Direct and Indirect Effects of Internal Control Weaknesses on Accrual Quality: Evidence from a Unique Canadian Regulatory Setting*

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1. Introduction

In this study we examine the effectiveness of a unique Canadian disclosure approach regarding the adequacy of a firm's internal control over financial reporting (ICOFR). According to this approach, the disclosures of internal control *design* weaknesses are contained in the "Management Discussion and Analysis" (MD&A). These disclosures are neither certified by management (Sarbanes Oxley Act of 2002 (SOX) 302 or SOX 404 Part (a)) nor audited by the external auditor (SOX 404 Part (b)). Further, they are not accompanied by implementation effectiveness tests, which were viewed as being the more costly activity in making the disclosure (Roberts and Beal 2005). Thus, the Canadian provisions are much less costly than equivalent SOX provisions.

Some observers cite the rising costs of compliance with SOX as one reason European companies are delisting from U.S. exchanges in increasing numbers.[1] Regulators in many countries outside the United States are improving their country's governance and listing standards and are seeking alternatives to the costly U.S. model of corporate governance, especially with respect to internal controls. Our study informs this cost–benefit debate by providing evidence from the lower compliance cost setting in Canada.

Issues related to costs have been at the heart of the U.S. debate since the passage of SOX in 2002, especially regarding the alleged disproportionate costs on smaller public companies that are above the minimum market capitalization requiring full SOX disclosure, that is, accelerated filers (see Hoitash, Hoitash, and Bedard 2008, 2009; Kinney and Shepardson 2010). Since 2007, even nonaccelerated filers have had to report under SOX 404 Part (a) which requires separate management certification of the results of an assessment of internal control design *and* implementation effectiveness. Further, it appears that

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1. See *Wall Street Journal* (Europe) article "Symbolic shift grows" on May 18, 2010. Piotroski and Srinivasan (2008) also find the incremental costs associated with SOX compliance affect the listing decision of small foreign firms.

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the June 15, 2010 deadline for smaller U.S. nonaccelerated files is the last deferral the U.S. Securities and Exchange Commission (SEC) will grant for the SOX 404 Part (b) auditor attestation requirement for nonaccelerated filers (SEC Release Number 33-9072, 34-60813), despite the added costs of compliance.

SOX North (as we call the Canadian approach) compliance costs related to internal control weakness disclosures are designed to be lower than SOX 404 costs and, at least in the period 2006–2008, to be lower than they are for nonaccelerated filers in the United States under SOX 404 Part (a) (Roberts and Beal 2005). Given this low-cost Canadian setting, and following the classic disclosure argument that low-cost signals are not credible (e.g., Spence 1973; Ross 1977; Comment and Jarrell 1991), the crucial research question we address is whether these self-reported disclosures in MD&A are credible. In the U.S. setting, prior studies find that disclosed internal control weaknesses affect accrual quality (e.g., Doyle, Ge, and McVay 2007a), suggesting that such disclosures are credible. However, it is not obvious that SOX North disclosures will be credible given their low-cost nature. Hence, our first research question is: Are Canadian internal control design weakness disclosures credible? Specifically, we examine the association between Canadian internal control design weakness disclosures and accrual quality. A negative association provides evidence that there exists an alternative regulatory regime, SOX North, that provides credible information to users yet is less costly than the SOX 404 regime.

Simunic (1980) and Griffin, Lont, and Sun (2008) argue that a firm can achieve a planned accrual quality level by substituting more external audit effort for weak internal control. Prior studies have ignored the substitution effect of external monitoring for internal control strength when testing for an association between internal control disclosures and accrual quality (e.g., Ashbaugh-Skaife, Collins, Kinney, and LaFond 2008; Doyle et al. 2007a; Raghunanda and Rama 2006). Given the lack of credibility enhancement mechanisms in the Canadian setting, the researcher employing a single- equation ordinary least squares (OLS) test of association could potentially observe a weakened or no association between internal control weaknesses and accrual quality due to this substitution effect. Because such a null result could arise either from no credibility or complete audit effort substitution, inferences arising from that finding would be problematic. Thus, our second research question is: Does external monitoring compensate for the impact of internal control weakness on accrual quality? In other words, is there a direct effect from internal control weaknesses to accrual quality, offset by an indirect effect from internal control weaknesses to accrual quality via audit effort? Either observed path result would lead us to conclude that the disclosures are credible, our key research focus.

We employ a multimethod research approach to investigate these issues. First, we employ OLS and two-stage regressions to examine the association between disclosed internal control weaknesses and accrual quality. This provides evidence comparable to Doyle et al. 2007a as to whether Canadian internal control design weakness disclosures are considered credible. Second, we employ path analysis embedded in a structural model in a recursive (unidirectional) setting where auditors are assumed to make the decision on financial statement audit effort after observing the quality of internal control. This allows us to test for direct and indirect effects of internal control strength on accrual quality. Finally, as a robustness check, we allow for endogeneity among the three variables by conducting non-recursive (bidirectional) path analysis. This approach assumes that audit effort, internal control strength, and accrual quality are jointly and simultaneously determined in anticipation of the audit of financial statement occurring and the need to make the required disclosures.

Our main accrual quality measure is based on Dechow and Dichev 2002, with absolute unexplained accruals representing the inverse of quality. We also test the robustness of our

conclusions using the Ball and Shivakumar 2006 modified Dechow and Dichev measure.[2] Our regression analysis reveals an overall positive association between disclosed internal control weaknesses and unsigned unexplained accruals. This establishes the credibility of Canadian internal control disclosures and replicates findings in the much costlier and more monitored U.S. setting. Our recursive (unidirectional) path analysis further shows that the overall positive effect is composed of a large direct positive effect of internal control weaknesses on unsigned unexplained accruals and a smaller indirect negative effect of internal control weaknesses on unsigned unexplained accruals via external audit effort. The direct effect suggests that the internal control weakness disclosures of Canadian firms are credible, consistent with the view of Canadian regulators and contrary to those who advocate the need for audited disclosures (e.g., Salterio 2006). The indirect negative effect also implies disclosure credibility. It suggests that there is a substitution effect (i.e., weaker internal controls are associated with more audit effort that results in higher accruals quality), but that substitution is both limited and incomplete, albeit statistically significant.

The study is different from the related studies in literature and provides policy implications. Given the lack of definitions about what constituted a weakness and what had to be disclosed, no management certification, no control implementation testing, and no external audit requirements for these disclosures, whether SOX North leads to credible disclosures cannot be inferred directly from the findings in the studies based on U.S. data. This is important to study given the lower costs of the SOX North approach and a worldwide interest in more cost-effective approaches to internal control reporting than the SOX model.

A more subtle contribution relates to the role of auditors in compensating for internal control weaknesses through increased substantive testing. Using U.S. data, Doyle et al. (2007a) show that there are a larger number of account-specific (i.e., auditable) weaknesses under SOX 404 than 302 and that the negative association only exists between less auditable design weaknesses and accrual quality. Ashbaugh-Skaife et al. (2008) examine a sample with both SOX 302 and 404 disclosures and show, in the levels, that firms reporting internal control deficiencies (versus none) have lower accrual quality. They observe that firms whose auditors confirm remediation of previously reported internal control deficiencies experience an increase in accrual quality. Both studies imply the important role of external auditors in mitigating the impact of internal control weaknesses on accrual quality but neither one explicitly examines this mitigating effect. In this study, we use path analysis to decompose the direct and indirect effects of internal control weaknesses on accrual quality. This is an important extension. The advantage to decomposing direct and indirect effects is that the direct effect captures the potentially harmful impact of internal control weaknesses on accrual quality. The indirect effect suggests the extent to which external auditors currently reduce the negative effect of internal control weakness on accrual quality via enhanced external monitoring. We show that such substitution effects are small, implying that auditors cannot fully compensate for poorly designed internal controls by increased substantive work. This constitutes *per se* evidence justifying some form of internal control disclosures for investors.

The remainder of this paper is organized as follows. Section 2 describes institutional background and hypotheses. Section 3 discusses our sample data and descriptive statistics. Section 4 presents our regression-based tests and the results. Section 5 discusses our

2. In this measure, we address the nonlinearity concern raised in Ball and Shivakumar 2006. We also tested but do not tabulate results employing a wide variety of accruals models and their resultant accrual quality measures, including several variants of the Jones model. We found generally consistent results with our two main Dechow and Dichev measures. Extant research (e.g., Kinney and Shepardson 2010; Dhaliwal, Naiker, and Navissi 2010) uses the Dechow and Dichev accruals model.

recursive path analysis embedded in a structural equation model and the results. Section 6 presents a path analysis which allows for endogeneity in addition to other robustness checks. Section 7 concludes the paper with implications, limitations, and suggestions for future research.

2. Institutional background and hypotheses

Institutional background

Canada has 10 provincial securities regulators plus three territorial regulators, of which four have the potential to have significant capital markets regulatory impact as the vast majority of registrants are domiciled in these jurisdictions (Alberta, British Columbia, Ontario, and Quebec) and they invest in staff somewhat commensurate with their responsibilities. Collectively, these provincial and territorial securities regulators call themselves the Canadian Securities Administrators (CSA). The CSA has no decision-making ability itself as Canada does not have a national securities regulator and all proposed regulations must be individually passed in each jurisdiction. In June 2003, the CSA originally proposed that management assess and test the effectiveness of internal controls over financial reporting effective 2005.

The 2003 proposal sounded somewhat similar to SOX 302, but even the original proposal provided for the ICOFR disclosures to be located in the MD&A section of the annual report (CSA 2005a, 2008). However, the CSA could not obtain the needed unanimous agreement because the British Columbia Securities Commission (BCSC) dissented (Salterio and Schmidt 2007). In September 2005, the BCSC agreed to ICOFR disclosure requirements, subject to such requirements being implemented in two phases in order to reduce compliance costs. The first stage, from 2006 to 2008, featured an internal control system design effectiveness evaluation (CSA 2005a). At that time, the details of implementation effectiveness testing requirements, to be required starting in 2008, were left for further negotiation (CSA 2008).

The final Canadian rule (known as 52–109) featured management signing a declaration that they had "designed such internal control over financial reporting, or caused it to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with the issuer's GAAP" (CSA 2005b). This declaration was filed with the securities commission and did not accompany the actual disclosures in the MD&A. In contrast, the SOX 302 certification states that the "certifying officers … have disclosed … based on our most recent evaluation … all significant deficiencies in the design or operation of internal controls … including any material weaknesses in internal controls …" (SEC 2002) and it accompanied the disclosures in the same report. In other words, under the Canadian regulation, there was no requirement for managers to certify they had discovered and disclosed any weaknesses (CSA 2005a). Indeed, the Canadian regulation had no mention of the term "weakness" in it and no provisions for certifying anything other than what is stated above (CSA 2005b). See Example 1 in Appendix 1 for what we found to be an example of a "best practice" disclosure.

