on accrual accounting can measure performance better than cash flows. Deferred tax expenses are recorded when accruals are recorded differently for book purposes and for tax purposes (Blaylock *et al.* 2012). Only temporary differences are captured by deferred tax expenses, not permanent differences.
6. DISPERM is a measure that is based on permanent differences and excludes temporary differences, consistent with Frank *et al.* (2009). In our robustness tests, we use discretionary total differences instead of discretionary permanent differences in Model 1. We calculate discretionary total differences by replacing permanent differences (PERMDIFF) with total book-tax differences (BTD) in Model 4. The regression results are qualitatively similar.
7. BI_{it} is pre-tax book income (Compustat item PI) for firm i in year t ; $CFTE_{it}$ is current federal tax expense (Compustat item TXFED) for firm i in year t ; $CFOR_{it}$ is current foreign tax expense (Compustat item TXFO) for firm i in year t ; DTE_{it} is deferred tax expense (Compustat item TXDI) for firm i in year t ; and STR_t is statutory tax rate in year t .
8. We derive qualitatively similar results from a robustness test by using the ratio ETR/STR instead of ETR to control for differences in STR between firms due to differing year-ends.
9. Untabulated results show that our findings are robust to using the simultaneous models and the cluster standard error regressions.

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About the authors

Chunwei Xian, PhD, is Assistant Professor of Accounting at Northeastern Illinois University. Her research interests include financial reporting, executive compensation and tax accounting. She is a member of both the American Accounting Association and the AICPA. Chunwei Xian is the corresponding author and can be contacted at: c-xian@neiu.edu

Fang Sun, PhD, is Assistant Professor of Accounting at Queens College, CUNY. Her main research interests include pension accounting, executive compensation, capital market and auditing. She is a member of the American Accounting Association.

Yinghong Zhang, PhD, is Assistant Professor of Accounting at the University of Central Oklahoma. Her research interests include audit quality, internal control, earnings management, bank regulation, corporate governance, executive compensation and accounting conservatism. She is a member of the American Accounting Association.

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