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Internal control weaknesses and evidence of real activities manipulation

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ABSTRACT

We examine whether US public firms that file internal control weakness (ICW) disclosure reports with the Securities and Exchange Commission, as part of the reporting requirements under Section 404 of the Sarbanes–Oxley (SOX) Act, exhibit higher levels of real activities manipulation (RM), compared to firms that do not file such reports. Using firm-level data for the post-SOX period, 2004–2010, we find a positive relationship between firms reporting internal control weaknesses and real activities manipulation. Further, those ICW-firms that use RM to beat earnings benchmarks have lower performance in the subsequent year. Our results also show that firms do not use discretionary accruals as a substitute for RM when they report internal control weaknesses. Overall, our findings suggest that ICW-firms are prone to using real activities manipulation as a form of earnings management. Our findings also have implications for audit quality as auditors need to gain a better understanding of how real activities manipulation influences the operations of the firm.

1. Introduction

The purpose of this study is to examine whether US firms that file internal control weakness (ICW) disclosure reports with the Securities and Exchange Commission (SEC), as part of the annual reporting requirements of Section 404 of the Sarbanes–Oxley (SOX) Act of 2002, also exhibit higher levels of real activities manipulation (RM). The extent to which ICW-firms manage earnings in the context of these operational activities has received limited attention. Provisions of Section 404 of the SOX Act require that both the management and the firm's external auditors assess the adequacy of internal controls over financial reporting (ICOFR).[1] Although firms are required to report deficiencies in their internal controls, and external auditors are expected to issue an attestation report on the quality of internal controls of their client company, a weak system of internal controls may also influence managements' attempts to further manipulate firm operations through controlled revenues, discretionary expenses, and production costs.

Studies have generally modeled earnings management as the magnitude or level of a firm's accruals. Schipper (1989, 92) refers to "real" earnings management and states that it is "accomplished by timing investment or financing decisions to alter reported earnings or some subset of it." Thus, while real activities transactions involve cost-cutting measures,[2] what differentiates them from ordinary reductions in costs is the extent to which these activities deviate, in a purely opportunistic sense, from normal business operations, and the extent to which they act merely as a short-term solution to a long-term valuation problem. Similarly, Gunny (2010, 855) states that "…managers undertake actions that change the timing or structure of an operation, investment, and/or financing transaction in an effort to influence the output of the accounting system." Contemporaneous research has shown that management uses or even substitutes accruals in favor of real activities transactions such that firm performance is either sustained or realized. For example, Chan, Chen, Chen, and Yu (2015) indicate that firms that adopt "clawbacks", or compensation recovery policies, substitute real activities manipulation for accruals management. While clawbacks have been shown to reduce financial misreporting, their study reports that earnings quality does not effectively improve because the increased use of real activities manipulation is undertaken to attract less inquiry from auditors and regulators. McGuire, Omer, and Sharp (2012) find that, although firms with strong religious social norms exhibit less financial reporting irregularities, managers of these firms still favor real activities manipulation beyond accruals management. Additionally,

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[1] Final compliance dates for management and auditor attestation reports issued on the effectiveness of a firm's internal control over financial reporting (ICOFR) under Section 404 of the SOX Act became effective for US firms for fiscal years ending on or after November 15, 2004 for large and accelerated filers (GAO, 2013). SOX Section 302 became effective for fiscal years on or after 2002. Section 302 requires firms' CEOs and CFOs to certify, as part of the financial statements, the effectiveness of their internal controls.

[2] Examples of real activities management (RM) used by firms to increase earnings can include accruing a smaller amount of bad debt expense or factoring accounts receivable. Firms may postpone or eliminate research, development and maintenance costs, reduce travel budgets, or delay or cancel projects such as IT software or hardware spending. Sales can also be escalated by encouraging customers to increase order quantities in response to upcoming sales price increases.

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not only does the preference for real activities manipulation occur in for-profit firms, but research provides evidence that it also exists in not-for-profit firms. For example, Eldenburg, Gunny, Hee, and Soderstrom (2011) find that not-for-profit firms control expenditures and incentive compensation with real activities in order to manage net operating income toward zero benchmarks. Brown, Chen, and Kim (2015) show that firms engage in earnings management through real activities to influence their credit ratings upward as they approach the speculative-grade categorization, or rather, sub-optimal investment ratings.

Prior research has provided evidence that firms with internal control deficiencies are associated with earnings management. Chan, Farrell, and Lee (2008) find that, for firms reporting material internal control weaknesses, there are higher incidences of both positive and absolute discretionary accruals, compared to firms that do not report material internal control weaknesses. Support for our argument for the relation between internal control weaknesses and real activities manipulation is provided by cues from several studies. Internal control weaknesses have been defined by problems associated with incorrect recognition of revenue, lack of segregation of duties, timing problems surrounding end of period reporting, and noncompliance of accounting policies (Ge & McVay, 2005), especially in regard to inventory, fair valuation of investments, and pension plans (PCAOB, 2007). Ge and McVay (2005) report that companies disclose at least one material weakness in internal controls in their annual SEC filings even after SOX became effective. They find that firms that disclose ICWs often experience problems with certain asset and earnings accounts and material weaknesses are positively associated with business complexity, and negatively associated with firm size and profitability (computed as return on assets).[3] Poor internal controls are associated with lower levels of accounting conservatism (Goh & Li, 2011) and poor accruals quality (Ashbaugh-Skaife, Collins, Kinney, & LaFond, 2007; Doyle et al., 2007a). Feng, Li, and McVay (2009) report that material weaknesses in internal controls affect the accuracy of management guidance.

Moreover, Ge and McVay (2005) show that high frequencies of material ICWs, classified by deficiency type, exist for the following categories: account specific, period-end accounting/accounting policies, and senior management. A study by the SEC (2011) also identifies high incidences of material ICWs which include: non-routine transaction control issues, accounting documentation, policy and/or procedures, and material and/or numerous auditor/year-end adjustments. These "planned" actions allude to the possibility that managing real activities may be an underlying characteristic of ICWs and is an important issue that requires further understanding and investigation.

The ability of auditors to investigate internal control weaknesses and real activities manipulation is a motivation for our study. Real activities manipulation is an alternate form of managerial opportunism that may be subject to less auditor scrutiny because it is obfuscated in a firm's operating decisions, instead of more clearly defined in accounting methods. Kim and Park (2014) show that since auditors cannot control clients' real activities, the audit firm tends to resign from engagements due to increased litigation risk. Their findings also indicate that, as a result of the auditor switch, firms who subsequently retain non-Big-4 auditors exhibit an even more pronounced incidence of real activities manipulation. When considering the audit of internal controls, regulators have recently questioned whether auditors even have the appropriate experience to evaluate material weaknesses in internal controls (PCAOB, 2013). Munsif, Raghunandan, Rama, and Singhvi (2011) indicate that firms pay higher audit fee premiums for at least four years after they remediate internal control weaknesses, in spite of reporting higher quality accruals.

Our study links together the literature on real activities manipulation (Cohen & Zarowin, 2010; Gunny, 2010; Roychowdhury, 2006; Zang, 2012) and research on internal control weaknesses and financial reporting quality (Ashbaugh-Skaife et al., 2007; Ge & McVay, 2005; Goh & Li, 2011; Schipper & Vincent, 2003). Taken together, our study extends the body of literature on earnings quality by examining whether firms that report internal control weaknesses also employ real activities manipulation. Using a sample of firms for the period 2004–2010, we focus on whether firms with ICWs, compared to those without ICWs, are more apt to use RM as evidenced by abnormal levels of firm operational activities. However, our analysis reveals that those ICW-firms that use RM to beat earnings benchmarks experience negative performance in the subsequent year. We further account for the potential for self-selection bias and the endogenous nature of our variables in our primary tests. Our results are consistent with the relation of weaker internal controls resulting in greater information risk that aids in facilitating RM. That is, we observe a positive relationship between firms with ICWs and managements' propensity to use RM.

This study is organized as follows. In the next section, we discuss the background of the Sarbanes–Oxley (SOX) Act, describe financial reporting risk as influenced by real earnings manipulation, and develop our hypotheses of the expected link between internal control weaknesses and real activities manipulation. The third section describes our sample, estimation models, and variables. The fourth section presents our empirical results. In Section 5, we undertake several additional robustness tests. The final section presents the summary, conclusion, and suggestions for future research.