CSA Staff Notice (CSA 2006a), issued in late September 2006, clarified regulatory staff views about when and if such assessments needed to be disclosed:

> Certifying officers should cause the issuer to disclose in the annual MD&A the nature of any weakness in the design of the issuer's ICOFR, the risks associated with the weakness and the issuer's plan, if any, to remediate the weakness. If no such plan exists, the issuer should consider disclosing its reasons for not planning to remediate the weakness.

TABLE 1
Internal control regulatory requirements: Canada–U.S. comparison

	U.S. Accelerated Filers	U.S. Nonaccelerated Filers	Canadian TSX companies
Assess design effectiveness of internal controls	Quarterly after August 14, 2003 (SOX 302)	Quarterly from 2003 (SOX 302)	Year ends after June 29, 2006
Effectiveness of implementation of internal controls	Quarterly after August 14, 2003 (SOX 302)	Quarterly from 2003 to date (SOX 302)	Quarterly after December 15, 2008 (52-109, revised 2008)
Management certification of evaluation of ICOFR	Year ends and quarterly after June 15, 2004 (SOX 404 Part a)	Year ends and quarterly after December 15, 2007 (SOX 404 Part a)	Year ends and quarterly after December 15, 2008 (52–109, revised 2008)
Audit of ICOFR	Year ends after June 15, 2004 (SOX 404 Part b)		N/A*

Notes:

* CSA (2006a) documents the proposal to require in Canada an audit of the effectiveness of internal controls over financial reporting. This proposal was dropped as part of the compromise that allowed management assessment of internal control to proceed.

This Staff Notice established the requirement, at least from a CSA staff perspective, to disclose weaknesses but without any definition about what weaknesses should be reported. On this issue, Goodfellow and Willis (2006: 40) characterize the conclusion of the Big 4 accounting firms and the Canadian Institute of Chartered Accountants (CICA) as follows:

> The U.S. test of "more than a remote likelihood of a material misstatement" ... needs to be considered since it could be used ... in the absence of a Canadian definition or authoritative guidance.

Further, the CICA's Risk Management and Governance Committee, which provides nonauthoritative guidance on governance best practices, states in its publication about board of directors' oversight of MD&A for 2007 disclosures (Willis 2008: 7):

> Management of non-venture issuers may also have to make judgments about the materiality of weaknesses in internal control over financial reporting and the need to include control-related disclosures in the MD&A, as required under the CSA's regulations related to the CEO's and CFO's certification of the annual and interim filings.

Example 2 in Appendix 1 provides a disclosure made by a company of weaknesses in internal controls over financial reporting. Table 1 provides a summary of the similarities and differences between the U.S. SOX regime and the Canadian setting.

Thus, fully compliant disclosure of internal control design weaknesses is not assured for at least three reasons. First, there is a lack of a definition in the regulation and the follow-up staff notice as to what weaknesses merit disclosure. Second, weaker incentives exist

for truthful reporting due to the lack of accountability and other credibility enhancement mechanisms (no direct management certification and no external audit of such disclosures). Third, by focusing on design effectiveness for the period under study and not testing implementation, design weaknesses may not be as readily identified as it is often during implementation tests of controls that design weaknesses become apparent.

These features make Canadian disclosures different from those disclosures under SOX 302, in which internal control weaknesses are well defined and implementation tests are required. As indicated in Table 1, the CSA added in 2008 the requirement for implementation tests and management certification of all disclosures about internal control (see KPMG 2008 for a summary of the reaction to this change). Thus, the credibility of 2006 Canadian internal control disclosures is far from assured.

Hypothesis development

Numerous prior studies have examined the factors affecting accrual quality. Poor accrual quality can be attributed to unintentional errors and intentional biases. Dechow and Dichev (2002) measure accrual quality by the extent to which current accruals map into past, current, and future cash flows. Various measures based on the Dechow and Dichev model have been adopted to examine the quality of financial reporting. Doyle et al. (2007a) hypothesize and find that internal control weaknesses are negatively associated with accrual quality after controlling for firm characteristics such as volatility of cash flows and sales, total assets, loss provision, business complexity, and operating cycles. They follow the logical development that a weak system of internal controls leads to an increased risk of intentional and unintentional errors in financial accounting and that such errors will be reflected in the quality of accounting accruals. If the Canadian disclosures are credible, the same results should be obtained here. Hence, we have our first hypothesis:

> Hypothesis 1. *The greater the number of internal control weaknesses reported by Canadian public companies in their MD&A, the lower the accrual quality.*

The null of Hypothesis 1 (H1) would occur if internal control design weaknesses lack credibility due to the institutional features discussed above. Restating the hypothesis in terms of unsigned unexplained accruals, our proxy for accrual quality, H1 predicts a positive relationship between the number of internal control weaknesses and unsigned unexplained accruals.

An alternative explanation for finding no effect of internal control weakness disclosures on accruals quality in Canada could be that the substitution involving external audit is complete (i.e., 100%) such that accruals quality is unaffected by internal control weaknesses. Both standard setters (American Institute of Certified Public Accountants 1997; Public Company Accounting Oversight Board 2007) and prior literature (Simunic 1980; Griffin et al. 2008; Prawitt, Smith, and Wood 2009) suggest that a substitution effect exists between the internal control systems established by management and the external monitoring by auditors with respect to financial reporting errors. Based on such an argument, a given level of accrual quality can be achieved by sacrificing some internal control quality but improving the quality of external monitoring. Hence, it does not follow necessarily that lower internal control quality should result in lower accrual quality because external audit effort influences whether accrual quality is lower or not.

The extant empirical evidence about the relationship between internal control weaknesses, audit fees, and accruals quality indirectly supports this substitution argument. Prior studies show that the level of firm investment in internal audit is a significantly negative determinant of external audit fees (e.g., Felix, Gramling, and Maletta 2001) and that the internal audit function helps prevent material weaknesses from occurring (Lin, Pizzini,

Vargus, and Bardhan 2010). Raghunandan and Rama (2006) demonstrate that more internal control weaknesses are associated with higher audit fees for SOX 404 firms. Hogan and Wilkins (2008) and Hoitash et al. (2008) find the same association for SOX 302 firms. Numerous empirical audit studies have established a positive association between audit effort and higher accrual quality, whether using simple (e.g., Kinney and Martin 1994) or complex research designs (e.g., Larcker and Richardson 2004). This combination of theoretical and empirical analysis leads to our second and third hypotheses:

Hypothesis 2. *A greater number of internal control weaknesses reported by Canadian public companies in their MD&A results in higher audit effort and, hence, higher audit fees.*

Hypothesis 3. *Higher audit fees, reflecting higher audit effort, result in higher audited accrual quality.*

Empirically Hypothesis 2 (H2) implies a positive relationship between number of internal control weaknesses reported and audit fees and Hypothesis 3 (H3) implies a negative relationship between audit fees and unsigned unexplained accruals. Combining H1 – H3, we have the net effect of the number of internal control weaknesses on accrual quality. Given SOX North ICOFR disclosure requirements, it would appear that Canadian regulators do not believe that the substitution of higher audit effort for weak internal controls is perfect.[3] If this belief is correct, in our path analysis we would expect to observe a positive net effect between internal control weaknesses and unsigned unexplained accruals. Empirically, in our recursive path analysis this would be reflected in a positive direct relationship from internal control weaknesses to unsigned unexplained accruals and a smaller net negative indirect relationship between internal control weaknesses and unsigned unexplained accruals via audit fees. If the substitution is complete, the posited negative indirect relationship would be the same size as the positive direct relationship between internal control weaknesses and accruals, hence implying a finding of the null of H1 in our regression analysis.

3. Data and descriptive statistics

We start with all Canadian firms in the Compustat 2006 data file. We obtain the annual reports and proxy statements (known in Canada as "Management Information Circulars") for all firms with year ends immediately following June 29, 2006 from SEDAR.com and/or for those Canadian firms cross-listed on the U.S. exchanges from EDGAR online. Any missing data items on Compustat are collected from the financial statements by a doctoral student and are carefully checked by one of the authors and a second doctoral student. The stock price at the end of fiscal year 2006 for some firms is collected from finance.yahoo.com.

All internal control weaknesses are coded by hand by a doctoral student who is a chartered accountant with five years of experience, recoded independently by one of the authors who is also a chartered accountant, and reconciled by a third doctoral student with a master's degree in accounting.[4] The second example in Appendix 1 illustrates that

3. Regulators are concerned with a firm's internal control choices for reasons beyond unacceptable accrual quality, postaudit. For example, internal control quality can affect the accuracy of management guidance based on interim numbers (Feng, Li, and McVay 2009).

4. Early in the coding process we checked for inter-rater reliability between the primary two coders on the first 152 companies coded. For number of internal control weaknesses disclosed, Cronbach's alpha (adjusted) was 0.943, and for weakness disclosed (yes/no) Cronbach's alpha was 0.952. Given this high level of initial coding agreement, although the coders continued to discuss and resolve the differences, formal statistics were not tracked for the remaining firms' coding.

the disclosures require a fair bit of accounting and control expertise in order to ascertain the number of internal control weaknesses. All governance compliance data are collected by hand from the proxy statements by 18 undergraduate research assistants who cross-check 100% of each other's work. In addition, 20% of the undergraduate research assistants' work is subject to random quality audits by a doctoral student with a master's degree in accounting with two years of work experience. We obtain the number of professional accountants (Chartered Accountants [CAs], Certified Management Accountants [CMAs], and Certified General Accountants [CGAs]) for each firm. As the data provided by these three professional accounting organizations are at the company (subsidiary) level, we employed four research assistants under the supervision of one of the authors to aggregate the numbers by COMPUSTAT firm (i.e., the publicly traded company) to get the total number professional accountants hired by each firm.[5]

The 2006 COMPUSTAT data file consists of 1,230 active firms. We are able to obtain a mostly complete sample of data for 826 firms out of these 1,230 in 2006. Accrual quality, cash flow volatility, and sales volatility measures need at least three years of information to calculate, which gives us a sample with 603 firms. We further eliminate 133 firms cross-listed in the United States, so our final sample consists of 470 firms. We focus on Canadian-only firms because the cross-listed firms are permitted by CSA MLI 52–109 (CSA 2005a) to substitute their certifications under U.S. SOX 302 and 404 for the Canadian disclosures, although in the vast majority of cases cross-listed firms explicitly reported both. The Canadian-only listed firms thus provide an uncontaminated test of our hypotheses albeit with the loss of a significant number of observations. In section 6, we test the robustness of our results for the full sample. Panel A of Table 2 describes this sample selection process.

