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Nan HU
Singapore Management University, nanhu@smu.edu.sg

Baolei QI

Gaoliang TIAN

Lee YAO

Zhen ZENG

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The impact of ineffective internal control on the value relevance of accounting information

Nan Hu[a]*, Baolei Qi[b], Gaoliang Tian[b], Lee Yao[c] and Zhen Zeng[b]

[a]*Department of Accounting and Finance, University of Wisconsin-Eau Claire, Eau Claire, WI, USA;* [b]*School of Management, Xi'an Jiaotong University, Xi'an, Shaanxi, P.R. China;* [c]*The Butt College of Business, Loyola University, New Orleans, USA*

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This paper investigates the value relevance of accounting information in the presence of ineffective internal control (IIC). Based on Ohlson's valuation model, this paper first documents that IIC can directly affect a firm's market value after control cost of capital, corporate governance, and other, value-relevant variables. Second, this paper finds that the value relevance of earnings and book value in determining a firm's market value are significantly reduced. Collectively, the results of this paper indicate that the effectiveness of internal controls can directly affect a firm's market value and the value relevance of accounting information.

Keywords: ineffective internal control; book value; earnings; value relevance; market value

JEL codes: M40; M41

1. Introduction

The large number of accounting scandals such as Enron and WorldCom at the beginning of the twenty-first century gave rise to the Sarbanes–Oxley Act of 2002 (SOX).[1] However, ever since its passage, the value of the Sarbanes–Oxley Act has been vigorously debated. Some researchers documented that Sarbanes–Oxley could improve accrual quality and prevent managers' earnings management behavior (Ashbaugh-Skaife et al. 2008). There is, however, a body of empirical research that reveals that the enforcement of SOX 404 imposes substantial costs on firms without commensurate benefits (e.g. Ribstein 2002; Berger, Li, Wong 2005; Romano 2005; Zhang 2007; Krishnan, Rama, and Zhang 2008; Li, Pincus, and Rego 2008). Executives complain that complying with the rules of SOX 404 diverts their attention from doing business (Solomon and Bryan-Low 2004). Furthermore, the Act exposes managers and directors to greater litigation risks and penalties. Consequently, CEOs may take less risky projects and change their business strategies, potentially damaging firm value (Ribstein 2002).

Motivated by the ongoing debates over the economic impact of the SOX 404 Act, this paper attempts to investigate the direct impact of internal control deficiency on the value relevance of accounting information in determining firm's market value. Previous literature imply that IIC might indirectly impact company valuation through either increasing a firm's cost capital (Lambert, Leuz, and Verrecchia 2007; Beneish, Billings,

*Corresponding author. Email: HUN@uwec.edu

and Hodder 2008; Ashbaugh-Skaife et al. 2009) or decreasing a firm's corporate governance (Gompers, Ishii, and Metrick 2003; Cremers and Nair 2005; Core, Guay, and Rusticus 2006; Bebchuk, Cohen, and Ferrell 2009). Often a higher cost capital or lower corporate governance is associated with a lower market value. However, till now, there is no study on the direct impact of IIC on firm's market valuation.

Based on Ohlson's (1995) residual valuation model, which is widely used in accounting literature (e.g. Ohlson 1995; Hand 2001; Ohlson 2001), and treating external auditors' SOX 404 opinions on internal control as "other information,"[2] this paper investigates whether the effectiveness of a firm's internal control can directly affect the value relevance of accounting information in determining the firm's market value. Specifically, we select a sample of firms that have received at least one SOX 404 audit opinion on internal control for the period from 15 November 2004 to 31 March 2009, and study the following questions: (1) Do firms whose internal controls are not effective, as indicated by having received adverse SOX 404 audit opinions, exhibit lower market value relative to firms that received unqualified SOX404 audit opinions? (2) Does the IIC affects the value relevance of earnings and book value of equity in determining firm's market value?

The cross-sectional tests indicate that firms whose internal controls are ineffective have lower market value relative to firms whose internal controls are effective. Our results also reveal that IIC can reduce the value relevance of earnings and book value of equity in determining firm's market value.

This paper makes several contributions to the literature. First, previous researches have studied market response to the disclosure of internal control deficiencies using event study methodology (De Franco, Guan, and Lu 2005; Beneish et al. 2008). This paper focuses on whether firm's market value is negatively related to the disclosure of IIC over a long period time using incremental association studies (Holthausena and Watts 2001). The reason we adopt a market value approach is that we are interested in investigating how the ineffective internal controls (IICs) are reflected in the firm's value, instead of the timing of information being impounded by the market. Second, it is the first paper to investigate direct impact of IIC on firm valuation. Results from previous research only imply that internal control deficiencies might indirectly impact firm market value through their impact on cost of capital or corporate governance. In addition, this paper investigates the value relevance of accounting information, especially the earnings and book value of equity in determining a firm's market value when the internal controls are ineffective or weak.

The remainder of the paper progresses as follows. Section 2 of the paper provides literature review. Section 3 presents our research framework and develops our hypotheses. Section 4 discusses the research methodology. Section 5 presents the analyses and the results of the study. Section 6 concludes our paper with managerial implications.