2. Literature review and hypothesis development

2.1. The Sarbanes–Oxley Act (SOX) and financial reporting quality

The Sarbanes–Oxley (SOX) Act of 2002 was enacted as a direct result of the more well-known and publicized accounting scandals that swept the USA in the late 1990s. The SOX Act addresses corporate governance and accountability by attempting to improve the quality and transparency of financial reporting. Section 404 of the SOX Act specifically details the detection and mandatory reporting of material weaknesses in internal controls. These corporate controls have been instituted to enforce and control firms from committing fraud. Section 302 of the Act also requires firms' managers to certify and disclose these material weaknesses in their financial reports (Beneish, Billings, & Hodder, 2008). Due to the passage of the SOX Act, information asymmetry has been posited to be reduced as firms are required to provide more transparency in their financial disclosures.

However, contemporaneous research has provided mixed findings on whether accounting quality has improved following required disclosures afforded by the SOX Act. On the one hand, due to the enhanced reporting requirements, many studies have shown that Section 404 has met its objectives and has provided benefits. For example, Nagy (2010) indicates that companies that comply with SOX Section 404 are least likely to issue misstated financial statements as evidenced by accounting restatements. Another beneficial consequence of the SOX Act is a perceived higher level of quality financial reporting, which ultimately maps into a lower cost of equity capital through a reduction in information risk.

On the other hand, opponents have stated that Section 404 has provided challenges consisting of high compliance costs and problems related to audit effectiveness. Studies have also found conflicting results as to whether firms with ICWs pay higher risk premiums. Ashbaugh-Skaife, Collins, Kinney, and LaFond (2009) and Beneish et al. (2008) examine the effect of SOX internal control deficiencies on firm risk and cost of equity. They note that disclosures made under SOX section 404 are indicative of poor quality accounting information, whether as a result of intentional or unintentional misstatements, and they document an increased cost of equity for ICW-firms. Ogneva, Subramanyam, and Raghunandan (2007) find that firms with ICWs exhibit a higher cost of equity capital compared to a control sample.

[3] Accounts most commonly affected by ICWs include current accrual accounts such as accounts receivable, inventory, and income taxes (Doyle, Ge, & McVay, 2007a).

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However, this relationship disappears after controlling for innate firm characteristics. Additionally, Ogneva et al. (2007) find that analysts' forecasts are upwardly biased for ICW-firms, which calls into question whether analysts are able to recognize differences in accounting quality for these firms. Finally, weaknesses in internal controls also negatively impact earnings quality (Dichev, Graham, Harvey, & Rajgopal, 2013).

2.2. Real activities manipulation and internal control weaknesses

RM involves manipulation of real operations to increase short-term earnings and cash flows at the expense of future earnings. On the other hand, accrual based earnings management normally entails year-end adjustments in order to manipulate reported earnings. Graham, Harvey, and Rajgopal (2005) find that RM is difficult for others to detect. The detection of RM is especially difficult for investors (Kothari, Mizikm, & Roychowdhury, 2016). RM is more likely to be used when accounting practices are under scrutiny as we saw in the post-SOX period (Cohen, Dey, & Lys, 2008).

Several studies investigate the practice by managers of using various types of RM to report improved performance for the firm. Badertscher (2011) provides evidence that firms alter earnings management methods in order to withstand overvaluation of their stock. These overvalued firms exhibit within-GAAP earnings management along with egregious non-GAAP earnings management. Roychowdhury (2006) defines real activities manipulation as "departures from normal operational practices, motivated by managers' desires to convince at least some stakeholders that certain financial reporting objectives have been met." Ordinarily, activities such as offering price discounts to temporarily inflate sales growth, overproducing products to report lower cost of goods sold, and reducing discretionary expenditures to improve reported margins, do not provide evidence of manipulation (Roychowdhury, 2006). However, when these activities are used more considerably than under normal circumstances, given a firm's economic situation, along with the intention of meeting or beating an earnings expectation, then a manager is engaging in RM (Demers & Wang, 2010; Gunny, 2010; Roychowdhury, 2006). Cohen and Zarowin (2010) investigate RM around seasoned equity offerings (SEOs). They show that SEO-firms engage in RM, and the decline in post-SEO performance is more severe when these firms undertake accruals management.

Internal controls over financial reporting (ICOFR) should normally uncover material internal control weaknesses. A single material internal control weakness could potentially prevent an auditor from issuing an unqualified audit report. In an ICOFR audit, auditors are required to use the top–down approach to understand overall risk by focusing on entity-level controls and examining significant accounts and associated relevant assertions (PCAOB, 2007). Furthermore, a client with a high risk of material misstatement requires the collection of more persuasive evidence than a client with lower risk (Kizirian, Mayhew, & Sneathen, 2005). Kizirian et al. (2005) note that the auditor is inclined to use more pre-year-end procedures when a client firm demonstrates a stronger set of internal controls. However, if a firm with weak internal controls has been engaged in RM, the auditor may believe that internal controls are strong and assess a low risk of material misstatement when it should be higher. The weak internal control environment could provide opportunities for real activities manipulation, and firms may abnormally increase revenues or generate excess cash flows by increasing production or decreasing discretionary expenditures. Prior research shows that firms reporting internal control weaknesses are associated with poor inventory management (Feng, Li, McVay, & Skaife, 2015) and increased insider trading (Skaife, Veenam, & Wangerin, 2013). In fact, Jarvinen and Myllymaki (2016) suggest that the public disclosure of internal control weaknesses forces management to diminish the negative market reactions of stakeholders by engaging in RM, which the authors contend is not easily detected by outsiders. However, they do not address the future performance of firms experiencing internal control weaknesses engaged in RM or examine the argument that discretionary accruals may be used as a substitute for RM.

When ICWs exist, it may be difficult for clients to manage discretionary accruals. Zang (2012) suggests that when a firm has used discretionary accruals in prior periods, management has "less ability to manipulate accruals upward in the current period, due to limited flexibility within GAAP and the reversal of accruals." Instead, she suggests that firms may substitute real activities manipulation for the use of discretionary accruals. As a result, auditors may not be able to identify abnormal activities (production, cash flows, revenues, discretionary expenses) until the following year. Dichev et al. (2013) find that chief financial officers of US companies believe that earnings are often managed using real activities. We propose that managers of firms with ICWs are more likely to use RM to meet financial reporting goals. We posit that firms have an incentive to manage earnings in the years in which they disclose ICWs to the public. Therefore, our first hypothesis (in alternative form) is expressed as:

H1. Firms reporting weaknesses in internal controls exhibit higher levels of real activities manipulation.

The use of real activities by ICW-firms has implications for firms' future performance. Given that RM is used in the current period, it is unlikely that this behavior can be sustained in future periods. Therefore we expect firms to experience a decrease in performance in the subsequent year. This relation is stated in our second hypothesis (in alternate form):

H2. Firms using real activities manipulation to just meet/beat earnings benchmarks experience negative performance in the subsequent year.

3. Research design

3.1. Estimation models

Following the research methods used in previous studies (Cohen & Zarowin, 2010; Roychowdhury, 2006), we calculate abnormal levels of cash flow from operations, discretionary expenses, and production costs as our proxies for real earnings manipulation activities. Cohen and Zarowin (2010) indicate that abnormal cash flows could result from the "acceleration of the timing of sales through increased price discounts or more lenient credit terms", resulting in lower cash flows in the current period (Cohen & Zarowin, 2010). If managers increase production, more than necessary, in order to increase earnings, then cost of goods sold would decrease. As a result, firms would report higher operating margins, albeit other production costs would be higher relative to sales, again resulting in lower cash flows (Cohen & Zarowin, 2010). Reducing discretionary expenses, such as advertising, R&D, and SG&A expenses aids in boosting current period earnings, which could lead to higher current period cash flows (Cohen & Zarowin, 2010).