Table 2, panel B reports descriptive statistics for all variables in our analysis measured at the end of fiscal year 2006. Some sample characteristics are noteworthy. The median total assets of Canadian-only listed firms is $235 million (reported in log form in Table 2), suggesting that many firms are small. The average age is 14 years, indicating that the firms are relatively older as the data requirement in calculating accrual quality has excluded newer firms. The mean of the number of internal control weakness is 0.49; 78% of firms were audited by Big-4 firms and 7% of firms changed their auditors in 2006. In addition, 13% of firms restated their earnings due to errors or the change of estimates within the four fiscal years preceding 2006. While the mean of return on assets (*ROA*) is negative, the majority of the firms are profitable, with a median *ROA* of 0.04. Table 3 provides Pearson correlations between variables.

4. The direct relationship between control weaknesses and accrual quality

Empirical method – regression analysis

We employ ordinary least squares (OLS) and two-stage regressions to test H1 while controlling for known factors that affect the relationship between the number of internal control weaknesses and accrual quality. This first step helps us to establish the credibility of Canadian internal control weakness disclosures, subject to our caveat about direct and indirect effects. According to H1, we expect to find a positive relationship between the number of internal control weaknesses and unsigned unexplained accruals.

We measure accrual quality by unsigned unexplained accruals obtained from the Dechow-Dichev model (*DDAAQ*). There are three assumptions underlying our analyses. First, internal control in 2006 is the same as internal control in prior years. This is a reasonable assumption given the high uncertainty about the effective date of implementation (the certifications to be filed for fiscal year 2006 were not finalized until December 2005;

5. We use Statistics Canada and Dun & Bradstreet to identify the subsidies of these Canadian COMPUSTAT firms.

TABLE 2
Sample selection and descriptive statistics

Panel A: Sample selection

	Number of Observations
(1) Active Canadian firms in COMPUSTAT data file in 2006.	1,230
(2) No missing value for internal control weaknesses and other control variables in 2006.	826
(3) No missing value for accrual quality, cash flow volatility, sales volatility (require multiple years information).	603
(4) Excluding 133 firms cross-listed in U.S. *Final sample:*	470

Panel B: Descriptive statistics

	Mean	Q1	Median	Q3	Std Dev
Accrual Quality (DDAAQ)	0.07	0.03	0.05	0.08	0.06
Audit fee	12.24	11.49	12.16	12.87	1.12
Num ICW	0.49	0	0	0	1.02
Abnormal NPAP	0.04	−0.45	0.09	0.61	0.94
Audit committee score	9.49	10	10	10	2.21
Age	14.20	8	12	20	8.02
Assets	5.38	4.09	5.46	6.73	1.95
Auditor	0.78	1	1	1	0.42
Auditor change	0.07	0	0	0	0.26
Board of directors score	22.21	18	26	30	11.63
Book-to-market ratio	0.54	0.29	0.48	0.76	3.21
CF volatility	0.19	0.001	0.003	0.01	3.25
Current assets	0.38	0.14	0.33	0.59	0.27
Financial industry dummy	0.14	0	0	0	0.35
Foreign transactions dummy	0.50	0	1	1	0.50
Inventory	0.07	0	0.01	0.12	0.12
Inventory & Receivables	0.21	0.04	0.14	0.33	0.22
Leverage	0.24	0.03	0.19	0.35	0.30
Loss	0.33	0	0	1	0.47
Num of business segments	1.12	0	0	2	1.58
Num of geographic segments	1.36	0	0	2	1.75
Restatement	0.13	0	0	0	0.33
Return on assets	−0.05	−0.02	0.04	0.08	0.47
Sales volatility	0.08	0.002	0.01	0.05	0.28

Note:

See Appendix 2 for variable definitions.

CSA 2005b). The internal control stability assumption is also common to the SOX 302/404 literature (e.g., Doyle et al. 2007a). We also assume that accrual quality is stable over time and measure unsigned unexplained accruals using data for the six-year period 2001–2006. This assumption is common in the earnings quality literature (e.g., Dechow and Dichev 2002). Finally, we assume that 2006 audit fees proxy for audit effort during

TABLE 3
Pearson correlation matrix

	V1	*V2*	*V3*	*V4*	*V5*	*V6*	*V7*	*V8*	*V9*	*V10*	*V11*
V2: Audit fee	−0.173										
V3: Num ICW	0.138	−0.025									
V4: Abnormal NPAP	−0.053	0.141	−0.062								
V5: Audit committee score	−0.087	0.148	−0.025	−0.044							
V6: Age	−0.167	0.170	−0.077	0.175	0.004						
V7: Assets	−0.357	0.698	−0.161	−0.019	0.106	0.164					
V8: Auditor	−0.090	0.188	−0.091	0.033	0.036	−0.032	0.295				
V9: Auditor change	0.048	−0.128	0.087	−0.027	−0.037	−0.002	−0.175	−0.025			
V10: Board of directors score	−0.189	0.344	−0.054	0.037	0.328	0.068	0.349	0.175	−0.126		
V11: Book-to-market ratio	0.003	0.019	−0.032	0.030	0.009	0.089	0.035	0.072	−0.004	0.017	
V12: CF volatility	0.060	−0.004	−0.025	−0.050	0.011	−0.029	−0.028	0.026	0.001	−0.033	−0.003
V13: Current assets	0.305	−0.126	0.074	0.008	−0.014	0.002	−0.481	−0.265	0.092	−0.108	−0.019
V14: Financial industry dummy	−0.038	−0.015	−0.109	−0.037	−0.082	0.003	0.201	0.015	−0.001	−0.049	−0.122
V15: Foreign transactions dummy	0.092	0.027	0.122	−0.078	0.011	−0.075	−0.165	0.035	0.103	−0.091	−0.026
V16: Inventory	0.103	0.163	0.101	−0.054	0.037	0.113	−0.036	−0.079	0.030	−0.042	0.020
V17: Inventory & Receivables	0.188	0.164	0.110	−0.061	0.057	0.063	−0.089	−0.128	0.010	−0.014	0.006
V18: Leverage	−0.013	0.073	−0.013	0.001	0.066	0.031	0.070	−0.063	0.018	−0.051	−0.113
V19: Loss	0.134	−0.247	0.094	−0.075	−0.073	−0.078	−0.419	−0.198	0.201	−0.116	−0.010
V20: Num of business segments	0.010	0.374	0.086	0.018	0.078	0.147	0.272	0.111	−0.036	0.079	0.074
V21: Num of geographic segments	0.045	0.246	0.102	0.009	0.057	0.054	0.070	−0.033	0.016	0.095	0.043
V22: Restatement	0.053	0.018	0.111	−0.027	−0.004	−0.001	−0.068	−0.073	0.061	−0.028	0.077
V23: Return on assets	−0.317	0.249	−0.048	−0.028	0.059	0.075	0.422	0.095	−0.128	0.133	0.033
V24: Sales volatility	0.257	−0.100	0.001	0.044	−0.002	−0.034	−0.168	−0.060	−0.027	−0.024	−0.016

(The table is continued on the next page.)

TABLE 3 (Continued)

	V12	*V13*	*V14*	*V15*	*V16*	*V17*	*V18*	*V19*	*V20*	*V21*	*V22*	*V23*
V13: Current assets	−0.010											
V14: Financial industry dummy	−0.023	−0.236										
V15: Foreign transactions dummy	0.039	0.171	−0.270									
V16: Inventory	−0.029	0.404	−0.185	0.129								
V17: Inventory & Receivables	−0.041	0.555	−0.069	0.060	0.680							
V18: Leverage	−0.008	−0.214	0.223	−0.102	−0.063	0.010						
V19: Loss	0.079	0.192	−0.170	0.180	−0.070	−0.107	0.006					
V20: Num of business segments	−0.039	0.000	−0.046	0.098	0.151	0.103	0.044	−0.184				
V21: Num of geographic segments	0.014	0.164	−0.182	0.279	0.153	0.161	−0.042	0.062	0.306			
V22: Restatement	−0.021	−0.019	−0.030	0.061	0.019	−0.017	0.005	0.061	0.004	0.005		
V23: Return on assets	−0.038	−0.196	0.095	−0.063	0.035	0.033	−0.088	−0.427	0.096	0.029	0.021	
V24: Sales volatility	−0.007	0.170	−0.080	0.006	0.129	0.169	0.057	−0.047	0.052	0.027	−0.027	−0.007

Note:

See Appendix 2 for variable definitions.

the 2001–2006 period for which accrual quality is measured (see Hay, Knechel, and Wong 2006 for evidence of reasonableness of this assumption).

To demonstrate the robustness of our findings, we follow Ball and Shivakumar (2006) who suggest that nonlinear accrual models incorporating the timely recognition of losses perform better than linear models. Hence, we add a current-year cash flow dummy and its interaction with the level of cash flows into the Dechow and Dichev model. We call this new measure *BSAQ* and conduct the same analyses as a robustness check.

Regression results

We employ the following equation in our OLS regression analysis:

$$\begin{aligned} DDAAQ = {} & \beta_0 + \beta_1 Num\,ICW + \beta_2 Assets + \beta_3 Num\,of\,business\,segments + \beta_4 CF\,volatility \\ & + \beta_5 Sales\,Volatility + \beta_6 Age + \beta_7 Loss + \beta_8 Return\,on\,assets \\ & + \beta_9 Foreign\,transactions + \varepsilon \end{aligned} \tag{1}$$

Our main independent variable is the number of internal control weaknesses (*Num ICW)*. The expected coefficient for *Num ICW* is positive. The remainder of (1) consists of control variables reported as statistically significant in Doyle et al. 2007a.[6] Appendix 2 provides the detailed definition of each variable and here we discuss the expected sign for each coefficient. *Assets* is total assets with the expected sign being negative, that is, larger firms have lower *DDAAQ* (high accrual quality). The *number of business segments*, *cash flow volatility (CF volatility*) and *sales volatility* are three variables significantly correlated with accrual quality (Doyle et al. 2007a; Hribar and Nichols 2007). We expect the coefficients for the above three variables to be positive, that is, more complex firms with high cash flows volatility and sales volatility have high *DDAAQ*. The predicted signs for *Age* and *Return on assets* are negative and for *Loss* and *Foreign transactions* are positive.