2. Literature review

Accounting scandals such as Enron and WorldCom at the beginning of the twenty-first century urged regulators to pay more attention to internal control over financial reporting. President Bush signed SOX into law on 30 July 2002. The SEC issued SOX 302 and SOX 404 on 29 August 2002 and 27 May 2003, respectively. The SOX 302 addresses corporate responsibility for financial reports, which requires managers (1) to certify that the financial report contains no misrepresentations and that the financial information is fairly presented, and (2) to disclose material weaknesses and material

changes in internal control to the public. SOX 302 does not require attestation by an independent external auditor. SOX 404 addresses management assessment of internal controls, which requires (1) the management to issue an annual report filed with the SEC that contains management's assessment of the effectiveness of the firm's internal control over financial reporting, and (2) the company's independent external auditor to issue a separate opinion over management's assertions. SOX 302 became effective on 29 August 2002 and SOX 404 became effective for accelerated companies for fiscal year ending after 15 November 2004.[3]

The passage of SOX triggered new investigation into the issue of internal control. For example, De Franco, Guan, and Lu (2005), Hammersley, Myers, and Shakespeare (2008), and Ashbaugh-Skaife et al. (2009) documented a negative abnormal return associated with the disclosure of material weaknesses. Ogneva, Raghunandan, and Subramanyam (2007) found no incremental explanatory power for the disclosure of internal control weaknesses. Ashbaugh-Skaife, Collins, and Kinney (2007) and Doyle, Ge, and McVay (2007b) find that firms disclosing material weaknesses tend to be smaller, younger, financially weaker, more complex, growing rapidly, or undergoing restructuring. Doyle, Ge, and McVay (2007a) and Ashbaugh-Skaife et al. (2008) find that internal control deficiencies can reduce quality of accounting information, such as adding noise to accruals. Most of previous literatures either focused on market response to the disclosure of internal control deficiencies or the indirect impact of IIC on market value, but it is still not clear whether the IIC can directly affect firm's market value. This paper tries to fill in this gap through exploring the impact of IIC on the value relevance of earnings and book value of equity in determining firm's market value.

3. Research framework and hypotheses development

3.1. Research frame work

Figure 1 presents the research framework of this study. The dot lines in Figure 1 represent the linkages among IIC, cost capital (corporate governance), and market value, which have been documented by previous literature, while the solid lines represent what we are going to investigate in this paper. As we can see in Figure 1, previous research has documented that internal control can indirectly affect firm's market value by increasing firm's cost of capital (Ogneva, Raghunandan, and Subramanyam 2007; Beneish, Billings, and Hodder 2008; Ashbaugh-Skaife et al. 2009) or by damaging firm's corporate governance (Gompers, Ishii, and Metrick 2003; Cremers and Nair

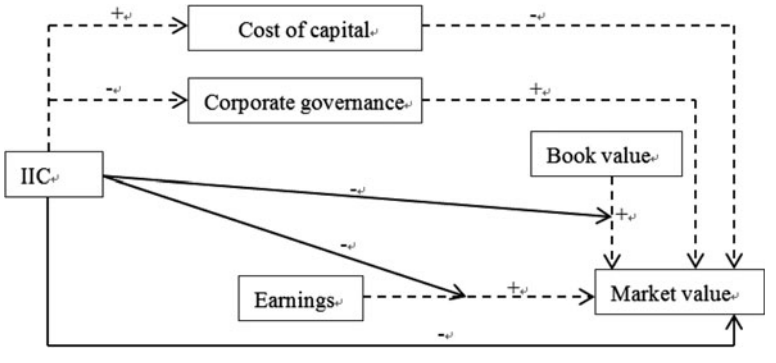

Figure 1. Research framework.

2005; Core, Guay, and Rusticus 2006; Bebchuk, Cohen, and Ferrell 2009). The purpose of this study is to explore the following questions: can IIC directly affect firm's market value after control cost of capital, corporate governance, and other related variables? Second, how can the value relevance of book value and earnings change in the presence of IIC?

3.2. Hypotheses development

Ohlson's valuation model (1995) expresses that firm's equity value at t equals invested capital at t plus the present value of future net value creation, as shown in the following equations.

$$V_t = \mathrm{BV}_t + \sum_{\tau=1}^{\infty} \frac{E_t[x_{t+\tau} - r\mathrm{BV}_{t+\tau-1}]}{(1+r)^{\tau}} \tag{1}$$

where V_t is the firm's equity value at time t, BV_t is the firm's book value at time t, x_t is the firm's reported earnings at time t, r is the firm's cost of capital, and $E_t[x_{t+\tau} - r\mathrm{BV}_{t+\tau-1}]$ is the expectation of firm's abnormal earnings.

IIC might reduce a firm's market value due to three reasons: it can (1) decrease a firm's expected future earnings ($E_t[x_{t+\tau}]$); (2) increase a firm's cost of capital (r); or (3) damage a firm's corporate governance.