The following models used in Roychowdhury (2006) are suggestive of "normal" operations. The residual value is then derived from these models representing "abnormal" economic activities, which serve as a proxy for real activities manipulation. In Model (1) below, the abnormal level of cash flow, *RCFO*, is derived from the residuals estimated from the following cross-sectional regression equation:

$$\frac{CFO_{it}}{Assets_{i,t-1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{Sales_{it}}{Assets_{i,t-1}} + \beta_3 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \qquad (1)$$

Cost of goods sold and inventory are used in Models (2) and (3) to arrive at production costs. Production costs include the summation of cost of goods sold and changes in inventory during the year. *COGS* is a

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linear function of current sales, and inventory growth is a linear function of current and lagged changes in sales.

$$\frac{COGS_{it}}{Assets_{i,t-1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (2)$$

$$\frac{\Delta INV_{it}}{Assets_{i,t-1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \beta_3 \frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (3)$$

Models (2) and (3) are used to estimate the normal level of production costs. Then, abnormal levels of production costs, *RPROD*, are acquired from the residuals obtained from the cross-sectional regression equation in Model (4).

$$\frac{PROD_{it}}{Assets_{i,t-1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{Sales_{it}}{Assets_{i,t-1}} + \beta_3 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \beta_4 \frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (4)$$

The normal level of discretionary expenses is accounted for in Model (5). The residuals from Model (5) below provide an estimate of abnormal discretionary expenses, *RDISX*:

$$\frac{DISX_{it}}{Assets_{i,t-1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \beta_3 \frac{Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (5)$$

Zang (2012) and Cohen and Zarowin (2010) demonstrate that firms use both discretionary accruals and real earning activities to manage earnings. We also estimate discretionary accruals, in order to examine their differential effect on ICWs. Normal accruals are estimated using Model (6) based on the cross-sectional Jones (1991) model with abnormal discretionary accruals derived from the residuals of Model (6):

$$\frac{TA_{it}}{Assets_{i,t-1}} = \beta_1 \frac{1}{Assets_{i,t-1}} + \beta_2 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + \beta_3 \frac{PPE_{it}}{Assets_{i,t-1}} + \varepsilon_{it} \quad (6)$$

We use the variable *DAC* to represent the abnormal discretionary accruals.

To test our hypothesis concerning the use of real activities manipulation by managers of firms reporting ICWs, we use our combined sample of ICW-firms and non-ICW firms. We employ Model (7), which includes an indicator explanatory independent variable (ICW), coded as 1 if the firm has a material ICW, zero otherwise. This variable allows us to compare ICW-firms with non-ICW firms and to assess whether the following modified Roychowdhury (2006) model works in our empirical setting. We regress these real activities on *ICW* and several control variables for firm *i* and time *t* as follows:

$$RM_{it} = \alpha_0 + \beta_1 MarketCap_{it} + \beta_2 MktBk_{it} + \beta_3 ROA_{it} + \beta_4 ICW_{it} + \varepsilon_{it} \quad (7)$$

RM represents our dependent variable, which is our acronym for real activities manipulation. *RM* symbolizes the specific residuals from Models (1), (4), or (5) (*RCFO*, *RPROD*, or *RDISX*, respectively). Following Cohen and Zarowin (2010) and Zang (2012), we also combine the three individual measures into two comprehensive measures, *RM_1* and *RM_2*. *RM_1* is calculated by multiplying *RDISX* by negative one and adding it to *RPROD*. *RM_2* is calculated by multiplying *RCFO* and *RDISX* by negative one, and adding them together. We perform this modification so that higher values of *RM_1* and *RM_2* will indicate that the firm is engaged in real earnings manipulation. As explained previously, we expect that firms reporting ICWs are more likely to manage earnings, favoring the use of real activities manipulation. Therefore, we expect the *ICW* variable to exhibit a positive coefficient when *RM_1* or *RM_2* is the dependent variable.

Alternatively, we use the variable *DAC*, representing discretionary accruals derived from Model (6), as the dependent variable to examine the level of discretionary accruals when internal control weaknesses are present. Chan et al. (2008) examine firms with ICWs and find that these firms have more positive and absolute discretionary accruals. However, they examine reports in only one year (2004), and only for accelerated filers. Their discretionary accruals measure is based on the average of discretionary accruals for the current and prior year. On the other hand, we expect that ICW-firms will prefer RM over *DAC* and, therefore, the coefficient for *DAC* will be either negative or insignificant.

Consistent with Roychowdhury (2006), we use the independent variables *MarketCap*, *MktBk*, and *ROA* in Model (7) to control for variations related to firm size, growth opportunities, and current-period firm performance, respectively. *MarketCap* is calculated as the stock price per share multiplied by the number of shares outstanding and is used as a measure of firm size. *MktBk* is the market value of equity plus book value of debt divided by book value of equity and debt. *ROA* is the measure of return on assets. These variables, along with the RM variables defined in our study, are listed in Appendix A.

In examining how the control variables are related to the RM variables, Roychowdhury (2006) finds that market capitalization is negatively related to abnormal cash flows from operations, and market to book value and *ROA* variables are positively related to abnormal cash flow from operations. He reports that the control variables *MarketCap* and *MktBk* are more inclined to be associated with abnormal discretionary expenses, while *ROA* is negatively associated with abnormal discretionary expenses. Roychowdhury (2006) finds that *MktBk* and *ROA* variables are negatively related to abnormal production costs, and *MarketCap* is positively related to abnormal production costs. In our study, the *ICW* variable is expected to be positively associated with abnormal production costs, *RPROD*. Just as overproduction results in increased production and holding costs (Roychowdhury, 2006), poor management and the recording of inventory, via weak internal controls, are likely to result in abnormal production costs that are not recaptured through sales in the same period. Abnormal cash flow, *RCFO*, is expected to be negatively associated with ICWs because sales management activities (such as price discounts and lenient credit terms) could be accomplished more easily when there are internal control weaknesses over the sales process. Similarly, abnormal discretionary expenses, *RDISX*, are more likely to be lower when ICWs exist. Discretionary expenditures may be generated to meet earnings targets, but also may be the result of poor controls over end-of-period reporting.

3.2. Sample selection

This study draws from a sample examining yearly, firm-level financial information for all US publicly-traded firms who have disclosed at least one material internal control weakness (ICW) for the period 2004 through 2010. These sample years are chosen beginning with 2004, the year SOX's internal control over financial reporting (ICOFR) requirement became effective. We ensure data availability on the COMPUSTAT annual and *Audit Analytics* databases through 2010. We collect all firms' financial statement data from COMPUSTAT and merge this data with ICW disclosure information from *Audit Analytics* for companies that have reported internal control deficiencies as required by the Public Companies Accounting Oversight Board (PCAOB). Initially, we obtain 28,886 firm-year observations for the sample period, of which 2332 firms denote at least one material ICW. In defining the incidence of an ICW, we measure RM in the year that the ICW occurs. Following Roychowdhury (2006), we eliminate firms in regulated industries (SIC codes between 4400 and 5000) and financial industries (SIC codes between 6000 and 6500). We require that each observation have the necessary data to enable the calculation of real earnings manipulation measures that we employ in our analysis. Again, following Roychowdhury (2006), we delete industries in which less than 15 observations are available (based on the combined sample of both ICW and non-ICW firms), by means of two-digit SIC code. The above data filtering process generates a sample of 7475 firm-year observations

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Table 1
Sample selection and industry distribution.

Panel A—sample selection procedure

	No. of firms	Firm year observations
Initial number of ICW-firm observations from *Audit Analytics*	2332	28,886
Less: Firms without ticker numbers	(819)	(6915)
Firms from SIC code 6000–6500	(182)	(3911)
Firms from SIC code 4400–5000	(155)	(2216)
Industries with fewer than 15 observations	(4)	(23)
Firms with missing financial information	(268)	(13,938)
Firms reporting internal control weaknesses in the sample	904	1883
Control sample of observations from COMPUSTAT	1308	5592
Total observations	2212	7475