There are four levels of reported internal control weaknesses: zero, one, two, and three or more reported weaknesses.[7] The most commonly disclosed internal control design weaknesses were around segregation of duties, lack of appropriate accounting or other expertise, and inadequate information systems. Unreported statistics show an average *DDAAQ* of 0.06, 0.08, 0.08, and 0.09 across zero, one, two, and three or more reported weaknesses. The patterns reveal a monotonically declining accrual quality pattern (accrual quality again being the inverse of the measure *DDAAQ*) as the number of internal control weaknesses increases. The differences in *DDAAQ* between the zero weakness group and the one, two, and three-or-more groups are significant, with *t*-values equal to 1.98, 1.81, and 2.81, respectively.

Columns 3 and 4 of Table 4 present the OLS regression coefficients and *t*-statistics, respectively. The variable of interest is *Num ICW*. The coefficient is positive and statistically significant at the 5% one-tailed conventional level. Thus, when the number of internal control weaknesses is high, *DDAAQ* is large, that is, accrual quality is low. The results for the other control variables are generally consistent with predictions. The variables *Assets, CF volatility, Sales volatility, Age, Number of business segments, Loss, and Return*

6. There are small differences between our variable measurement and that employed by Doyle et al. (2007a). In order to measure the existence of losses, Doyle et al. (2007a) use the proportion of losses over the last seven years and we use a 2006 loss indicator and return on assets. In addition, although operating cycle is significant in the regression model reported by Doyle et al. 2007a, we do not include this variable as we would lose 34% of our observations. Nevertheless, when we rerun the regression for the reduced sample and include operating cycle in the model, our results do not change.
7. This four category classification also makes this variable appropriate for inclusion as a structural variable in our path analysis (Garson 2009).

TABLE 4
Effect of internal control weaknesses on accrual quality: ordinary least squares (OLS) and two-stage regression

		OLS regression		Two-stage regression	
	Predicted Sign	Coeff	*t*-stat.	Coeff	*t*-stat.
Intercept		0.1054	10.48***	0.0870	5.38***
Num ICW	+	0.0043	1.84**		
Predicted Num ICW	+			0.0234	1.75**
Assets	−	−0.0068	−4.68***	−0.0050	−2.55***
Num of business segments	+	0.0030	1.93**	0.0018	0.96
CF volatility	+	0.0009	1.26	0.0011	1.50*
Sales volatility	+	0.0413	4.87***	0.0438	5.06***
Age	−	−0.0008	−2.69***	−0.0007	−2.13**
Loss	+	−0.0077	−1.34*	−0.0090	−1.54*
Return on assets	−	−0.0284	−4.99***	−0.0301	−5.17***
Foreign transactions	+	0.0023	0.48	−0.0005	−0.11
Adjusted R^2		22.35%		22.30%	

Notes:

See Appendix 2 for variable definitions. *Predicted Num ICW* is estimated using ordinal probit model including all variables in the internal control weakness equation and the exogenous variables in the second stage regression. *, **, and *** represents statistical significance at a one-tailed 0.10, 0.05, and 0.01 levels, respectively.

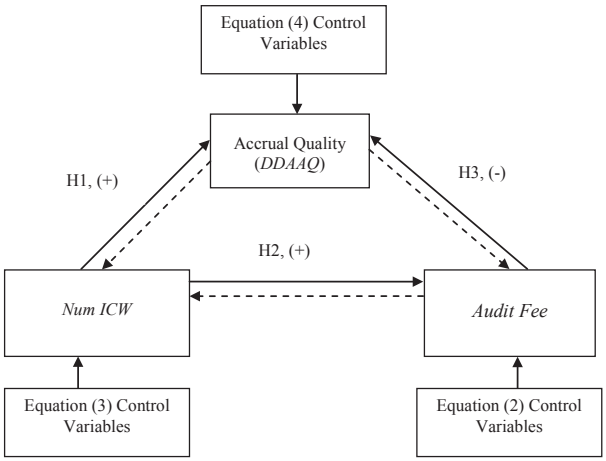
on assets are statistically significantly associated with accrual quality. Small firms with higher sales volatility have higher *DDAAQ*, thus poorer accrual quality. Firms with higher returns on assets and older firms have higher accrual quality.

We consider the number of internal control weakness as a better proxy for internal control quality than an indicator variable capturing whether there is at least one internal control weakness. Nevertheless, we replace *Num ICW* with an indicator variable, *ICW,* assuming a value of one if a firm reports one or more internal control weaknesses and zero otherwise. The coefficient for *ICW* is significant with a *t*-value of 2.24.

In the above OLS regression, we assume that the number of internal control weaknesses is exogenous. However, the number of internal control weaknesses and accrual quality may be jointly endogenous. To examine the robustness of our Table 4 results to this concern, we supplement OLS regression with a two-stage regression. In the first stage, we use an ordinal probit model to estimate the expected number of internal control weaknesses. The independent variables consist of the variables besides *Num ICW* in (1) and the additional determinants of the number of internal control weaknesses in (3) as described in section 5. In the second stage, we replace *Num ICW* with the estimated number of internal control weaknesses from the first stage. We find the coefficient on this new variable remains significantly positive with *t*-value = 1.75. All coefficients are in general robust to this two-stage regression approach. Columns 5 and 6 of Table 4 report the results.

In summary, regression analysis suggests that the existence of internal control weaknesses affects accrual quality among Canadian firms. As such, the evidence suggests that Canadian firms' internal control weakness disclosures are credible.

Figure 1 This figure illustrates recursive path analysis (solid lines) models as well as nonrecursive (bidirectional indicated by the solid and dashed lines) path analysis. Each hypothesis is represented by a solid directional arrow with the sign in parenthesis reflecting the expected directional relationship following the hypothesis number. In all cases, the higher accrual quality term in the hypotheses has an inverse relationship with *DDAAQ*.



5. Tests of H2 and H3 with further tests of H1

Empirical method – path analyses embedded in a structural equation model

We use path analysis embedded in a structural equation model (Bollen 1989a; Wong and Law 1999) to examine the hypothesized relations among the number of internal control weaknesses, audit fees, and accrual quality while controlling for well-known determinants of each of these path variables.[8] This approach tests the direct effect from internal control weakness to accrual quality and the indirect effect between the two via audit fees. We employ a recursive path model premised on the assumption that audit effort is allocated based on the auditor's observation of internal control quality. The recursive path model is shown in Figure 1 (solid lines only). In addition to the expected positive relationship between the number of internal control weaknesses and unsigned unexplained accruals (H1), we expect a positive path coefficient from the number of internal control weakness to audit fees (H2) and a negative path coefficient from audit fees to unsigned unexplained accruals (H3). We report maximum likelihood estimates as they have several advantages over other estimation methods, such as being robust over non-normal data, providing overall model fit measures, providing tests of statistical significance, etc. (Lance, Cornwell, and Mulaik 1988).[9]

Path analytical models tested within structural equation modeling software are widely used in many disciplines because they enable researchers to examine direct and indirect effects while explicitly taking into account measurement errors in both dependent and

8. Structural equation models are frequently thought of as involving only latent variables, their indicators, and the paths among the latent variables. However, it should be noted that structural equation models are generalizations of the general linear model (including OLS regression) and path analysis provides the ability to carry out a more robust test of hypotheses (Garson 2009; Arbuckle and Wothke 1999).

9. We have replicated all of our analyses employing generalized least squares estimation and asymptotic covariance estimates instead of maximum likelihood estimates and the results are essentially the same, with minor differences in levels of significance but not in the inferences obtained. These robustness checks provide some assurance that the exact model specification issues often raised against using maximum likelihood estimates are not a problem in our models (Lance et al. 1988).

independent variables (Bollen 1989a; Wong and Law 1999; Kline and Klammer 2001). The hypothesized path model can be tested using either a recursive analysis or a nonrecursive bidirectional path analysis where simultaneity among our three choice variables is assumed (Figure 1). Using either approach, the researcher seeks to determine the extent to which the hypothesized path model is consistent with the data, based on a fit assessment of the measurement model. We present the unidirectional path analysis as our main results and the non-recursive path analysis as a robustness check of our hypotheses.

Measurement model

Each path variable in Figure 1 (internal control weakness, audit fees, and accrual quality) is estimated with respect to control variables selected based on prior literature. In the recursive setting (see the solid lines of Figure 1), internal control weaknesses are a determinant of audit fees but audit fees are not an explanatory variable in the internal control weakness equation. All variables in the following equations are defined in Appendix 2.

Audit fee equation

The determinants of audit fees have been explored extensively in the literature. Hay et al. (2006) survey the literature and conclude that audit fees are generally affected by firm size, organization complexity, inherent risk, profitability, leverage, internal control quality, industry, and audit quality. Further, we predict that audit fees are affected by internal control weaknesses (H2). Based on Hay et al.'s meta-analysis of the audit fee model literature, we adopt the fee model in (2).

$$\begin{aligned} Audit\ Fee = {} & \beta_0 + \beta_1 NumICW + \beta_2 Assets + \beta_3 Inventory\&Receivables + \beta_4 Current\ assets \\ & + \beta_5 Num\ of\ business\ segments + \beta_6 Num\ of\ geographic\ segments \\ & + \beta_7 Book\text{-}to\text{-}market\ ratio + \beta_8 Leverage + \beta_9 Return\ on\ assets + \beta_{10} Auditor \\ & + \beta_{11} Financial\ industry\ dummy + \varepsilon \end{aligned} \tag{2}$$

Equation (2) shows that *Audit Fee* is affected by the number of internal control weakness (*Num ICW*) as well as those determinants identified in prior studies. It is expected that audit fees increase with firm size. Operating complexity is proxied by the *number of business segments* and the *number of geographic segments*. We expect the coefficients for both variables to be positive, that is, the more complex the firm, the higher the audit fee. Inherent risk is proxied by four variables – *Inventory & receivables, Current assets, Leverage,* and *Book-to-market ratio*. The predicted signs for the first three variables are positive and the predicted sign for *Book-to-market ratio* is negative. The predictions imply that audit fees increase in operating risk. Profitability is measured by *Return on assets* and external monitoring is proxied by auditor characteristics. We create an indicator variable, *Auditor,* given that Big-4 auditors are perceived to provide better audit quality (see, e.g., Khurana and Raman 2004). The industry indicator variable (*Financial industry dummy*), based on SIC codes, separates the financial industry from other industries.