3.2.1. *Decrease in a firm's expected future earnings* ($E_t[x_{t+\tau}]$)

IIC can affect a firm's market value through decreasing firm's expected future earnings ($E_t[x_{t+\tau}]$). First, decreased expected future earnings can be related to costs directly associated with internal control deficiencies, such as, the expected costs of remediating the internal control deficiencies, the expected increased audit fee, etc. Various business decisions, including the operational decisions within firm, are made based on accounting information. A body of previous study has proved that firms with internal control deficiencies have lower quality of accounting information, and managers have more discretion to manipulate accounting information (Doyle, Ge, and McVay, 2007a; Ashbaugh-Skaife et al. 2008). Second, IIC may lead to ineffectiveness and inefficiency in a firm's business operation, which can harm the firm's capability for persistent earnings in the future. Third, IIC may impair the market's confidence in the firm and lead customers, suppliers, and other stakeholders to question the firm's ability to fulfill its implied commitments or the effectiveness and efficiency of its business operation. These factors will harm either the firm's actual future earnings or the investors' expectations about firm's future earnings. As it is indicated in Equation (1), decreased expected future earnings will result in a decrease of the firm's market value.

3.2.2. *Increase in a firm's cost of capital*

IIC can indirectly affect a firm's market value through increasing the firm's cost of capital (r). A body of previous literature has documented that firms with internal control deficiencies have higher system risk and idiosyncratic risk, which can lead to higher cost of capital (Lambert, Leuz, and Verrecchia 2007; Ashbaugh-Skaife et al. 2008, 2009; Beneish, Billings, and Hodder 2008). The higher cost of capital is due to high information uncertainty, poor earnings quality (Bedard 2006; Ashbaugh-Skaife et al.

2008), and low financial reporting quality (Francis et al. 2005; Ge and McVay 2005; Ashbaugh-Skaife, Collins, and Kinney (2007); Doyle, Ge, and McVay (2007a, 2007b); Chan, Farrell, and Lee 2008). Poorer earnings quality and lower reporting quality are associated with a higher cost of capital (Botosan 1997; Francis et al. 2004, 2005). As it is indicated in Equation (1), higher cost of capital can lead to lower firm's market value.

3.2.3. *Damage the firm's corporate governance*

IIC can indirectly affect firm's market value through weakening firm's corporate governance. Previous research has examined the way how internal governance could be one important factor determining firm's market value. For example, Gompers, Ishii, and Metrick (2003), Cremers and Nair (2005), Core, Guay, and Rusticus (2006), Bebchuk, Cohen, and Ferrell (2009), among others, document that weaker corporate governance is associated with lower firm valuation, both in terms of specific governance aspects and in terms of overall indices.

As discussed above, IIC might directly or indirectly reduce firm's market value. The direct way is decreasing firm's expected future earnings ($E_t[x_{t+\tau}]$); the indirect way is increasing firm's cost of capital and damaging firm's corporate governance (r). Either of these two ways can decrease a firm's market value. Therefore, we hypothesize that:

> Hypothesis 1: The presence of IIC has a negative impact on firm's market value even after controlling the cost of capital and corporate governance.

As noted in SEC (2003), while historically the term "internal control" is almost exclusively applied to the accounting profession, it represents a system that could deeply affect the financial reporting process. Therefore, IIC may introduce unintentional errors as well as intentional misstatements which can bias the quality of financial reporting. A body of research has documented that internal control weaknesses can reduce accrual quality (Doyle, Ge, and McVay 2007a; Ashbaugh-Skaife et al. 2008). Chang et al. (2011) find that discretionary accruals become even more important to predict future operating cash flows during the post-SOX period.

IIC give managers more discretion to manipulate earnings which also add noise to accounting information. Watts and Zimmerman (1986) show that earnings management can be used to distort reported earnings. Christensen, Hoyt, and Paterson (1999) find that the more managers manipulate earnings, the less informative the earnings announcement is to investors. Marquardt and Wiedman (2004) document that earnings are less value relevant in determining stock price in the presence of earnings management. Tutticci (2002) finds that the supplementary financial statements do not convey additional relevance to the market for equity accounted figures. Bedard (2006), Doyle, Ge, and McVay (2007a, 2007b); Ashbaugh-Skaife et al. (2008), and Chan, Farrell, Lee (2008) provide evidence that internal control weaknesses may lead to poor earnings quality. Since internal control has a deep effect on the whole financial reporting system, the presence of IIC may decrease value relevance of both earnings and book value of equity in determining firm's market value (see Figure 1). Therefore, we hypothesize that:

> Hypothesis 2: Book value of equity and earnings are less value relevant in determining firm's market value in the presence of IIC.