Panel B—industry distribution

Industry	Two-digit SIC codes	Freq.	Percent	Cum.
Metal mining	10	26	2.88	2.88
Coal mining	12	9	1	3.87
Oil and gas	13	42	4.65	8.52
Nonmetallic minerals	14	5	0.55	9.07
General building	15	3	0.33	9.4
Heavy construction	16	4	0.44	9.85
Special trade	17	5	0.55	10.4
Food products	20	24	2.65	13.05
Tobacco products	21	1	0.11	13.16
Textile mill products	22	1	0.11	13.27
Apparel	23	5	0.55	13.83
Lumber and wood	24	4	0.44	14.27
Furniture	25	6	0.66	14.93
Paper products	26	3	0.33	15.27
Printing and publishing	27	8	0.88	16.15
Chemicals	28	85	9.4	25.55
Petroleum and coal	29	2	0.22	25.77
Rubber and plastics	30	9	1	26.77
Leather	31	1	0.11	26.88
Primary metal	33	28	3.1	29.98
Fabricated metal	34	18	1.99	31.97
Machinery and equipment	35	71	7.85	39.82
Electronic equipment	36	128	14.16	53.98
Transportation equipment	37	25	2.77	56.75
Instruments products	38	55	6.08	62.83
Misc. manufacturing	39	13	1.44	64.27
Railroad transportation	40	1	0.11	64.38
Trucking and warehousing	41	3	0.33	64.71
Wholesale trade-durables	50	15	1.66	66.37
Wholesale trade-nondurables	51	9	1.00	67.37
Building materials & gardening	52	1	0.11	67.48
General merchandise stores	53	11	1.22	68.69
Food stores	54	7	0.77	69.47
Automotive dealers	55	9	1	70.46
Apparel and accessory stores	56	18	1.99	72.46
Furniture stores	57	3	0.33	72.79
Eating and drinking places	58	10	1.11	73.89
Miscellaneous retail	59	22	2.43	76.33
Real estate	65	2	0.22	76.55
Holding and other investments	67	15	1.66	78.21
Hotels and other lodging places	70	1	0.11	78.32
Personal services	72	3	0.33	78.65
Business services	73	147	16.26	94.91
Motion pictures	78	3	0.33	95.24
Amusement and recreation	79	6	0.66	95.91
Health services	80	13	1.44	97.35
Educational services	82	11	1.22	98.56
Engineering and management services	87	13	1.44	100
	Total	904	100	

from 48 two-digit SIC industries based on Fama and French (1997). This final sample includes 904 ICW-firms, which represent 1883 firm-year observations. The description of our sample is provided in Table 1, panel A. Non-ICW firms used in our analysis represent firms that did not report ICWs and consist of the remaining firms from the COMPUSTAT database during the sample time frame. For the control sample, there are a total of 1308 control firms affording 5592 observations.

The industry distribution of ICW-firms, which is reported in Table 1, panel B, illustrates that the sector with the highest frequency of ICWs is from the business services industry (2-digit SIC code 73: 147 firms, or 16.26% of the sample), followed by the electronic equipment (2-digit SIC code 36: 128 firms, or 14.16% of the sample), chemicals (2-digit SIC code 28: 85 firms, or 9.4% of the sample), and machinery and equipment sectors (2-digit SIC code 35: 71 firms, or 7.85% of the sample). This sample distribution differs slightly from the sample used by Ge and McVay (2005), where the highest number of firms with ICWs is from the computer and service industries. In their sample, electrical equipment firms comprise only 3.8% of the sample, with chemical firms comprising a distant 1.3%.

4. Empirical results

4.1. Descriptive statistics

Table 2 illustrates the descriptive statistics for our variables, comparing ICW-firms to non-ICW firms. The results in Table 2 also show that ICW-firms are, on average, smaller, as represented by *Total Assets*, *Sales*, and *MarketCap*. Additionally, ICW-firms have a comparatively lower *Net Income*, lower cash flow from operations (*CFO*), and lower *ROA* to non-ICW firms. In comparing the RM variables, the results show that ICW-firms have significantly lower-scaled abnormal cash flows, *RCFO*, significantly higher-scaled abnormal production costs, *RPROD*, and significantly lower-scaled abnormal discretionary expenses, *RDISX*, compared to non-ICW firms. Table 2 also provides evidence that *RM_1* and *RM_2* variables are significantly different between ICW-firms and non-ICW firms.

Table 3 reports the Pearson correlation coefficients among the variables used to analyze real activities manipulation. *RCFO* is positively correlated with size (represented by *MarketCap*), *ROA*, *MktBk*, and *CFO*. *RPROD* is negatively correlated with size and *ROA*, indicating that firms with higher *ROA* have lower abnormal production costs. Alternatively, *RPROD* is negatively correlated with cash flow from operations (*CFO*). *RDISX* is negatively correlated with *ROA* and *CFO*, indicating that abnormally low discretionary expenses are incurred to improve earnings and cash flow. In examining the relationships among the RM variables, the negative correlation between abnormal production, *RPROD*, and abnormal cash flow from operations, *RCFO* (−0.306), indicates that overproduction decreases contemporaneous cash flow from operations. *RDISX*, *RM_1*, and *RM_2* are also negatively correlated with abnormal cash flow from operations, while the same three variables are positively correlated with abnormal production, *RPROD*. Abnormal discretionary expenses, *RDISX*, are positively correlated with *RM_1* and *RM_2*, and *RM_1* and *RM_2* are positively correlated with each other.

4.2. Real activities and ICW-firms

Using Model (7), we present in Table 4 OLS regression estimates, where different measures of real activities manipulation and discretionary accruals are used as the dependent variable. Following Roychowdhury (2006) and Zang (2012), we estimate regressions for every industry, every year, using two-digit SIC codes to define industry-year. We also cluster standard errors in the regression. For consistency in reporting the individual and combined variables, we report the results for the *RCFO* and *RDISX* variables multiplied by −1 so that the interpretation is comparable to that of *RM_1* and *RM_2*. Thus, for all of our RM variables, a positive coefficient of our test variable (*ICW*) implies higher use of RM. Our results show that the internal control weaknesses variable (*ICW*) is significantly positive in the *RCFO*, *RPROD*, *RDISX*, *RM_1*, and *RM_2* equations. When *DAC* is used as a dependent variable, the *ICW* variable is insignificant. Specifically,

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Table 2
Descriptive statistics.

	ICW-firms		Non-ICW firms		Differences in	
	Mean	Median	Mean	Median	Mean (*t*-test)	Median (*z*-test)
Total Assets	3613.665	449.472	6186.720	900.403	−2573.055***	−450.931***
Sales	2369.428	406.410	5812.122	790.924	−3442.694***	−384.514***
MarketCap	2181.659	460.409	5823.359	919.417	−3641.700***	−459.008***
Net Income	124.436	9.817	399.285	37.427	−274.848***	−27.610***
CFO	228.517	29.700	719.743	84.165	−491.225***	−54.465***
ROA	−0.036	0.026	0.003	0.050	−0.039***	−0.024***
MktBk	1.267	0.942	1.549	1.100	−0.282***	−0.158***
Return	2.845	0.047	0.735	0.071	2.11	−0.024**
FirmAge	29.519	26	29.573	26	−0.46	0
ZSCORE	6.922	1.201	9.191	1.101	−3.731	0.100***
RCFO	−0.007	−0.004	0.009	0.016	−0.016***	−0.020***
RPROD	0.005	−0.002	−0.026	−0.030	0.031***	0.027***
RDISX	0.019	0.003	0.043	0.017	−0.023***	−0.013***
RM_1	−0.027	−0.015	−0.089	−0.062	0.062***	0.047***
RM_2	−0.016	−0.003	−0.060	−0.043	0.043***	0.040***

The full sample includes 7475 firm-year observations, with 1883 ICW firm-year observations. The sample covers the period 2004 to 2010. Total Assets, Sales, MarketCap, Net Income, and CFO are stated in millions of dollars, while the remainder of the variables are stated in percent. Total Assets, Sales, MarketCap, Net Income, and CFO (cash flow from operations) are collected from COMPUSTAT. ROA is defined as net income divided by total assets. MktBk is the market value of equity plus book value of debt, divided by book value of equity and debt. Return is the market-adjusted annual return, computed as firm stock return minus S&P 500 index return. FirmAge is defined as number of years since a firm was listed on a stock exchange. ZSCORE is based on Altman's (1968) Z model. Abnormal CFO (RCFO), production costs (RPROD), and discretionary expenses (RDISX) are residuals from the stated estimation models. RM_1 and RM_2 are comprehensive measures of real activities. RM_1 = (RPROD) + (RDISX) [−1], RM_2 = (RCFO + RDISX) * [−1]. Results are based on two-tailed tests.

** Refers to 0.05% significance level of t-test for mean comparisons and Wilcoxon tests for median comparisons.

*** Refers to 0.01% significance level of t-test for mean comparisons and Wilcoxon tests for median comparisons.

these results indicate that firms reporting weak internal controls have abnormally lower cash flow from operations, *RCFO*, abnormally lower discretionary expenses, *RDISX*, and abnormally higher production costs, *RPROD*. In addition, the equations with *RM_1* and *RM_2* as the dependent variable also confirm that ICW-firms manage earnings through real activities manipulation. Finally, we find that ICW firms do not manage earnings through discretionary accruals.