Internal control weakness equation

Following Doyle et al. 2007b and Ashbaugh-Skaife et al. 2007, we adopt the following internal control weakness model:[10]

10. To ensure we have enough observations and to limit the number of parameters to be estimated, we do not include (or are unable to include in certain cases) all variables identified in Doyle et al. 2007b. For example, the values for the number of sponsored special purpose entities, acquisition value, and restructuring charge are missing for many Canadian firms as they are not required for Canadian-only listers.

$$NumICW = \beta_0 + \beta_1 Assets + \beta_2 Age + \beta_3 Num\ of\ business\ segments + \beta_4 Loss + \beta_5 Foreign\ transactions + \beta_6 Inventory + \beta_7 Audit\ committee\ score + \beta_8 Abnormal\ NPAP + \beta_9 Restatment + \beta_{10} Auditor + \beta_{11} Auditor\ change + \varepsilon \quad (3)$$

Equation (3) includes both risk and incentive factors. Regarding the proxies for risk factors, we have the following predictions: We expect that larger and older firms have fewer internal control weaknesses. Thus, the expected coefficient for *Assets* and *Age* is negative. The predicted sign for the *number of business segments* is positive, that is, as the number of business segments increases, the likelihood of having internal control weaknesses increases. *Loss* is an indicator variable, equaling one if earnings before extraordinary items is negative and zero otherwise. We also include a *foreign transaction dummy* variable and the level of *inventory*. The expected sign is positive for both variables.

Ashbaugh-Skaife et al. (2007) examine SOX 302 internal control deficiency disclosures and suggest that the disclosure decision is the trade-off between costs and benefits. They use institutional investor concentration, earnings restatement, Big-6 auditor, and litigation to proxy for the managers' incentives to discover and disclose internal control deficiencies under SOX 302. We use similar proxies for these factors to control for disclosure incentives except for litigation.[11] The variable *Audit committee score* is audit committee quality score (see Appendix 2 for the computation details). It is developed to measure the degree of compliance with the Canadian guidelines for audit committees and to proxy for audit committee oversight. Krishnan (2005) shows that audit committee quality is negatively associated with the incidence of internal control problems and Goh (2009) suggests that effective audit committees can ensure the timely remediation of material internal control weaknesses. The variable *Abnormal NPAP* measures the abnormal number of professional accountants (CA, CMA, CGA) hired by the firm and proxies for the quality of the internal control environment. The residuals of the regression employing the logarithm of the number of professional accountants on the measures of firm size, risk, complexity, etc. are defined as the abnormal number of professional accountants (*Abnormal NPAP*). We expect the signs on both variables to be negative.

Firms are more likely to be forthcoming about control problems when the quality of their financial reports has been questioned by auditors and market regulators in the past, so firms with a restatement history may have incentives to disclose internal control weaknesses (Ashbaugh-Skaife et al. 2007). We include a *Restatement* dummy variable in (3). The variable assumes a value of one if the company has at least one restatement due to errors or the change of estimates within the four fiscal years preceding the 2006 fiscal year. We collect the restatement information for Canadian firms through text searching in the DisclosureNet database.[12] We expect the sign on *Restatement* to be positive. Finally, we control for *Auditor* and *Auditor change*, dummy variables defined in Appendix 2. The expected signs are negative and positive, respectively.

11. The legal system in Canada, in contrast to that in the United States, makes it very difficult to launch class action lawsuits by investors (Jamal 2009). Thus, litigation is not a serious concern for Canadian firms and is unlikely to be an important factor driving the disclosure decision. In addition, while we do not have institutional ownership data, (3) employs audit committee score and the abnormal number of professional accountants working for the company as proxies for the quality of monitoring of management. Also, when we control for the presence of at least one large shareholder (i.e. greater than 10% of the equity outstanding which is a required Canadian disclosure), our untabulated results are the same.

12. Our search identified 399 restatement records involving in 262 Canadian firms. These restatements are due to errors or the change of estimates or the change of accounting standards. After excluding accounting standard changes, we identified for our full sample 95 firms having restatements.

Accrual quality equation

We use the following accrual quality model:

$$DDAAQ = \beta_0 + \beta_1 Audit\,Fee + \beta_2 Num\,ICW + \beta_3 Age + \beta_4 CF\,Volatility + \beta_5 Sales\,volatility + \beta_6 Audit\,committee\,score + \beta_7 Board\,of\,directors\,score + \varepsilon \quad (4)$$

DDAAQ is the same dependent variable as in the previous section. Cash flow and sales volatility are the two most significant variables correlated with unsigned unexplained accruals (Hribar and Nichols 2007). Higher volatility of cash flows and sales should lead to higher unsigned unexplained accruals, so the predicted signs for the two variables are positive. *Board of directors score* is a board of director quality score. The higher the score of *Audit committee* and *Board of directors*, the higher the quality of monitoring by audit committee and board of directors.[13] Thus, the signs for the two variables are expected to be negative.

Model fit and the measurement model

Model over fitting is frequently subject to criticism in structural equation research (e.g., Chin 1998, Brannick 1995) due to the fact that model fit can be improved in two ways, namely, specification of what paths between variables exist and specification of what variables are allowed to covary. Bollen (1989a) notes that the role of ex ante theory is more important in structural equation modeling research. Hence, we relied heavily on theory, including prior empirical studies documenting consistent empirical associations, to determine the variables we included in our measurement models ((2) to (4)). We then subject the various measurement models to both traditional OLS screening techniques (e.g., tests of multicollinearity among the variables) and structural equation model specification techniques (e.g., model convergence).[14] For the basic measurement model in Figure 1, we allow variables to covary with each other only if the relation passes the substantive test of economic intuition (e.g., *Age* of firm covaries with total *Assets*).[15] With respect to such specification searches, we ensure that improvements to the measurement models are not driven merely by indices of model fit. Indeed, we set our level for consideration of a modification index at 7 which is nearly twice the level recommended (for an elaboration, see Arbuckle and Wothke 1999).

Table 5 presents various measures of fit for the recursive path analysis models (Thompson 2000; Garson 2009). There is no consensus on what fit measures to report except that too few and too many are not appropriate. Thompson (2000: 270–71) describes the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) as being the two most informative criteria for assessing model fit and Garson (2009) advocates adding the χ^2 divided by the degrees of freedom test. The benchmarks for the goodness-of-fit measures reported in Table 5 (including the classic χ^2 test) are a CFI approaching 1 with anything over 0.90 indicating a moderately good fit, a RMSEA

13. We verified the two measures by regressing each score on a set of traditional governance variables. The test shows that both variables are significantly associated with standard governance variables. For example, *Audit committee score* is associated with audit committee size, financial expertise of audit committee, etc.; *Board of directors score* is associated with board size, percentage of independent directors, and chair/chief executive officer separation dummy variable.
14. The structural equation modeling software we employ provides a warning of model lack of convergence due to such factors as indefinite variance covariance matrices and in the case of our robustness checks using nonrecursive modeling warnings about model stability, that is, the estimates of the structural coefficients and their associated probabilities are not unique (Schaubrouck 1990).
15. For conciseness, the covariances in the measurement models are not reported but are available upon request.

TABLE 5
Fit summary for recursive path analysis

Goodness of fit criteria	
CFI*	0.927
IFI*	0.929
RMESA**	0.040 (p > 0.99)
χ^2, p-value***	351.00, 0.0001
χ^2/df****	1.76
When model estimated using asymptotic distribution assumptions:	
GFI*****	0.999
AGFI*****	0.999

Notes:

* CFI (comparative fit index) with 0.90 and above being a moderately good fit (Chau 1997). Thompson (2000) advocates a tighter standard for constructed scales (i.e., experimental or survey scales) of 0.95 and above. However we are using archival data that is inherently noisier compared to measures gathered in controlled experiments and surveys as the experimenter can directly design both the number and types of measurements taken. Archival researchers must use data that is in the public domain and is not custom crafted to suit the research questions of interest. Bollen (1989b) developed an earlier fit index called the IFI (incremental fit index) where values approaching 1 are considered excellent fits and values over 0.90 are adequate fits.

** RMSEA (root mean square error of approximation) with 0.05 being a very good fit and anything below 0.06 representing an acceptable fit (Thompson 2000). The *p*-value in bracket is a test of the null hypotheses that $p = 0.05$ and is based on a simulated distribution of RMSEA values. Other authors argue that anything less than .08 is acceptable for archival data (Chau 1997).

*** While a highly significant test result may be intuitively thought of as good, in fact in structural modeling the opposite is true. The goal is to test the null hypothesis that no improvement in the model fit is possible; hence one does not want to reject the null. However, the χ^2 test is highly sensitive to sample size. Brannick (1995: 205) states that "with large samples, it is extremely rare to find a nonsignificant chi-square". Our sample falls into the category of moderately large to large compared to samples typically employed using structural equations modeling. Hence, the finding of significant values for the χ^2 test is not surprising.

**** An alternative test to deal with the sensitivity of the χ^2 test to large sample size. The test divides χ^2 by degrees of freedom, with anything less than 3.0 being cited from simulation studies as indicating a good fit (Chau 1997).

*****Jöreskog and Sörbom (1984) developed the GFI (goodness of fit index) for structural equation models. Models that approach 1 are considered to have a good fit. The AGFI (adjusted goodness of fit index) is a modification to the GFI that considers the number of degrees of freedom in the model. Again, good fit is indicated by models that approach 1.

approaching 0 with either 0.05 or 0.08 being the benchmark of a good fit, and a nonsignificant χ^2 test result (Chau 1997; Thompson 2000; Garson 2009).[16] We also report the incremental fit index (IFI) and from our asymptotic tests the original goodness of fit (GFI) and

16. The concept of a nonsignificant $\chi 2$ may seem nonintuitive. Statistically, the test is of the null hypothesis that there is no better fitting model available and hence an insignificant finding suggests a well-fitting model. However, the $\chi 2$ test is highly sensitive to sample size (Brannick 1995: 205), that is, with large samples it is rare to find a nonsignificant $\chi 2$. Our sample size falls into the category of moderately large by structural equation modeling standards. One proposed approach to deal with the increasing sample size resulting in spurious significance is to use the criterion of $\chi 2$ divided by degrees of freedom, with anything less than 3 being shown in simulation studies as indicating a good fit (Chau 1997).

adjusted goodness of fit (AGFI) with all three having the same interpretation as the CFI.[17] Shown in Table 5, the model exhibits good fit. For example, CFI is 0.927 and RMSEA is 0.04.