4. Research methodology

To examine the value relevance of the effectiveness of internal controls, we use a market valuation framework based on Ohlson's (1995) model. As stated in Equation (2), the market value of a firm is related to a combination of the current book value of equity and earnings of the firm, and other value-relevant variables (Lev and Sougiannis 1996; Collins, Pincus, and Xie 1999). According to previous research, Equation (2) includes several control variables, such as growth, risk, industry, and year etc.

$$\begin{aligned} P_t = {} & \beta_0 + \beta_1 \mathrm{BV}_{t-1} + \beta_2 E_t + \beta_3 \mathrm{IIC}_t + \beta_4 \mathrm{Cost\_}E_t + \beta_5 \mathrm{Gindex}_t + \beta_6 \mathrm{BETA}_t + \beta_7 \mathrm{SG}_t \\ & + \beta_8 \mathrm{AG}_t + \beta_9 \mathrm{AUDITOR}_t + \beta_{10} \mathrm{R\&D}_t + \beta_{11} \mathrm{ADVER}_t + \beta_{12} \mathrm{RES}_t \\ & + \sum_{i=1}^{n} \beta_{13} \mathrm{Ind}_i + \sum_{j=1}^{m} \beta_{14} \mathrm{Year}_j + \varepsilon_t \end{aligned} \tag{2}$$

where P is the firm's common share price at the end of the third month after its fiscal year end. BV is book value of equity. E is earnings e at the end of fiscal year. IIC_t is a dummy variable which equals one in the presence of IIC in year t, otherwise zero. $\mathrm{Cost\_}E_t$ is the cost of equity in year t developed by Ashbaugh-Skaife et al (2009). Gindex_t is the firm's corporate governance index collected from *Risk Metrics*. BETA_t is firm's market risk in year t. SG_t is sales growth in year t. AG_t is asset growth in year t. $\mathrm{AUDITOR}_t$ is a dummy variable which equals one if the auditing is done by one of big four audit firms in year t, and zero otherwise. $\mathrm{R\&D}_t$ is the research and development fees in year t. ADVER_t is advertisement expenses in year t. RES_t is set to one if a firm engages in restructure, zero otherwise. Whenever, our variables are deflated by number of common shares to take into account of potential size effect. We also include the industry dummy variables and year dummy variables to control the fixed year or industry effect. A variable is value relevant if it provides incremental information about expected future earnings beyond that conveyed by the book value and current earnings. According to Hypothesis 1, the presence of IIC will be negatively associated with firm's market value. A significant and negative β_3 will support Hypothesis 1.

We use Equation (3) to test our Hypothesis 2. Equation (3) is developed from Equation (2), in which we add in two interaction terms. $\mathrm{BV} \times \mathrm{IIC}$ is the interaction between BV_{t-1} and IIC_t, $\mathrm{E} \times \mathrm{IIC}$ is the interaction of E_t and IIC_t.

$$\begin{aligned} P_t = {} & \beta_0 + \beta_1 \mathrm{BV}_{t-1} + \beta_2 E_t + \beta_3 \mathrm{IIC}_t + \beta_4 \mathrm{BV}_{t-1} \times \mathrm{IIC} + \beta_5 E_t \times \mathrm{IIC} \beta_6 \mathrm{Cost\_}E_t \\ & + \beta_7 \mathrm{Gindex}_t + \beta_8 \mathrm{BETA}_t + \beta_9 \mathrm{SG}_t + \beta_{10} \mathrm{AG}_t + \beta_{11} \mathrm{AUDITOR}_t + \beta_{12} \mathrm{R\&D}_t \\ & + \beta_{13} \mathrm{ADVER}_t + \beta_{14} \mathrm{RES}_t + \sum_{i=1}^{n} \beta_{15} \mathrm{Ind}_i + \sum_{j=1}^{m} \beta_{16} \mathrm{Year}_j + \varepsilon_t \end{aligned} \tag{3}$$

A negative and significant β_4 and β_5 in Model 4 provide evidence for Hypothesis 2.

5. Results

5.1. Sample selection

We obtain information on the disclosures about SOX404 internal control from the *Audit Analytics* database. This database keeps track of SEC filings in auditors' independent SOX 404 opinion on the effectiveness of the system of internal control on financial

report. For each firm year, we code it as having IIC if a firm received adverse audit opinion on its internal control according to SOX 404. We code it as having effective internal control if a firm received unqualified audit opinion on its internal control according to SOX 404. Data on book value, earnings, R&D spending, advertising expenses, and sales were collected from *Compustat*. Stock price details were collected from the CRSP (Center for Research in Security Prices) monthly files. Corporate governance data were collected from *Risk Metrics.*

After merging data from *Audit Analytics* with *Compustat* data and CRSP data, we are able to obtain our initial sample of 23,596 firm years that have at least one SOX 404 audit opinion from November 2004 to March 2009. Then, we require our initial sample to meet the following requirements: (1) earnings and book value are available in *Compustat* annual database; (2) book value must be greater than zero; (3) firms belong to non-financial industries; (4) no missing values for other control variables. Finally, we have 1292 firm years that have IIC and 14,353 firm years that have effective internal control.

5.2. Descriptive statistics

Table 1 displays the summary statistics of the variables used in this paper. It shows that on average about 8% firms have IIC deficiencies in our research period. There are about 83.9% firms that chose Big4 audit companies as their external auditors. Table 2 reports the correlations, where the upper diagonal displays the Spearman rank-order correlations and the lower diagonal displays the Pearson product-moment correlations. As expected, we find that IIC is significantly and negatively correlated to price, cost of capital, and corporate governance index.

Table 1. Descriptive statistics.