These results support our first hypothesis that firms reporting ICWs manage earnings through real activities manipulation. That is, firms reporting weak internal controls have abnormally lower cash flows from operations, *RCFO*, which often occurs when firms may offer increased price discounts and more lenient credit terms. Such activities result in lower cash flows in the current period. ICW-firms also report abnormally higher production costs, *RPROD*. When managers increase production more than necessary, they distribute the fixed overhead costs over wider range, which decreases cost of goods sold and increases operating margins. Additionally, ICW-firms exhibit abnormally low discretionary expenses (*RDISX*). The equations with *RM_1* and *RM_2* as the dependent variable further reflect that ICW-firms manage earnings through real activities manipulation.

4.3. Real activities manipulation by ICW firms and future firm performance

The association between beating earnings benchmarks, by engaging in real activities manipulation, and future performance is consistent with signaling managerial competence (Bartov, Givoly, & Hayn, 2002; Gunny, 2010). Conversely, the use of RM may impose greater long-term costs because of the negative consequences on future cash flows (Chi, Lisic, & Pevzner, 2011; Cohen & Zarowin, 2010; Cohen et al., 2008; Roychowdhury, 2006). In order to test our second hypothesis,

Table 3
Pearson correlation matrix.

Pearson correlation coefficients of residuals

	MarketCap	ROA	CFO	MktBk	Return	FirmAge	ZSCORE	RCFO	RPROD	RDISX	RM_1	RM_2
MarketCap	–											
ROA	0.2938*	–										
CFO	0.2745*	0.8051*	–									
MktBk	0.0303*	−0.1737*	−0.1605*	–								
Return	−0.0025	0.0270*	0.0032	−0.0087	–							
FirmAge	0.1329*	0.0707*	0.0672*	−0.0418*	−0.0192	–						
ZSCORE	0.0142	0.01	0.0057	0.1532*	−0.0008	−0.0327*	–					
RCFO	0.1246*	0.2478*	0.3841*	0.0242*	0.0044	0.0164	0.0116	–				
RPROD	−0.1688*	−0.1974*	−0.2254*	−0.1516*	0.002	−0.0166	−0.0175	−0.3069*	–			
RDISX	0.0795*	−0.1242*	−0.1135*	0.0876*	−0.0066	−0.0896*	0.0442*	−0.0375*	−0.6530*	–		
RM_1	−0.1084*	0.0414*	0.0269*	−0.1695*	0.0066	0.0700*	−0.0350*	−0.1686*	0.8892*	−0.9271*	–	
RM_2	−0.1374*	−0.0247*	−0.1378*	−0.1504*	0.0027	0.0823*	−0.0446*	−0.5086*	0.7463*	−0.8413*	0.8966*	–

ROA is defined as net income divided by total assets. CFO is cash flow from operations. MktBk is the market value of equity plus book value of debt, divided by book value of equity and debt. Return is the market-adjusted annual return, computed as firm stock return minus S&P 500 index return. FirmAge is defined as number of years since a firm was listed on a stock exchange. ZSCORE is based on Altman's (1968) Z model. RCFO, RPROD, and RDISX are residuals from stated estimation models. RM_1 and RM_2 are comprehensive measures of real activities. RM_1 = (RPROD) + (RDISX) [−1], RM_2 = (RCFO + RDISX) * [−1]. Significance levels are based on two-tailed tests.

* Indicates significance at 10% level.

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Table 4
OLS regression estimates using Model (7): real activities and ICW-firms.

Dependent Variable:	Abnormal CFO (RCFO)(−1)		Abnormal PROD (RPROD)		Abnormal DISX (RDISX)(−1)		Discretionary accruals (DAC)		RM_1		RM_2	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
MarketCap	0.001	0.105	−0.010***	0.000	0.021***	0.000	−0.010***	0.000	−0.027***	0.000	−0.021***	0.000
MktBk	0.011***	0.000	−0.025***	0.000	0.038***	0.000	0.001*	0.089	−0.084***	0.000	−0.055***	0.000
ROA	0.286***	0.000	−0.218***	0.000	−0.298***	0.000	0.232***	0.000	0.238***	0.000	0.032*	0.088
ICW	0.008***	0.001	0.008*	0.091	0.009*	0.085	0.002	0.312	0.024**	0.023	0.012*	0.068
Intercept	0.007	0.000	0.116***	0.000	−0.260***	0.000	0.055***	0.000	0.399***	0.000	0.255***	0.000
Industry indicator	Included		Included		Included		Included		Included		Included	
Year indicator	Included		Included		Included		Included		Included		Included	
Number of Obs	7475		7475		7475		7475		7475		7475	
Pseudo *R*-square	0.256		0.132		0.113		0.178		0.104		0.100	

This table reports the regression results. We rely on the model developed by Roychowdhury (2006). The dependent variables are components of real activities, discretionary accruals, and aggregate measures of real economic activities: RM_1 = (RPROD) + (RDISX) [−1], RM_2 = (RCFO + RDISX) * [−1]. Independent variables are defined in the variable description section. Numeric variables are winsorized at 1st and 99th percent level. Results are based on two-tailed tests.

* Refers to 10% significant level.
** Refers to 5% significant level.
*** Refers to 1% significant level.

we examine whether ICW-firms who use RM to manage earnings have improved future performance. Specifically, we examine the future performance of firms experiencing ICWs and using RM to beat earnings benchmarks. Following Gunny (2010), we define a *BEAT* firm using a dummy variable equal to 1 if: a) ROA is greater than or equal to 0.01, or b) a change in ROA, between time periods $t-1$ and t, is greater than or equal to 0.01. We use the following model to test the relation between *BEAT_ICW* firms' use of RM and future performance.

$$AdjROA_{it+1}/AdjCFO_{it+1} = \alpha_0 + \beta_1 Adj\_ROA_{it} + \beta_2 MarketCap_{it} + \beta_3 MktBk_{it} + \beta_4 \text{Return}_{it} + \beta_5 Zscore_{it} + \beta_6 BEAT_{it} + \beta_7 ICW_{it} + \beta_8 RM\text{variable}_{it} + \beta_9 BEAT * ICW * RM\text{variable}_{it} + \varepsilon_{it} \quad (8)$$

The variables in Model (8) are defined as follows. We measure future firm performance by using adjusted-*ROA* or adjusted-*CFO*. *AdjROA* is the difference between firm ROA and industry median ROA where industry is defined by two-digit SIC code. *AdjCFO* is the difference between firm CFO and industry median CFO. *MarketCap* is calculated as the stock price per share multiplied by the number of shares outstanding and is used as a measure of firm size. Larger firms are expected to have higher future ROA and smaller-size firms may not be able to sufficiently invest in appropriate internal controls (Krishnan, 2005). *MktBk* is the market value of equity plus book value of debt divided by book value of equity and debt. Larger *MktBk* value firms are more likely to produce lower future ROA. *Return* is the market-adjusted annual return, computed as firm stock return minus the S&P 500 index return. Higher contemporaneous-return-firms are likely to have higher future returns. *ZSCORE* is based on Altman's (1968) Z equation, and is calculated as: 0.033 * (Net Income$_t$/Assets$_{t-1}$) + 0.999*(Sales$_t$/Assets$_{t-1}$) + 0.14*(Retained Earnings$_t$/Assets$_{t-1}$) + 0.12*(Working Capital$_t$/Assets$_{t-1}$); *BEAT* and *ICW* variables are previously defined. We expect that firms which report weak internal controls will likely manage earnings using real activities manipulation, and such action will adversely affect their next period performance.

Consistent with Gunny (2010), we partition our dataset into separate samples. The *RCFO* sample contains all firm years with non-zero data available to estimate *RCFO* (5434 observations). The *RPROD* sample contains all firm years with non-zero data available to estimate *RPROD* (4032 observations). The *RDISX* sample contains all firm years with non-zero data available to estimate *RDISX*. The *RM_1* sample reflects the combined *RPROD* and *RDISX* datasets, and the *RM_2* sample consists of the combined *RCFO* and *RDISX* datasets. We run Model (8) using *RCFO*, *RPROD*, *RDISX*, *RM_1* and *RM_2* samples, respectively. Table 5 reports the findings. Consistent with our reporting in Table 4, we report the results for the *RCFO* and *RDISX* variables multiplied by −1 so that the interpretation is comparable to that of the *RM_1* and *RM_2* variables. Thus, for all of our RM variables, a higher value of the residual implies higher use of RM in the current time period.