For expositional purposes we proceed in the order of (2) to (4). Table 6, panel A presents the results for the audit fee model (2). H2 is supported by the significantly positive coefficient for *Num ICW*. Audit fees increase with firm size as indicated by a positive coefficient of 0.454. Panel A also reveals that audit fees increase with the following attributes: (i) complexity, as proxied by the number of business and geographical segments and (ii) inherent risk, as proxied by current assets, inventory & receivables, and leverage. Audit fees decrease with the following attributes: profitability, as proxied by return on assets, and industry, as proxied by a dummy variable used to represent financial institutions. The corresponding coefficients for these variables are all in the predicted direction and statistically significant. Panel A also reports the Squared Multiple Correlation (SMC), a pseudo R^2 measure capturing the extent of the variation explained by the model. The SMC is above 60%, suggesting that a substantial variation of audit fees is explained by the model.

Table 6, panel B reports the results for the internal control weaknesses model (3).[18] The number of reported internal control weaknesses decreases in firm size and increases in the number of business segments and the presence of foreign currency translation amounts. The corresponding coefficients are −0.070, 0.082, and 0.128. The signs on *Inventory* and *Restatement* support our predictions as well. Consistent with the results reported in Doyle et al. 2007b, we do not observe a significant association between our audit committee governance score and internal control weaknesses. *Auditor* and *Auditor change* are insignificant. The small amount of variation explained by the model (SMC = 5.1%) indicates that internal control weakness disclosures are noisy, decreasing model fit.[19]

Table 6, panel C reports the results for our accrual quality model (4). The first two rows provide unstandardized coefficients for *Num ICW* and *Audit Fee*. Both variables are significantly associated with accrual quality, supporting H1 and H3. *DDAAQ* is increasing in sales volatility. The corresponding coefficient of 0.043 is significant and in the predicted direction. We find that *board of directors score* is associated with accrual quality, with stronger boards being associated with lower levels of abnormal accruals. However, *audit committee score* continues to be insignificant.

Recursive path analysis results

Table 6 provides the unstandardized coefficients and significance levels. Figure 2 reports the standardized coefficient values. The latter allows combining direct and indirect coefficients along the paths as they are expressed in common units (standard deviations). The positive path coefficient of 0.136 from *NumIcw* to *DDAAQ* implies that a one-standard-deviation increase in *Num ICW* results in a 0.136-standard-deviation increase in *DDAAQ*. This supports the significant negative direct effect of internal control weaknesses on

17. We thank an anonymous reviewer for suggesting that we employ multiple goodness of fit measures.
18. We repeat our recursive path analysis using an indicator variable for the presence/absence of internal control weaknesses. Results are the same using this alternative definition of control weaknesses similar to that employed by Ashbaugh-Skaife et al. 2008 and others who posit the mere presence of a weakness is sufficient. However, the use of a single indicator variable as a structural variable is not recommended for structural equation modeling path analysis. Hence, we do not tabulate these results (Garson 2009; Bollen 1989a).
19. One potential source of noise is incomplete disclosures by management. We are not able to compare our model fit with Doyle et al. 2007b as they do not report the pseudo R^2 in their logistic regression. Any noise in our observed internal control weakness disclosures works against our rejecting the credibility null in tests of (4).

TABLE 6
Results for recursive path analysis

Panel A: Audit fee equation

$$\begin{aligned} Audit\ Fee = \beta_0 + \beta_1 NumICW + \beta_2 Assets + \beta_3 Inventory\&Receivables + \beta_4 Current\ assets \\ + \beta_5 Num\ of\ business\ segments + \beta_6 Num\ of\ geographic\ segments + \beta_7 Book\text{-}to\text{-}market\ ratio \\ + \beta_8 Leverage + \beta_9 Return\ on\ assets + \beta_{10} Auditor + \beta_{11} Financial\ industry\ dummy + \varepsilon \end{aligned}$$

	Pred. Sign	Unstandardized coefficient
Num ICW	H2 +	0.059**
Assets	+	*0.454****
Inventory &Receivables	+	*0.668****
Current assets	+	*0.590****
Num of business segments	+	*0.076****
Num of geographic segments	+	*0.059****
Book-to-market ratio	–	*–0.009*
Leverage	+	*0.247***
Return on assets	–	*–0.119**
Auditor	+	*0.027*
Financial industry dummy	?	*–0.350****
Squared Multiple Correlation		61.0%

Panel B: Internal control weakness equation

$$\begin{aligned} NumICW = \beta_0 + \beta_1 Assets + \beta_2 Age + \beta_3 Num\ of\ business\ segments + \beta_4 Loss + \beta_5 Foreign\ transactions \\ + \beta_6 Inventory + \beta_7 Audit\ committee\ score + \beta_8 Abnormal\ NPAP + \beta_9 Restatment + \beta_{10} Auditor \\ + \beta_{11} Auditor\ change + \varepsilon \end{aligned}$$

	Pred. Sign	Unstandardized coefficient
Assets	–	*–0.070****
Age	–	*–0.009**
Num of business segments	+	*0.082****
Loss	+	*0.044*
Foreign transactions	+	*0.128**
Inventory	+	*0.590**
Audit committee score	–	*–0.011*
Abnormal NPAP	–	*–0.039*
Restatement	+	*0.270***
Auditor	–	*–0.104*
Auditor change	+	*0.189*
Squared Multiple Correlation (SMC)		5.1%

(The table is continued on the next page.)

TABLE 6 (Continued)

Panel C: Accrual quality equation

$$DDAAQ = \beta_0 + \beta_1 Audit\ Fee + \beta_2 Num\ ICW + \beta_3 Age + \beta_4 CF\ Volatility + \beta_5 Sales\ volatility + \beta_6 Audit\ committee\ score + \beta_7 Board\ of\ directors\ score + \varepsilon$$

	Pred. Sign	Unstandardized coefficient
Audit Fee	H3 −	−0.005**
Num ICW	H1 +	0.007***
Age	−	*−0.001****
CF volatility	+	*0.001**
Sales volatility	+	*0.043****
Audit committee score	−	*−0.001*
Board of directors score	−	*−0.000***
Squared Multiple Correlation		6.80%

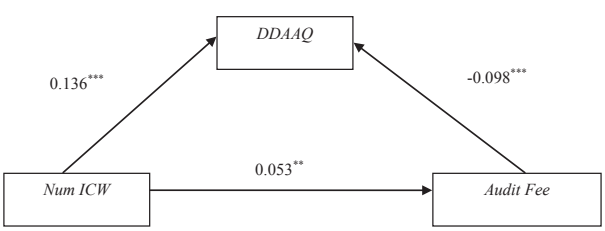
Notes:

See Appendix 2 for variable definitions. Unstandardized coefficient values are reported for all variables. See Figure 2 for standardized coefficients. *, ** and *** represent statistical significance at a one-tailed 10%, 5%, and 1% level, respectively. Squared Multiple Correlation is a pseudo R^2 measure capturing the extent of the variation explained by the recursive model (Arbuckle and Wothke 1999).

accrual quality (the inverse of *DDAAQ*) and continues to support the first hypothesis. The indirect effect is composed of the positive direct effect (path coefficient = 0.053) of the number of internal control weaknesses on audit fees (more weakness result in more substantive auditing), consistent with H2; and the direct negative effect (path coefficient = −0.098) from audit fees to *DDAAQ* (more audit effort results in fewer deliberate or accidental financial accounting errors), consistent with H3. Combining the two paths, we have a net negative indirect effect of −0.0052 (−0.098*0.053). It reduces the positive direct effect from *Num ICW* to *DDAAQ* by 4% (−0.0052/0.136). The 4% reduction may be considered as the offsetting effect of external audit on increasing accrual quality in the presence of weaknesses in the internal control system; hence, a potential measure of the value of external auditing in this specific setting. The overall positive net effect on *DDAAQ* implies an incomplete, albeit statistically significant, substitution effect between internal control strength and external audit monitoring.

The net effect is consistent with the findings of Doyle et al. 2007a, who report that the existence of SOX 302 and 404 internal control weaknesses in U.S. firms are associated

Figure 2 Recursive (unidirectional) path analysis with standardized path coefficients.



Overall positive net effect: 0.136 – 0.098*0.053 = 0.131.

with lower accrual quality. It is also consistent with the findings of Ashbaugh-Skaife et al. 2008, who demonstrate that firms reporting internal control weaknesses have lower accrual quality. Our results extend these studies by showing how audit effort can indirectly mitigate the effect of internal control design weakness on accrual quality. The increase of audit fees in response to the increase of the number of internal control design weaknesses improves accrual quality, although the size of such an effect (about 4%) is small.

6. Robustness of results

In our first robustness test we relax the assumption that audit effort is determined sequentially. We allow for nonrecursive (i.e., bidirectional) relationships to exist between our three main constructs (see solid and dashed lines in Figure 1) in a structural equation model. This provides a test of whether our results differ when allowing for endogeneity between the three path variables. In our second robustness test, we demonstrate robustness via an alternative Dechow and Dichev measure that incorporates the suggested modifications of McNichols 2002 and Ball and Shivakumar 2006. Third, we report the results from tests controlling for additional internal control risk attributes. Finally, we compare the existing results with the results based on the sample consisting of both cross-listed and Canadian-only listed firms.

Allowing for endogeneity between internal control, audit effort, and accrual quality

The original path analysis is premised on the assumption that audit effort choice is made after auditors observe internal control quality. Accrual quality is thus affected by both internal control quality and the resulting audit effort. An alternative possibility is that the planned level of accrual quality, internal control quality, and external monitoring by auditors are jointly endogenous choice variables. According to Simunic 1980 and Griffin et al. 2008, a company chooses simultaneously the level of both internal monitoring and external monitoring to reach a planned level of accrual quality ex ante. Under such a scenario, the level of accrual quality can be achieved by planning internal monitoring quality and the quality of external monitoring at the same point of time, for example, at the beginning of the year, and audit fee is an expected fee to be charged. If the monitoring investment is planned, it could be carried out in a *complementary* fashion (i.e., investing in higher levels of internal controls and external audit at the same time due to the change in the external regulatory climate). Based on this intuition, we explore the relationship among the three path variables using nonrecursive path analysis.