Variables	Mean	Median	SD	Q1	Q3
BV_{t-1}	0.453	0.452	0.315	0.253	0.659
E_t	0.024	0.037	0.119	0.005	0.086
IIC	0.081	0.000	0.272	0.000	0.000
Cost_E_t	0.499	0.434	0.321	0.365	0.588
$Gindex_t$	9.039	9.000	1.029	7.000	10.000
$BETA_t$	0.985	0.827	0.730	0.464	1.347
SG_t	0.142	0.103	0.219	0.014	0.228
AG_t	0.111	0.071	0.213	−0.013	0.184
$AUDITOR_t$	0.839	1.000	0.368	1.000	1.000
$R\&D_t$	0.034	0.000	0.066	0.000	0.036
$Adver_t$	0.007	0.000	0.015	0.000	0.003
RES_t	0.379	0.000	0.485	0.000	1.000

IIC_t = one if the firm received an adverse auditor opinion regarding its internal control in annual reports in fiscal year t, zero otherwise.
BV_{t-1} = firm's book value of equity at fiscal end-of-year $t-1$; E_t = firm's earnings in the fiscal year t; Cost_E_t = average annual value line three to five-year expected return over the 12 months encompassing the firm's fiscal year; $Gindex_t$ is firm's corporate governance index come from *Risk Metrics*; BETA = estimate of b_1 from $EXERT = b_0 + b_1 RMRF + c$ using monthly returns over the 60 months prior to the firm's fiscal year-end, requiring a minimum of 18 months, where EXRET = the firm's monthly return minus the risk-free rate and RMRF = excess return on the market. SG_t = firm's sales growth rate in year t; AG_t = firm's asset growth rate in year t; $AUDITOR_t$ = one if a firm engaged one of the largest four audit firms for fiscal year t, and zero otherwise; $R\&D_t$ = the firm's research and development expenditure in year t; $Adver_t$ = firm's advertisement expenditure is year t; RES_t = one if a firm restructured in year t, zero otherwise.

Table 2. Correlation.

	P_t	BV_{t-1}	E_t	IIC_t	Cost_E_t	$Gindex_t$	$BETA_t$	SG_t	AG_t	$AUDITOR_t$	$R\&D_t$	$Adver_t$	RES_t
P_t	1.000	0.585***	0.447***	−0.021**	−0.198***	0.097***	0.154***	0.275***	0.304***	0.073***	0.405***	0.042***	0.048***
BV_{t-1}	0.365***	1.000	0.186***	0.026***	−0.249***	−0.031***	0.328***	0.060***	0.011	0.030***	0.445***	0.030***	−0.004
E_t	0.154***	−0.012	1.000	−0.106***	−0.006	0.013	−0.165***	0.248***	0.371***	0.114***	−0.068***	0.033***	−0.046***
IIC_t	−0.031***	0.016**	−0.079***	1.000	−0.056***	0.055***	0.089***	−0.015*	−0.018**	−0.045***	0.030***	0.039***	0.080***
Cost_E_t	−0.175***	−0.209***	0.093***	−0.070***	1.000	0.007	−0.286***	−0.066***	−0.043***	0.033***	−0.172***	−0.093***	−0.042***
$Gindex_t$	0.030***	−0.045***	−0.001	−0.029***	−0.055***	1.000	−0.124***	0.050***	0.042***	0.042***	−0.005	−0.022***	−0.004
$BETA_t$	0.165***	0.232***	−0.271***	0.103***	−0.280***	−0.055***	1.000	0.002	−0.092***	0.026***	0.384***	0.049***	−0.006
SG_t	0.295***	0.005	0.117***	−0.001	−0.068***	−0.016**	0.058***	1.000	0.532***	0.004	0.052***	−0.054***	0.019**
AG_t	0.372***	0.063***	0.262***	−0.001	−0.049***	−0.017**	−0.018**	0.517***	1.000	−0.011	−0.041***	−0.033***	−0.012
$AUDITOR_t$	0.009	0.028***	0.073***	−0.045***	0.056***	0.016**	0.009	−0.015*	−0.018**	1.000	0.057***	−0.046***	−0.008
$R\&D_t$	0.395***	0.360***	−0.395***	0.021***	−0.200***	−0.032***	0.411***	0.102***	0.023***	0.037***	1.000	0.051***	0.004
$Adver_t$	0.120***	0.079***	0.070***	0.025***	−0.108***	−0.026***	0.048***	−0.040***	−0.010	0.044***	−0.015*	1.000	0.007
RES_t	0.028***	−0.009	−0.041***	0.080***	−0.067***	−0.024***	0.005	0.008	0.015	−0.012	0.025***	0.004	1.000

$IIC_t = 1$ if the firm received an adverse auditor opinion regarding its internal control in annual reports in fiscal year t, zero otherwise.
BV_{t-1} = 1firm's book value of equity at fiscal end-of-year $t-1$; E_t = firm's earnings in the fiscal year t; Cost_E_t = average annual value line three to five-year expected return over the 12 months encompassing the firm's fiscal year; $Gindex_t$ is firm's corporate governance index come from *Risk Metrics*; BETA = estimate of b_1 from $EXERT = b_0 + b_1 RMRF + c$ using monthly returns over the 60 months prior to the firm's fiscal year-end, requiring a minimum of 18 months, where EXRET = the firm's monthly return minus the risk-free rate and RMRF = excess return on the market. SGt = firm's sales growth rate in year t; AG_t = firm's asset growth rate in year t; $AUDITOR_t = 1$ if a firm engaged one of the largest four audit firms for fiscal year t, and zero otherwise; $R\&D_t$ = the firm's research and development expenditure in year t; $Adver_t$ = firm's advertisement expenditure is year t; RES_t = one if a firm restructured in year t, zero otherwise.
***, **, * denote significant at the 0.01, 0.005, 0.10 levels, respectively (two sided)