In Table 5, panel A, the coefficients of *AdjROA*, *MarketCap*, and *Return* are positive and significant for all four samples, which indicates that these current period variables are positively associated with future performance as measured by *AdjROA* at time $t+1$. In the RCFO sample, the coefficient of the *BEAT*ICW*RCFO* variable is insignificant, and a higher *MktBk*, *ICW*, and *RCFO* reduce next period ROA. For the *RPROD* sample, the coefficient of the *BEAT*ICW*RPROD* variable is negative and significant, indicating that future performance decreases when ICW-firms beat zero earnings or prior earnings, and production increases in the current period. In the *RDISX* sample, the coefficient of the *BEAT*ICW*RDISX* interaction term shows a significant, negative effect on performance in the next time period. Finally, the coefficients of the *BEAT*ICW*RM_1* and *BEAT*ICW*RM_2* variables in their respective samples are also negative and significant, indicating that, overall, ICW-firms that beat analysts' forecasts, using real activities, exhibit a decrease in performance in the next time period. These results are consistent with Cohen and Zarowin (2010) when they study future performance of SEO-firms who use RM. In examining increases of one standard deviation in ROA, one year after the SEO, they find decreases of 5.2 and 3.8 cents per dollar of assets for their measures *RM_1* and *RM_2*, respectively. In our *RM_1* sample, the coefficient of *BEAT*ICW*RM_1* is −0.065, which indicates that a one standard deviation increase (40.0% in our sample) is associated with an earnings decline of 2.6 cents per dollar of assets in year 1 following the disclosure of an internal control weakness. In our *RM_2* sample, the coefficient of *BEAT*ICW*RM_2* is −0.056, indicating that a one standard deviation increase (27.5%) is associated with an earnings decline of 1.5 cents per dollar of assets in year 1 following the disclosure of an internal control weakness. Our results differ from Gunny's (2010) study of firms that just meet earnings benchmarks. Her study shows that firms that meet earnings benchmarks perform better in the future; however, she does not address internal control weaknesses as a part of her study.

In Table 5, panel B, when we examine the effect of our variables on the *AdjCFO* at time $t+1$, the outcomes in the *RPROD*, *RDISX*, *RM_1*, and *RM_2* samples are generally consistent with the results in Table 5, panel A. With the exception of the *Beat*ICW*RM_1*, each of the interaction variables is significant. Compared to panel A, the coefficient of the

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Table 5
ICW-firms, real activities manipulation, and future performance.

Panel A: *future ROA*

Dependent variable	Adj_ROA_{t+1}	Adj_ROA_{t+1}	Adj_ROA_{t+1}	Adj_ROA_{t+1}	Adj_ROA_{t+1}
	RCFO sample RCFO (−1)	RPROD sample	RDISX sample RDISX (−1)	RM_1 sample	RM_2 sample
Adj_ROA	0.324***	0.347***	0.309***	0.274***	0.329***
MarketCap	0.019***	0.022***	0.017***	0.018***	0.017***
MktBk	−0.011***	−0.009***	0.004	0.004	0.002
Return	0.018***	0.014***	0.015***	0.014***	0.016***
ZSCORE	0.000	0.000	0.000	0.000	0.000
BEAT	0.007	0.009	0.006	0.013*	0.056
ICW	−0.012*	−0.008	−0.023***	−0.015**	−0.022**
RCFO	−0.344***				
BEAT*ICW*RCFO	0.024				
RPROD		−0.082***			
BEAT*ICW*RPROD		−0.095**			
RDISX			0.099***		
BEAT*ICW*RDISX			−0.116***		
RM_1				0.030***	
BEAT*ICW*RM_1				−0.065***	
RM_2					0.023
BEAT*ICW*RM_2					−0.056**
Intercept	−0.147***	−0.161***	−0.141***	−0.141***	−0.129***
Industry indicator	Included	Included	Included	Included	Included
Year indicator	Included	Included	Included	Included	Included
Adj *R* square	0.187	0.174	0.171	0.149	0.149
No. of obs	5434	4032	5129	4032	5129

Panel A reports regression results of Eq. (9) using Adj_ROA as future performance measure. *Adj_ROA* is the difference between firm ROA and industry median ROA. *MarketCap* is the stock price per share multiplied by the number of shares outstanding. *MktBk* is the market value of equity plus book value of debt divided by book value of equity and debt. *Return* is the market-adjusted annual return, computed as firm stock return minus S&P500 index return. *ZSCORE* is based on Altman's Z model. *BEAT* is a dummy variable equal to 1 if ROA is greater than or equal to 0.01, or the change in ROA between $t-1$ and t is greater than or equal to 0.01. *ICW* is a dummy variable equal to 1 if a firm has reported a material internal control weakness, 0 otherwise. *RCFO*, *RPROD*, and *RDISX* are components of real activities. RM_1 = (RPROD) + (RDISX)[−1], RM_2 = (RCFO + RDISX) * [−1].
*Refers to 10% significant level.
**Refers to 5% significant level.
***Refers to 1% significant level.

Panel B: *future CFO*

Dependent variable	Adj_CFO_{t+1}	Adj_CFO_{t+1}	Adj_CFO_{t+1}	Adj_CFO_{t+1}	Adj_CFO_{t+1}
	RCFO sample RCFO (−1)	RPROD sample	RDISX sample RDISX (−1)	RM_1 sample	RM_2 sample
Adj_ROA	0.311***	0.339***	0.303***	0.283***	0.322***
MarketCap	0.012***	0.012***	0.010***	0.010***	0.010***
MktBk	−0.012***	−0.013***	−0.001	−0.003*	−0.004***
Return	0.004*	0.001	0.001	0.000	0.002
ZSCORE	0.000	0.000	0.000	0.000	0.000
BEAT	−0.002	−0.004	−0.003	−0.011**	−0.012***
ICW	−0.008**	−0.014***	−0.019***	−0.022***	−0.018***
RCFO	−0.279***				
BEAT*ICW*RCFO	−0.112***				
RPROD		−0.084***			
BEAT*ICW*RPROD		−0.053*			
RDISX			0.049***		
BEAT*ICW*RDISX			−0.047**		
RM_1				0.007	
BEAT*ICW* RM_1				−0.020	
RM_2					−0.010
BEAT*ICW* RM_2					−0.037**
Intercept	−0.070***	−0.040*	−0.057***	−0.015	−0.043***
Industry indicator	Included	Included	Included	Included	Included
Year indicator	Included	Included	Included	Included	Included
Adj *R* square	0.116	0.121	0.099	0.309	0.309
Number of obs	5434	4032	5129	4032	5129

Panel B reports regression results of Eq. (9) using Adj_CFO as future performance measure. Adj_CFO is the difference between firm CFO and industry median CFO. Adj_ROA is the difference between firm ROA and industry median ROA. MarketCap is the stock price per share multiplied by the number of shares outstanding. MktBk is the market value of equity plus book value of debt divided by book value of equity and debt. Return is the market-adjusted annual return, computed as firm stock return minus S&P500 index return. ZSCORE is based on Altman's Z model. BEAT is a dummy variable equal to 1 if ROA is greater than or equal to 0.01, or the change in ROA between $t-1$ and t is greater than or equal to 0.01. ICW is a dummy variable equal to 1 if a firm has reported a material internal control weakness, 0 otherwise. RCFO, RPROD, and RDISX are components of real activities. RM_1 = (RPROD) + (RDISX) [−1], RM_2 = (RCFO + RDISX) * [−1].
* Refers to 10% significant level.
** Refers to 5% significant level.
*** Refers to 1% significant level.

*BEAT*ICW*RCFO* term is negative and significant, indicating that ICW-firms that beat analysts' forecasts through abnormal cash flows have lower adjusted cash flow in the next period. In summary, the results in Table 5 suggest that firms with internal control weaknesses that engage in real activities manipulation pay dearly in the next period in terms of lower firm performance.

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5. Additional analysis and robustness tests

5.1. Heckman procedure to correct for self-selection bias

Self-selection bias may arise when the researcher selects observations for a sample in a non-random fashion, which gives rise to coefficient bias when OLS regression analysis is used (Maddala, 1991). In our study, the selection of firms with ICWs may result in self-selection bias. We control for this potential bias by employing the Heckman (1979) two-step correction procedure. The Heckman (1979) method has been used in various accounting studies to account for self-selection bias (Alam & Loh, 2004; Feng et al., 2009; Garcia Lara, Garcia Osma, & Penalva, 2009; Lennox, Francis, & Wang, 2012). Heckman (1979) describes self-selection bias as "a specification error due to missing or omitted variables." These omitted variables are unobserved and are derived from sample participants, which affects the probability of inclusion. Bias arises when "the characteristics of participants and non-participants are different, and unobserved characteristics of participants are correlated with explanatory variables" (Raper, 1999).