The nonrecursive path model is more appropriate when the time period is sufficiently long to allow all three endogenous variables to affect each other. Because we observe internal control design weaknesses for 2006 only, this assumption may not be valid in our setting. Canadian firms may not have had time to alter ICOFR in response to SOX North regulations, given the uncertainty regarding passage of 52–109. As such, the 2006 ICOFR we observe are best characterized as lagged endogenous variables which are exogenous entering the 2006 fiscal year. Thus, 2006 audit fees respond in a recursive fashion to observed 2006 ICOFR but it is less plausible that 2006 ICOFR responds to 2006 audit fees, given the above-mentioned short reaction time. This explains why we report the nonrecursive analysis as a robustness check only. A longer panel of ICOFR disclosures would be required to fully explore simultaneity as firms move to a new equilibrium in response to SOX North–related regulatory changes.

Figure 1 also presents our nonrecursive model (arrows in both directions with solid and dashed lines). If theory suggests alternative models, researchers may turn to model fit statistics showing empirically which model better fits a set of data (e.g., whether the relationship can only go in a single direction versus being bidirectional in our study). We compare the fit of the nonrecursive (bidirectional) model with the fit of the unidirectional path

analysis model. The nonrecursive model appears to better fit the data than the recursive model based on the nonrecursive model having a higher CFI and lower RMESA; moreover, the difference in χ^2 fit measures between the two models is highly statistically significant.[20] Thus, the fit evidence warrants reporting the results using nonrecursive analysis as a robustness check.

We find that the sign and the significance of the coefficients in our non-recursive path analysis continue to support our initial hypotheses (see Table 7) as well as documenting evidence of the endogenous nature of these variables. The nonrecursive path analysis reveals a pattern of significant bidirectionality, indicating the potential for two-way causality. This finding suggests that there may be both substitutes and complements effects at work in this setting. The key inferences regarding H1–H3 remain unchanged. Thus, our conclusion that Canadian internal control weaknesses are credible is not affected by allowing for endogeneity. We leave further exploration of the endogeneity issue to future research.

Alternative accrual quality measure

We create an alternative accrual quality measure, *BSAQ*, based on the following two modifications of the Dechow and Dichev model. First, following prior studies (McNichols 2002; Francis, LaFond, Olsson, and Schipper 2005; Doyle et al. 2007a), we include the current-year change in revenues and the current-year level of property, plant, and equipment as additional controls in the basic Dechow and Dichev model. Second, Ball and Shivakumar (2006) suggest that nonlinear accrual models incorporating the timely recognition of losses perform better than linear models. We create a dummy variable which equals one if current-year cash flows are negative (zero otherwise) and augment the Dechow and Dichev model by controlling for the interaction between this dummy variable and current-year cash flows. We conduct the same regression and path analysis using the *BSAQ* measure.

The untabulated results for the *BSAQ* measure using OLS and two-stage regression are robust for all variables. The standardized path coefficients for the recursive path analysis are reported in panel A of Table 8. The direct effect of *Num ICW* on *BSAQ* is positive and significant as predicted by H1 (0.091), the path from *Num ICW* to *Audit Fee* is positive and significant as predicted by H2 (0.046), and the effect of *Audit Fee* on *BSAQ* is negative and significant as predicted by H3 (−0.087). This leads to an overall positive net effect of 0.086 (0.091 + (−0.087*0.046)), which represents a 4.4% reduction over the direct positive effect. Hence, this more comprehensive accrual model leads to the same conclusion regarding disclosure credibility. For completeness, we report results from the nonrecursive bidirectional analysis in panel B. Our hypothesized results are still maintained and continue to show the significant bidirectional effects found in the previous robustness analysis.

Controls for additional factors that potentially determine Num ICW

We repeat our recursive path analysis after augmenting (3) for additional factors that potentially determine *Num ICW*.[21] To reduce the number of parameters requiring estimation, we incorporate each factor one at a time. We first control for the following two factors (see Appendix 2 for variable definition): leverage and financial industry dummy. Next, we control for additional internal control risk attributes employed by Ashbaugh-Skaife

20. A comparison of panel D of Table 7 to Table 5 indicates a CFI of 0.937 versus 0.927 and a RMESA of 0.037 versus 0.040, respectively. In addition, the nonrecursive model is a significantly better fit than the recursive model ($\chi(1) = 21.2$, $p < 0.0001$).

21. We thank an anonymous reviewer for the insight that the determinants of audit fees could also potentially be determinants of *Num ICW* and accordingly we conduct this robustness check.

TABLE 7
Results for nonrecursive (bidirectional) path analysis

Panel A: Audit fee equation

$$\begin{aligned} Audit\,Fee = {} & \beta_0 + \beta_1 DDAAQ + \beta_2 Num\,ICW + \beta_3 Assets + \beta_4 Inventory\,\&\,Receivables + \beta_5 Current\ assets \\ & + \beta_6 Num\ of\ business\ segments + \beta_7 Num\ of\ geographic\ segments + \beta_8 Book\text{-}to\text{-}marktet\ ratio \\ & + \beta_9 Leverage + \beta_{10} Return\ on\ assets + \beta_{11} Auditor + \beta_{12} Financial\ industry\ dummy + \varepsilon \end{aligned}$$

	Pred. Sign	Unstandardized coefficient
DDAAQ	+	2.963***
Num ICW	H2 +	0.154***
Assets	+	*0.488* ***
Inventory & Receivables	+	*0.521****
Current assets	+	*0.589****
Num of business segments	+	*0.060****
Num of geographic segments	+	*0.052****
Book-to-market ratio	–	*–0.008*
Leverage	+	*0.261***
Return on assets	–	*–0.045*
Auditor	+	*0.025*
Financial industry dummy	?	*–0.365****

Panel B: Internal control weakness equation

$$\begin{aligned} NumICW = {} & \beta_0 + \beta_1 DDAAQ + \beta_2 Audit\ Fee + \beta_3 Age + \beta_4 Num\ of\ business\ segments + \beta_5 Loss \\ & + \beta_6 Foreign\ transactions + \beta_7 Inventory + \beta_8 Audit\ committee\ score + \beta_9 Abnormal\ NPAP \\ & + \beta_{10} Restatment + \beta_{11} Auditor + \beta_{12} Auditor\ change + \varepsilon \end{aligned}$$

	Pred. Sign	Unstandardized coefficient
DDAAQ	–	–7.995***
Audit Fee	–	–0.349***
Age	–	*–0.016****
Num of business segments	+	*0.149****
Loss	+	*0.127*
Foreign transactions	+	*0.220***
Inventory	+	*1.466****
Audit committee score	–	*–0.014*
Abnormal NPAP	–	*0.023*
Restatement	+	*0.376***
Auditor	–	*–0.104*
Auditor change	+	*0.128*

(The table is continued on the next page.)

TABLE 7 (Continued)

Panel C: Accrual quality equation

$$DDAAQ = \beta_0 + \beta_1 Audit\ Fee + \beta_2 Num\ ICW + \beta_3 Age + \beta_4 CF\ Volatility + \beta_5 Sales\ volatility + \beta_6 Audit\ committee\ score + \beta_7 Board\ of\ directors\ score + \varepsilon$$

	Pred. Sign	Unstandardized coefficient
Audit Fee	H3 −	−0.009***
Num ICW	H1 +	0.027***
Age	−	*−0.001**
CF volatility	+	*0.001**
Sales volatility	+	*0.042****
Audit committee score	−	*−0.001*
Board of directors score	−	*0.000*

Panel D: Goodness of fit criteria

CFI	0.937
IFI	0.940
RMESA	0.037 (p > 0.99)
χ^2, p-value	327.21, 0.0001
χ^2/df	1.653
Stability Index#	0.30
When model estimated using asymptotic distribution assumptions:	
GFI	0.999
AGFI	0.999

Notes:

The table presents results for a non-recursive path analysis. See Appendix 2 for variable definitions. Unstandardized coefficient values are reported for all variables including the path variables (*Audit Fee*, *Num ICW*, and *DDAAQ*). *, ** and *** represent statistical significance at a one-tailed 10%, 5%, and 1% level, respectively. SMC computations in AMOS are not reliable in the case of nonrecursive models and hence are not reported (Arbuckle and Wothke 1999 and see also http://www.amosdevelopment.com/support/faq/how_compute_smc.htm assessed on June 4, 2010). Further there is controversy in the literature about how to compute them in the cases of
nonrecursive models (e.g., Bentler and Raykov 2000).

Stability index indicates whether a nonrecursive model has a reliable solution. Values range from negative to positive infinity with values ranging from −1 to positive 1 considered acceptable and the closer to 0 the better (Arbuckle and Wothke 1999).

et al. 2007: growth, measured as the average growth in sales from 2004 to 2006, and *Z*-score, the Altman 1980 *Z*-score measure of distress risk. Our recursive path analysis shows that none of the coefficients on these additional control variables are significant. Further, the inclusion of these variables does not change any of our inferences regarding H1–H3 using recursive path analysis.

Robustness check using both cross listed and Canadian-only listed firms

Cross-listed firms are much larger than Canadian-only listed firms. The median total assets of the non-cross-listed firms is $235 million while the median total assets for the

TABLE 8
Standardized coefficients for *BSAQ* path models robustness check

Panel A: Recursive analysis	
Num ICW — BSAQ	0.091 **
Num ICW — Audit Fee	0.046*
Audit Fee — BSAQ	−0.087**
Model fit:	CFI = 0.928,
	IFI = 0.930,
	RMSEA = 0.040 (p > 0.99),
	$\chi^2(182) = 1.744$ (p < 0.001)
Panel B: Non-recursive analysis	
Num ICW — BSAQ	0.388***
Num ICW — Audit Fee	0.115***
Audit Fee — BSAQ	−0.193***
BSAQ — Num ICW	−0.324***
BSAQ — Audit Fee	0.139***
Audit Fee — Num ICW	−0.273***
Model fit:	CFI = 0.999,
	IFI = 0.999,
	RMSEA = 0.043 (p > 0.96),
	$\chi^2(198) = 1.850$ (p < 0.001),
	Stability Index = 0.186.