5.3. Cross-sectional tests

Table 3 presents the OLS regression results for Equation (2). The estimated coefficients on book value (Para = 0.549 and *P*-value = 29.29) and earnings (Para = 2.446 and *P*-value = 39.18) are positive and significant. The magnitudes of the coefficients on book value and earnings are consistent with those found in other studies that utilize Ohlson's model. For our variable of interest, the coefficients on the IIC variable are negative and significant (Para = −0.162 and *P*-value = −5.06), supporting Hypothesis 1 that there is a negative association between the presence of IIC and firm's market value. Consistent with prior studies, we also find R&D spending to be significant and positively associated with firm's market value (Para = 7.466 and *P*-value = 36.51). The coefficients for the asset growth (Para = 0.397 and *P*-value=30.39) and sales growth (Para = 1.332 and *P*-value = 9.06) variables are significant and positive as well. As expected, the coefficient for the cost of capital shows a negative sign (Para = −0.105 and *P*-value = −2.95). Overall, the results show that the presence of IIC is negatively associated with firm's market value, after controlling for cost of capital, corporate governance index, and other value-relevant variables. This finding suggests that, on average, market participants do take note of information released through SOX 404 and consider it to be an important source of information in valuing firms, supporting Hypothesis 1.

Table 3. Cross-sectional analysis of the effect of internal control weaknesses on value relevance of accounting information using OLS regression

$$P_t = \beta_0 + \beta_1 \mathrm{BV}_{t-1} + \beta_2 E_t + \beta_3 \mathrm{IIC}_t + \beta_4 \mathrm{Cost\_}E_t + \beta_5 \mathrm{Gindex}_t + \beta_6 \mathrm{BETA}_t + \beta_7 \mathrm{SG}_t + \beta_8 \mathrm{AG}_t + \beta_9 \mathrm{AUDITOR}_t + \beta_{10} \mathrm{R\&D}_t + \beta_{11} \mathrm{ADVER}_t + \beta_{12} \mathrm{RES}_t + \sum_{i=1}^{n} \beta_{13} \mathrm{Ind}_i + \sum_{j=1}^{m} \beta_{14} \mathrm{Year}_j + \varepsilon_t \quad (2).$$

Variables	Predicted sign	Coefficient
Intercept		0.791***
BV_{t-1}	+	0.549***
E_t	+	2.446***
IIC_t	−	−0.162***
$\mathrm{Cost\_}E_t$	−	−0.105***
Gindex_t	+	0.003
BETA_t	−	0.006
SG_t	+	0.397***
AG_t	+	1.332***
$\mathrm{AUDITOR}_t$	+	−0.240***
$\mathrm{R\&D}_t$	+	7.466***
Adver_t	+	6.621***
RES_t	−	−0.337***
Adjusted R^2		0.4935
Observations		15,645

IIC_t = one if the firm received an adverse auditor opinion regarding its internal control in annual reports in fiscal year *t*, zero otherwise.
BV_{t-1} = firm's book value of equity at fiscal end-of-year *t*−1; E_t = firm's earnings in the fiscal year *t*; $\mathrm{Cost\_}E_t$ = average annual value line three to five-year expected return over the 12 months encompassing the firm's fiscal year; Gindex_t is firm's corporate governance index come from *Risk Metrics*; BETA = estimate of b_1 from $\mathrm{EXERT} = b_0 + b_1 \mathrm{RMRF} + c$ using monthly returns over the 60 months prior to the firm's fiscal year-end, requiring a minimum of 18 months, where EXRET = the firm's monthly return minus the risk-free rate and RMRF = excess return on the market. SG_t = firm's sales growth rate in year *t*; AG_t = firm's asset growth rate in year *t*; $\mathrm{AUDITOR}_t$ = 1 if a firm engaged one of the largest four audit firms for fiscal year *t*, and zero otherwise; $\mathrm{R\&D}_t$ = the firm's research and development expenditure in year *t*; Adver_t = firm's advertisement expenditure is year *t*; RES_t = one if a firm restructured in year *t*, zero otherwise.
*, *, ***denote significant at the 0.01, 0.005, 0.10 levels, respectively (two sided).

To test whether the presence of IIC affects the value relevance of accounting information in determining firm's market value, we conducted a regression using Equation (3). In Equation (3), the coefficients of $BV_{t-1} \times IIC_t$ and $E_t \times IIC_t$ represent the incremental value relevance of book value of equity and earnings for firms that received adverse SOX 404 audit opinions respectively. Table 4 presents the OLS regression results for Equation (3). We observe that the coefficient of $BV_{t-1} \times IIC_t$ is negative and significant at 1% level of significance (Para = −0.538 and *P*-value = −4.63), and the coefficient of $E_t \times IIC_t$ (Para = −1.732 and *P*-value = −7.63) is also negative and significant at 1% significance level. This means that, relatively speaking, IIC impairs the value relevance of book value of equity and earnings in determining firm's market value. Overall our findings reveal that, compared to those firms with effective internal control, the value relevance of earnings and book value of equity is lower for firms with internal control deficiencies.