In the first stage of the Heckman (1979) model, we estimate the likelihood of a firm having ICWs using a probit model, incorporating financial variables used in explaining ICWs by Ge and McVay (2005). The probit model is also used to construct a selectivity variable, which is the inverse Mills ratio, *IMR*, for each firm in the sample. The *IMR* is then included in the second-stage OLS regression model.

The significance of the coefficient representing the selectivity variable, *IMR*, serves as the test for self-selection bias. When the *IMR* coefficient is not significantly different from zero, self-selection bias is not a major concern. Nonetheless, even though self-selection bias may be indicated, the addition of the *IMR* variable in the regression equation results in, according to Maddala (1983), consistency in the other explanatory variable OLS coefficient estimates in the equation. Our first-stage probit model, based on Ge and McVay (2005), measures the probability of an ICW while controlling for industry and year specifications, and is provided in Model (9) as follows:

$$ICW_{it} = \alpha_0 + \beta_1 FirmAge_{it} + \beta_2 ForeignCurrency_{it} + \beta_3 MarketCap_{it} + \beta_4 OCF_{it} + \beta_5 ROA_{it} + \beta_6 BIG4_{it} + \varepsilon_{it} \quad (9)$$

The variables in the equation above are defined in Appendix A, and explained as follows. The age of the firm can affect the development of a company's system of internal controls. Ge and McVay (2005) reason that younger firms are less likely to have established procedures, and firm employees may have less experience as well. We expect *FirmAge* to be negatively associated with internal control weaknesses since less experienced firms are more likely to exhibit ICWs. The *ForeignCurrency* variable measures complexity by the existence of foreign currency transactions. Ge and McVay (2005) note that firms with "more complicated transactions" likely have a greater probability that users of the financial information will have difficulty understanding the financial statements.[4] *MarketCap* measures firm size. A small size firm may be unable to adequately invest in proper internal controls (Krishnan, 2005). We expect that smaller size firms are more likely to disclose ICWs than larger size firms. The operating cash flow (*OCF*) variable is expected to be negative when firms report ICWs. Lower *OCF* suggests lower profitability, and firms with lower *OCF* are likely to have fewer internal controls. Return on assets (*ROA*) is also expected to be negative for firms reporting ICWs. Poorly performing firms will not have adequate resources to provide for adequate internal controls. Finally, the *BIG4* variable is expected to be negatively related to ICW since Big 4 auditors are likely to insist on stronger internal controls. Higher levels of auditing expertise, along with increased legal liability issues, have become more customarily expected from top tier audit firms than for smaller audit firms (Ge & McVay, 2005).

Following Doyle, Ge, and McVay (2007b), we run the first-stage regression, which identifies the likelihood of a firm being "selected" as an ICW-firm, in order to calculate the inverse Mills ratio (*IMR*) (Heckman, 1979; Leuz & Verrecchia, 2000). Then, we include this ratio in our real activities manipulation regressions. We analyze two separate Heckman (1979) models, one for the *RM_1* sample and one for the *RM_2* sample.

Table 6 presents the results of the two-stage Heckman (1979) model. Panel A, column 1, illustrates the results when *RM_1* is the dependent variable in stage two. The stage one results report that the complexity measure, *ForeignCurrency*, is positively related to *ICW*. Firm size, as measured by *MarketCap*, is negatively related to the probability of an ICW being reported. Unexpectedly, operating cash flow (*OCF*) is positively related to ICWs suggesting that ICW-firms report increasing operating cash flows. Finally, the coefficient of the *Big4* variable is negative, indicating the absence of a Big 4 auditor increases the likelihood of ICWs. These results are consistent in panel A, column 2, when *RM_2* is used as the dependent variable in stage two.

Our second stage estimate of the Heckman (1979) model-based OLS regression is reported in panel B of Table 6. The results support our findings, previously reported in Table 4, that ICW-firms are associated with real activities manipulation. The control variables indicate that larger

Table 6
Regression results using Heckman (1979) model.

Panel A: probit regression

First-stage Heckman model

Dependent variable: ICW		RM_1 sample	RM_2 sample
Independent variable	Pred. sign	Coeff.	Coeff.
FirmAge	−	0.0007 (0.68)	0.004 (0.45)
ForeignCurrency	+	0.3674 (10.40)***	0.3498 (10.65)***
MarketCap	−	−0.1956 (−15.09)***	−0.2010 (−16.64)***
OCF	−	0.5201 (3.24)***	0.3283 (2.17)**
ROA	−	−0.1147 (−0.88)	0.0801 (0.65)
BIG4	−	−0.1196 (−1.93)*	−0.1576 (−2.76)**
Intercept		0.1850 (1.99)**	0.4241 (4.91)***

Panel B: OLS regression

Second-stage Heckman model

Dependent variable: RM_1, RM_2		RM_1 sample	RM_2 sample
Independent variable	Pred. sign	Coeff.	Coeff.
ICW	+	0.1762 (2.96)***	0.1308 (3.06)***
MarketCap	−	−0.0284 (−2.59)**	−0.0222 (−2.43)**
MktBk	−	−0.0428 (−5.29)***	−0.0515 (−9.04)***
ROA	+	0.1386 (2.56)***	−0.1280 (−3.74)***
IMR	?	0.0266 (0.42)	−0.0502 (−1.16)
Number of observations		7475	7475
Model Wald chi-square		51.44***	103.88***

The first stage model is similar to Ge and McVay (2005). Z values are in parentheses. FirmAge is the number of years the firm has been in operation. ForeignCurrency is coded as one if the foreign currency translation dollar amount is greater than zero, zero otherwise. MarketCap is the market value of the firm; OCF represents operating cash flow; ROA is return on assets; and BIG4 is coded as 1 if the audit firm is a BIG4, otherwise zero; IMR is the inverse Mills ratio. Second stage dependent variables are: RM_1 = (RPROD) + (RDISX) [−1], RM_2 = (RCFO + RDISX) * [−1]. MktBk is the market value of equity plus book value of debt divided by book value of equity and debt. Results are based on two-tailed tests.

* Refers to 10% significant level.
** Refers to 5% significant level.
*** Refers to 1% significant level.

[4] While Ge and McVay (2005) examine the number of operating segments, we only use one measure of complexity due to limited data availability on number of segments for our ICW sample of firms.

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sample firms do not engage as extensively in RM, compared to smaller firms, and have lower growth prospects. RM-firms are shown to be generally more profitable firms. The IMR variable, representing the inverse Mills ratio, is not significant.

In summary, the results illustrated in Tables 4 and 6 indicate that reported internal control weaknesses are positively related to real activities manipulation. We further examine the issue of endogeneity in terms of the direction of causality; that is, whether ICWs may lead to real activities manipulation.

5.2. Controlling for endogeneity

In our primary tests, we examine the hypothesis that weaknesses in internal controls are positively correlated to real activities manipulation. To account for unobserved heterogeneity and to control for endogeneity, we use the dynamic panel data approach following Arellano and Bover (1995). This two-stage system, using the generalized method of moments (GMM) model, treats all explanatory variables as endogenous and orthogonally uses lagged values as instruments. To correct the unobserved heterogeneity and omitted variable bias, we take the first difference of the variables in our original Model (7). Doing so treats all explanatory variables, except firm size (proxied by *MarketCap*), as endogenous (Wintoki, Linck, & Netter, 2012).

We test Model (7) using the two-stage dynamic system GMM approach, which checks for both forms of causation—from ICW to RM and from RM to ICW, in the event this relation were to occur. Table 7 reports the estimation results. The significant F-test shows the model is well-fitted and the insignificant Hansen J-statistic suggests the instruments are valid in the two-stage system GMM model. The positive association of ICW with *RM_1* and *RM_2* indicates a higher level of real activities manipulation by the ICW-firms. Importantly, the test results of this dynamic two-stage model indicate that the causality direction is only from ICW to RM, because the coefficient of ICW is still significant, as previously reported in Table 4, after controlling for endogeneity. In other words, the direction confirms that internal control weaknesses prompt firms to engage in real activities manipulation for our sample of firms.

Table 7
Dynamic two-stage GMM regression result.