Notes:

The table presents the standardized path coefficients with *DDAAQ* replaced by *BSAQ*, and alternative accrual quality measure. See Appendix 2 for variable definitions and Figure 1 for predicted signs. Model fit statistics are defined in Table 5. *, ** and *** represent statistical significance at a one-tailed 10%, 5%, and 1% level, respectively.

cross-listed firms is $633 million. In untabulated analysis, we observe that slightly more non-cross-listed firms (24%) versus cross-listed firms (19%) disclose control weaknesses; however, this difference is not statistically significant. The firms cross-listed in the United States are subject to the more strict SOX regulations which may make the disclosures more credible. This makes cross-listed firms an interesting benchmark sample. We thus conduct analysis using the sample consisting of both cross-listed and Canadian-only listed firms (603 observations in total). In our OLS regression analysis, we add an interaction term *Crosslist*Num ICW* in (1) to capture the incremental effect of cross-listing. The interaction term is significantly positive with t-value = 1.52, suggesting that the association between internal control weakness and accrual quality is slightly stronger for the cross-listed firms than Canadian-only listed firms in OLS regression. However, when we repeat the analysis for the 603 observations using the two-stage regression approach (as in Table 4), we do not observe a significant difference in the association between *Num ICW* and accrual quality between cross-listed and non-cross-listed firms. In addition, all our results from the path analysis reported above are robust to this full sample. Of the 133 cross-listed firms, 18 firms have market capitalization smaller than $75 million, qualifying as nonaccelerated filers under SOX 404. Hence, under Canadian regulations these 18 firms must comply with 52–109 while also complying with U.S. SOX 302. Again, reclassifying these 18 firms as Canadian-only firms or deleting them does not change our inferences.

The above analysis, while preliminary, does not suggest a substantial amount of credibility enhancement when firms are subject to the stricter and more comprehensive U.S. reporting requirements for ICOFR. We leave it to future research to investigate whether adding implementation testing and management certification to SOX North (as was required in 2008 but not substantially implemented until 2009) results in an increase in credibility.

7. Conclusions

We examine a unique Canadian setting where 2006 ICOFR disclosures are provided to investors without a definition of a design weakness to be reported, without control implementation effectiveness testing, no management certification of the completeness of the disclosures and no external audit of such disclosures. The one offsetting credibility enhancing mechanism was the requirement to place the design weakness disclosures, if any, in MD&A. The MD&A has to be approved by the audit committee and the board of directors and hence such disclosures would be reviewed by these corporate governance actors. Though the costs of such disclosures are lower than in the U.S. SOX 302/404 settings, the credibility of these disclosures is far from assured and hence poses an important empirical issue for regulators interested in the benefit versus cost trade-off of various disclosure regimes. Hence, this setting required us to carefully consider the potential for substitution between internal and external monitoring both theoretically and empirically.

Using OLS and two-stage regressions, we find evidence that the disclosures are credible as there is a negative association between internal control weaknesses and accrual quality. In addition, our recursive path analysis reveals an offsetting net indirect effect from internal control weakness to accrual quality via audit effort. This substitution effect of increased external monitoring in the presence of control weaknesses is modest and hence still leaves a significant net negative effect of internal control weakness on accrual quality, consistent with the OLS regression analysis. Thus, our recursive path analysis also suggests that the disclosures are credible. The overall negative net effect suggests that the substitution effect is incomplete, consistent with the view of regulators. This constitutes per se evidence justifying some form of internal control disclosure for investors.

SOX North was motivated by having a large number of relatively small-cap firms on the two Canadian stock exchanges, thus searching for a cost effective method of providing enhanced integrity at lower cost than the SOX 404 regime. Among the implications of our research is that, if other international jurisdictions are searching for alternatives to SOX 404–like regimes, our evidence regarding credibility would suggest that there is some benefit to unaudited disclosures that are subject to audit committee and board approval. This is an important result because the concern with noncompliant SOX 302 disclosures is evident in both the regulatory literature (see SEC Release Number 33-8934 published in June 2008) and the academic literature (e.g., Ashbaugh-Skaife et al. 2007; Gong, Ke, and Yu 2007).

There are limitations to our research. We assume that audit fees fully capture any change in audit effort while we know that fees reflect other factors as well. We also have all the limitations that are standard when assuming the discretionary accruals models capture accrual quality. This concern is mitigated in our research by finding consistent results across different accrual models. Finally, we assume that internal control systems are stable over the 2001–2006 period. This internal control stability assumption is common to the SOX 302/404 literature and hence any biases are likely to be similar. Indeed, given the uncertainty surrounding passage and implementation of 52–109, changes to controls in expectation of such regulatory change are potentially less likely than in the SOX environment.

Overall, the finding that SOX North disclosures are effective provides some comfort to non-U.S. regulators that SOX 404 approach is not the only way to gain improved financial reporting quality. Whether these benefits could be achieved in other

international settings with different institutional arrangements than Canada remains to be seen. The 2008 enhancements to SOX North to include implementation effectiveness testing provide an opportunity for future researchers to determine whether design tests alone provide most of the benefit from internal control effectiveness disclosures.

Appendix 1

Canadian internal control disclosures examples under 52–109

Example 1: Aeaon Group

Internal Control over Financial Reporting

As at the financial year ended December 31, 2006, the chief executive officer (CEO) and chief financial officer (CFO) evaluated the design of the company's internal control over financial reporting. Based on that evaluation, the CEO and the CFO concluded that the design of internal control over financial reporting was effective as at December 31, 2006, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with Canadian GAAP.

There have been no changes in the company's internal control over financial reporting that occurred during the most recent interim period ended December 31, 2006, that have materially affected, or are reasonably likely to materially affect, the company's internal control over financial reporting.

Example 2: Gendis Inc.

The CEO and the CFO have concluded, based on their evaluations, that the corporation's disclosure controls and procedures are sufficiently effective to provide reasonable assurance that material information has been disclosed in the corporation's annual filings for the year ended January 31, 2007.

The CEO and the CFO have concluded, based on their evaluations, that the corporation's internal controls over financial reporting have been sufficiently designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with the issuer's GAAP with the following identified weaknesses.

- Effective internal control requires that the functions of authorizing transactions, recording transactions, control over the custody of assets, and the account reconciliation process be conducted by different personnel. There are insufficient personnel to accomplish this requirement. The corporation has a small staff complement of eight employees and accordingly it is impractical to achieve proper segregation of incompatible functions in all transaction cycles.
- The corporation employs only one individual with the requisite financial skills and competence to determine the appropriate critical accounting estimates in accordance with GAAP for the compilation of the corporation's financial statements. As a result, the calculations and conclusions are not independently verified by other personnel in two critical accounting processes, namely:

1. The determination of the accounting and disclosure of the investment balances and income from flow-through entities investment and
2. The determination of the accounting for the income tax provision, balances, and related ancillary note disclosure.

The limited staff complement requires that the company's senior management actively participate in most aspects of each transaction cycle. Consequently there is an inherent

risk of management overriding controls and procedures. The nature of an internal control exception from the lack of segregation of incompatible functions could be so pervasive that a material error could occur and not be detected on a timely basis in any transaction cycle. Also, the lack of independent verification of the two critical accounting processes noted above could result in a material error in investment balances, income from flow-through entities investments, the income tax provision, tax balances, and related ancillary note disclosure not being detected on a timely basis.

Potential solutions to these internal exceptions would ordinarily involve hiring additional staff or engaging independent qualified accountants on a consulting basis. At this time, the board of directors has determined that these remedies are not cost effective in relation to the risk of material misstatement.

The chairman, president, and CEO and the vice president, finance, and comptroller have filed certificates in SEDAR as required under Multilateral Instrument 52-316 regarding assertions on material facts, assertions on the fair presentation of the company's financial statements, acknowledgements on the design and effectiveness of disclosure controls and procedures, and acknowledgements on the design of internal control over financial reporting.

The company's independent auditors have reported to shareholders, based on Canadian Generally Accepted Auditing Standards, their opinion on the fair presentation of the company's financial statements in accordance with Canadian GAAP.

Appendix 2

Variable definitions

Variable Names	Definitions and Estimations
Dependent (or path) variables	
Audit Fee	Logarithm of total audit fee for the fiscal year 2006.
BSAQ	The average of the absolute value of the residuals from the Dechow and Dichev model modified by McNichols (2002), Francis et al. (2005), and Ball and Shivakumar (2006). The measure is estimated in cross section from 2001–2006 by Fama-French industries and by year.
DDAAQ	The average of the absolute value of the residuals from the Dechow and Dichev accrual quality measure, estimated in cross section from 2001–2006 by Fama-French industries and by year.
Num ICW	Number of internal control weakness self-reported by the firm in its Management Discussion & Analysis. Collected by hand from annual reports.
Control variables	
Abnormal NPAP	Abnormal number of professional accountants. The residuals of the regression of the logarithm of the number of professional accountants on the measures of firm size, risk, and complexity.

(The table is continued on the next page.)

Appendix 2 (Continued)

Variable Names	Definitions and Estimations
Audit committee score	Audit committee quality score is a linear composite score for compliance with best practices recommended by the Canadian Securities Administrator 2004. Examples are: All members of the committee are independent, financially literate, etc. Collected by hand from proxy statements.
Age	The logarithm of the number of years that the firm is publicly traded.
Assets	Logarithm of total assets at the end of fiscal year 2006.
Auditor	Big-4 auditor indicator variable.
Auditor change	An indicator variable, 1 if there is a change in auditor in fiscal year 2006 compared to the prior year, 0 otherwise.
Board of directors score	Board of directors quality score is a linear composite score for compliance with best practices recommended by the Canadian Securities Administrators (NP 58-101 and 58-201). Examples are: Is the chair of the board not the chief executive officer or president, is the compensation committee made up of non-management and a majority of independent directors, etc. Collected by hand from proxy statements.
Book-to-market ratio	Book to Market ratio. Book value divided by the market value at the end of fiscal year 2006.
CF volatility	The standard deviation of cash from operations (Compustat data item #308), scaled by average assets, from 2001–2005.
Current assets	Current Assets divided by total assets
Financial industry dummy	Financial industry indicator variable; 1 if financial firms, 0 otherwise.
Foreign transactions dummy	An indicator variable which equals 1 if the firm has a nonzero foreign currency translation in fiscal year 2006, and 0 otherwise.
Inventory	Inventory scaled by total assets at the end of fiscal year 2006.
Inventory & Receivables	Account Receivable and Inventory scaled by total assets at the end of fiscal year 2006.
Leverage	Long term debt plus short term debt divided by total assets.
Loss	An indicator variable; 1 if the average of earnings before extraordinary items in fiscal years 2005 and 2006 is negative, 0 otherwise.
Num of business segments	The number of business segments collected from the financial statements.

(The table is continued on the next page.)

Appendix 2 (Continued)

Variable Names	Definitions and Estimations
Num of geographic segments	The number of geographic segments collected from the financial statements.
Restatement	An indicator variable, 1 if the company has at least one earnings restatement due to errors or the change of estimates involving the four fiscal years preceding fiscal year 2006, 0 otherwise.
Return on assets	Net income divided by total assets.
Sales volatility	The standard deviation of sales (COMPUSTAT data item #12), scaled by average assets from 2001–2005

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