Table 4. Cross-sectional analysis of the effect of internal control weaknesses on value relevance of accounting information using OLS regression.

$$P_t = \beta_0 + \beta_1 \mathrm{BV}_{t-1} + \beta_2 E_t + \beta_3 \mathrm{IIC}_t + \beta_4 \mathrm{BV}_{t-1} \times \mathrm{IIC} + \beta_5 E_t times \mathrm{IIC} \beta_6 \mathrm{Cost\_}E_t + \beta_7 \mathrm{Gindex}_t + \beta_8 \mathrm{BETA}_t + \beta_9 \mathrm{SG}_t + \beta_{10} \mathrm{AG}_t + \beta_{11} \mathrm{AUDITOR}_t + \beta_{12} \mathrm{R\&D}_t + \beta_{13} \mathrm{ADVER}_t + \beta_{14} \mathrm{RES}_t + \sum_{i=1}^{n} \beta_{15} \mathrm{Ind}_i + \sum_{j=1}^{m} \beta_{16} \mathrm{Year}_j + \varepsilon_t \quad (3).$$

Variables	Predicted sign	Coefficient
Intercept		0.726***
BV_{t-1}	+	0.653***
E_t	+	2.609***
IIC_t	−	0.058
$\mathrm{BV}_{t-1} \times \mathrm{IIC}_t$	−	−0.538***
$\mathrm{E} * \mathrm{IIC}_t$	−	−1.732***
$\mathrm{Cost\_}E_t$	−	−0.099***
Gindex_t	+	0.002
BETA_t	−	0.007
SG_t	+	0.407***
AG_t	+	1.331***
$\mathrm{AUDITOR}_t$	+	−0.233***
$\mathrm{R\&D}_t$	+	7.478***
Adver_t	+	6.478***
RES_t	−	−0.331***
Adjusted R^2		0.4972
Observations		15,645

IIC_t = one if the firm received an adverse auditor opinion regarding its internal control in annual reports in fiscal year *t*, zero otherwise.
BV_{t-1} = firm's book value of equity at fiscal end-of-year *t*−1; E_t = firm's earnings in the fiscal year *t*; $\mathrm{Cost\_}E_t$ = average annual Value line three to five-year expected return over the 12 months encompassing the firm's fiscal year; Gindex_t is firm's corporate governance index come from *Risk Metrics*; BETA = estimate of b_1 from $\mathrm{EXERT} = b_0 + b_1 \mathrm{RMRF} + c$ using monthly returns over the 60 months prior to the firm's fiscal year-end, requiring a minimum of 18 months, where EXRET = the firm's monthly return minus the risk-free rate and RMRF = excess return on the market. SG_t = firm's sales growth rate in year *t*; AG_t = firm's asset growth rate in year *t*; $\mathrm{AUDITOR}_t$ = 1 if a firm engaged one of the largest four audit firms for fiscal year *t*, and zero otherwise; $\mathrm{R\&D}_t$ = the firm's research and development expenditure in year *t*; Adver_t = firm's advertisement expenditure is year *t*; RES_t = one if a firm restructured in year *t*, zero otherwise.
$\mathrm{BV}_{t-1} \times \mathrm{IIC}_t$ is the interaction between BV_{t-1} and IIC_t.
$\mathrm{E}_t \times \mathrm{IIC}_t$ is the interaction between E_t and IIC_t.
Please see Appendix 1 for other variables' definitions.
***, **, * Denote significant at the 0.01, 0.005, 0.10 levels, respectively (two sided).

5.4. Robustness test

SOX requires top management to establish, maintain, and regularly evaluate the effectiveness of internal control over financial reporting. Top management must identify material weaknesses within their firm and auditors must attest to the management's report of internal control under Section 404 of SOX. Therefore, the number of material weaknesses within the firm can also reflect the effectiveness of internal control over financial reporting. Investors may downward their valuation when firms have more material weaknesses relative to other firms. In this section, for robustness check, we use the number of material weaknesses with the firm (N_ICW_t) as another proxy for the effectiveness of firm's internal control. By replacing IIC_t in Equations (2) and (3) with N_ICW_t, respectively, we re-estimate Equations (2) and (3), and present the results in Table 5.

Overall, we observe similar results as in the previous sections. The coefficient of N_ICW_t (Para = −0.029 and *P*-value = −2.84) is negative and significant at 99% confidence interval, which indicates that the material weaknesses can impair firm's market value. In additional, the more of material weaknesses within the firm, the less

Table 5. Cross-sectional analysis of the effect of the number of material weaknesses on value relevance of accounting information using OLS regression.