	RCFO(−1)	RPROD	RDISX(−1)	RM_1	RM_2
$MarketCap_{t-1}$	−0.009	−0.007	−0.030***	0.041	0.047***
$MktBk_{t-1}$	−0.003	−0.009	0.025***	−0.063***	−0.026***
ROA_{t-1}	0.163**	0.156*	−0.028	0.277*	−0.192
ICW_{t-1}	0.173*	0.094	0.622***	1.026***	0.862***
$RCFO_{t-1}$	0.618***				
$RPROD_{t-1}$		0.825***			
$RDISX_{t-1}$			0.300**		
RM_1_{t-1}				0.298**	
RM_2_{t-1}					0.438***
Intercept	0.109	0.035	0.355***	−0.516**	−0.531***
F-stat (5, 2045):	63.84***	Hansen J:	5.78(0.671)		
Number of obs	7069	5657	7069	5657	7069

This table reports the two-stage system generalized method of moments (GMM) estimation of Eq. (7). Sample size is lower because it excludes 2004 as there is no data from 2003 to compute the first difference (*t-1*). *MarketCap* is the stock price per share multiplied by the number of shares outstanding. *MktBk* is the market value of equity plus book value of debt divided by book value of equity and debt. *ROA* is return on assets. *ICW* is a dummy variable equal to 1 if a firm has reported a material internal control weakness, 0 otherwise. The remaining variables are components of real activities (RCFO, RPROD, RDISX) and aggregate measures of real activities: RM_1 = (RPROD) + (RDISX)*[−1], RM_2 = (RCFO + RDISX)*[−1].

* Refers to 10% significant level.
** Refers to 5% significant level.
*** Refers to 1% significant level.

Table 8
Real activities manipulation and discretionary accruals.

	RM_1	RM_2
MarketCap	−0.023***	−0.012***
MktBk	−0.085***	−0.057***
ROA	0.277***	−0.257***
ICW	0.023**	0.009
DAC	0.491***	0.968***
DAC*ICW	−0.141	−0.056
Intercept	0.311***	−0.531***
Number of obs	7475	7475

Variables are defined in Appendix A.
* Refers to 10% significant level.
** Refers to 5% significant level.
*** Refers to 1% significant level.

5.3. Real activities manipulation versus discretionary accruals

Finally, we examine how ICW-firms use real activities manipulation compared to using discretionary accruals (*DAC*). Zang (2012) shows that managers tend to tradeoff between the two earnings management methods; that is, managers may adjust accruals to a level of realized real activities. Using our ICW-sample, we repeat our analysis presented in Table 4. We employ Model (10), which includes the addition of discretionary accruals (*DAC*) as an independent variable in the model, in order to distinguish the relationship between discretionary accruals and RM. We also include the interaction between the *ICW* and *DAC* variables to indicate whether ICW-firms exhibit a similar relationship as all other firms.

$$RM_{it} = \alpha_0 + \beta_1 MarketCap_{it} + \beta_2 MktBk_{it} + \beta_3 ROA_{it} + \beta_4 ICW_{it} + \beta_5 DAC_{it} + \beta_6 DAC * ICW_{it} + \varepsilon_{it} \quad (10)$$

The results, shown in Table 8, indicate that discretionary accruals are positively related to measures of real activities manipulation, indicating that companies may use both measures at the same time. The interaction variable coefficients for *DAC*ICW* are −0.141 and −0.056 and are insignificant for both of the RM measures, respectively. These results indicate that discretionary accruals are not used as a substitute for real activities manipulation when internal control weaknesses exist.

6. Summary and conclusion

We examine the earnings management behavior of firms that report internal control weaknesses (ICWs) by focusing on their use of real activities manipulation (RM). We provide evidence that firms with ICWs engage in real, beyond accrual-based, earnings manipulation. Our univariate and regression analyses indicate that firms with ICWs have lower abnormal cash flows from operations, higher abnormal production costs, and lower abnormal discretionary expenses compared to non-ICW-firms. However, the level of discretionary accruals for ICW-firms is not significantly different from non-ICW-firms. These findings provide support for the contention that the reporting of ICWs does not prevent real earnings manipulation activities from occurring. Our initial multivariate analysis demonstrates that firms reporting ICWs manage real activities and these firms do not manage discretionary accruals. These results are supportive of the position that, in the post-Sarbanes–Oxley era, firms may manage earnings with real activities manipulation because of increased scrutiny of the financial reporting practices by the external auditors. Further analysis also reveals that while ICW-firms attempt to manage real activities in order to achieve or maintain earnings targets, firm performance actually decreases in the subsequent period

We apply the Heckman (1979) procedure in our study to control for self-selection bias. Our first-stage results generally support the Ge and McVay (2005) internal control weakness model that indicates that ICWs are associated with operating complexity and profitability, ICWs decrease with increasing firm size, and ICWs decrease when audited

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by a Big 4 audit firm. Furthermore, our second-stage results show that ICWs reported by firms are positively correlated with different measures of real activities manipulation.

Overall, our findings contribute to the literature by showing the importance and relevance of identifying real earnings manipulation activities in assessing ICWs. Our analysis complements the findings of prior research that provide insight as to why firms with material ICWs may incur higher risks and higher costs of equity capital (Ashbaugh-Skaife et al., 2009; Lambert, Leuz, & Verrecchia, 2007). The results of our study also have implications for audit quality as auditors need to gain a better understanding of how real activities manipulation influences future operations of the firm. Furthermore, our results suggest that research in the area of earnings management should continue to focus not only on accruals-based manipulation, but also on real activities manipulation. Future research could examine the market reaction to real activities manipulation by examining whether investors or analysts recognize the decrease in value associated with real activities manipulation, particularly for firms reporting ICWs in the current period, and whether the information is compounded into stock prices and returns. Hence, it would be interesting to examine whether the cost of capital for these firms would increase in future periods.

Appendix A. Variable definitions.

Variable	Definition
RM variables:	
RCFO	The abnormal level of cash flow, derived from the residuals of Model (1)
RPROD	The abnormal level of production costs, derived from the residuals of Model (4)
RDISX	The abnormal level of discretionary expenses, derived from the residuals of Model (5)
RM_1	A comprehensive measure of real activities manipulation, RM_1 = (RPROD) + (RDISX) * [−1]
RM_2	A comprehensive measure of real activities manipulation, RM_2 = (RCFO + RDISX) * [−1]
Adj-ROA	A measure of firm performance. Adj-ROA is the difference between firm ROA and industry median ROA, where industry is defined by the two-digit SIC code
Assets	Total assets at the end of period *t*
BEAT	an indicator variable equal to 1 if: (a) net income divided by total assets is greater than or equal to 0.01, or (b) the change in net income divided by total assets between t − 1 and t is greater than or equal to 0.01
BIG4	Coded as one if the company's auditor is a Big 4 firm, zero otherwise
CFO	Cash flow from operations
COGS	Cost of goods sold
DAC	Abnormal discretionary accruals, derived from the residuals of the Jones (1991) model represented in Model (6)
DISX	Discretionary expenses, composed of R&D, advertising, and SG&A expenses that are generally expensed in the same time period that they are incurred
FirmAge	The number of years the company has stock price data available on COMPUSTAT
ForeignCurrency	The existence of foreign currency transactions, coded as one if the foreign currency translation dollar amount is greater than zero, zero otherwise
ICW	Represents an internal control weakness, coded as 1 if the firm has a material internal control weakness, 0 otherwise
INV	Inventory; ΔINV = inventory growth, measured by change in inventory from the previous time period
MarketCap	Stock price per share multiplied by the number of shares outstanding, used as a measure of firm size
MktBk	Market value of equity plus book value of debt divided by book value of equity and debt
OCF	The net cash flow from operating activities divided by total assets
PROD	Production costs. Production costs include the summation of cost of goods sold and changes in inventory during the year.
Return	The market-adjusted annual return, computed as firm stock return minus the S&P 500 index return.
ROA	Return on assets
Sales	Sales during the period; ΔSales = change in sales from the previous time period
TA	Total accruals, measured by the Jones (1991) model represented in Model (6)
ZSCORE	Altman's (1968) Z equation, calculated as: 0.033 * (Net Income$_t$/Assets$_{t-1}$) + 0.999*(Sales$_t$/Assets$_{t-1}$) + 0.14*(Retained Earnings$_t$/Assets$_{t-1}$) + 0.12*(Working Capital$_t$/Assets$_{t-1}$)

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