Variables	Predicted sign	Model (2) Coefficient	Model (3) Coefficient
Intercept	?	0.227	0.205
BV_{t-1}	+	1.209***	1.242***
E_t	+	2.613***	2.700***
N_ICW_t	–	−0.029***	0.012
$BV_{t-1} \times N\_ICW_t$	–		−0.152***
$E_t \times N\_ICW_t$	–		−0.410***
$Cost\_E_t$	–	−0.042	−0.039
$Gindex_t$	–	0.006	0.006
$BETA_t$	–	0.013	0.012
SG_t	+	0.383***	0.385***
AG_t	+	1.290***	1.292***
$AUDITOR_t$	?	−0.194***	−0.197***
$R\&D_t$	+	7.156***	7.192***
$Adver_t$	+	5.192***	5.179***
RES_t	–	−0.288***	−0.288***
Adjusted R^2		0.5117	0.5133
Observations		15,645	15,645

BV_{t-1} = firm's book value of equity at fiscal end-of-year $t-1$; E_t = firm's earnings in the fiscal year t; $Cost\_E_t$ = average annual value line three to five-year expected return over the 12 months encompassing the firm's fiscal year; $Gindex_t$ is firm's corporate governance index come from *Risk Metrics*; BETA = estimate of b_1 from $EXERT = b_0 + b_1 RMRF + c$ using monthly returns over the 60 months prior to the firm's fiscal year-end, requiring a minimum of 18 months, where EXRET = the firm's monthly return minus the risk-free rate and RMRF = excess return on the market. SG_t = firm's sales growth rate in year t; AG_t = firm's asset growth rate in year t; $AUDITOR_t = 1$ if a firm engaged one of the largest four audit firms for fiscal year t, and zero otherwise; $R\&D_t$ = the firm's research and development expenditure in year t; $Adver_t$ = firm's advertisement expenditure is year t; RES_t = one if a firm restructured in year t, zero otherwise.

N_ICW_t is the number of internal control weaknesses in year t.

$BV_{t-1} \times N\_ICW_t$ is the interaction between BV_{t-1} and N_ICW_t.$E_t* \times N\_ICW_t$ is the interaction between $E_t$and N_ICW_t.

Please see Appendix 1 for other variables' definitions.

*, **, *** Denote significant at the 0.01, 0.005, 0.10 levels, respectively (two sided).

firm's market value. The coefficients of $BV_{t-1} \times N\_ICW_t$ (Para = −0.152 and *P*-value = −4.16) and $E_t \times N\_ICW_t$ (Para = −0.410 and *P*-value = −5.92) are both negative and significant at 99% confidence interval, which indicate that the material weaknesses reduce the value relevance of both earnings and book value of equity.

6. Summary and conclusions

A fundamental premise underlying compliance with SOX provisions is that effective internal control provides a significant benefit to investors by reducing both intentional and unintentional misstatements in measuring, recording, and processing financial information, resulting in more reliable financial statements. Using SOX 404 audit opinions, we first investigated whether the effectiveness of internal controls can directly impact firm's market value through Ohlson's valuation framework. Furthermore, using the SOX 404 audit opinion on internal control mandated by AS No. 2, we tested whether IIC can affect the value relevance of earnings and book value of equity in determining firm's market value.

After controlling for cost of capital, corporate governance, and other factors that may influence firm's market value, we found that IIC are significantly and negatively related to firm's market value. We also found that IIC can reduce the value relevance of earnings and book value of equity in determining firm's market value.

Our tests document that the effectiveness of internal control can impact firm's market value directly, and the value relevance of earnings and book of equity in determining firm's market value is also impacted in the presence of IIC. The results also reveal the direct and indirect paths that IIC might impact valuation and draw insights into how investors make their valuation decision based on the existence of internal control deficiencies.

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Notes

1. http://www.soxlaw.com/.
2. In Ohlson's (1995) linear information dynamics model, a firm's market value is determined by three parts of the accounting information: the firm's book value of equity, the present value of the firm's future abnormal earnings, and "other information" which is expected to affect the firm's future abnormal earnings.
3. Accelerated companies are generally those domestic firms with a market capitalization of $75 million or greater. The SOX 404 started to be effective for other firms with a market capitalization smaller than $75 million on 15 December 2008.

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Appendix. Variables definitions

Variables	Predict sign	Definition
P_t		Common share price at the end of third month after the end of fiscal year t
BV_{t-1}	+	Firm's book value of equity in year $t-1$
E_t	+	Firm's earnings in year t
IIC_t	–	IIC, which is set to 1 when a firm received an adverse SOX opinion in year t, 0 otherwise
N_ICW_t	–	The number of a firm's material weaknesses in year t
$Cost\_E_t$	–	Cost of capital in year t
$Gindex_t$	+	Corporate governance index in year t
$BETA_t$	–	Firm's market risk in year t
SG_t	+	Firm's sales growth rate in year t
AG_t	+	Firm's total asset growth rate in year t
$AUDITOR_t$	+	$AUDITOR_t$ is set one if a firm engaged one of the largest four audit firms for fiscal year t, and zero otherwise
$R\&D_t$	+	Firm's research and development expenditure in year t
$Adver_t$	+	Firm's advertisement expenditure is year t
RES_t	–	RES_t is set to 1 if a firm restructured in year t, 0 otherwise