

The Effects of Fraud and Going-concern Risk on Auditors' Assessments of the Risk of Material  
Misstatement and Resulting Audit Procedures

Allen D. Blay  
Florida State University

L. Dwight Sneathen, Jr.  
Georgia Southern University

and

Tim Kizirian  
California State University, Chico

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# The Effects of Fraud and Going-concern Risk on Auditors' Assessments of the Risk of Material Misstatement and Resulting Audit Procedures

## Abstract

This study uses audit file data to analyze the association between the auditors' preliminary assessments of going-concern and fraud risk and the planning and performance of the financial statement audit. We analyze the association between the above risks and the auditor's assessment of the risk of material misstatement (RMM) within the revenue cycle, and examine whether going-concern and fraud risk assessments have an effect on the persuasiveness, timing and extent of audit evidence gathered. Our results indicate that both fraud risk and going-concern risk are significantly related to RMM. Our results also indicate that although the effect of fraud risk is fully mediated by the RMM, moderate going-concern risk remains significantly related to our proxies for the persuasiveness and timing of audit evidence, even after controlling for RMM.

**Key words:** Audit risk, going-concern, fraud, audit evidence, International Accounting Standards, nature, timing, extent.

**Data availability:** The data was obtained via a confidentiality agreement with the providing audit firm. As a result, revealing the identity of the providing firm and disseminating the data is prohibited.

## INTRODUCTION

Auditing standards indicate that the planning and performance of an audit should be related to the risks present in the audit (AICPA, 1983, IAASB, 2004C). These risks include not only the inherent and control risk identified in the Audit Risk Model, but also the client's business risk (Johnstone, 2000; Public Oversight Board, 2000). Most client business risks eventually have consequences to the financial statements, and authoritative guidance specifically states that the auditor should consider the effect of client business risk in planning the audit (AICPA, 2006A, IAASB, 2004B). Thus, the association between client business risk and evidential planning is important to both standard setters and practitioners.

In this study, we use audit file data to analyze the association between the auditors' preliminary assessments of the client's ability to continue (going-concern risk) and fraud risk and the performance of the revenue cycle audit<sup>1</sup>. Prior archival research on the association between client risks and audit evidence is mixed. Mock and Wright (1993, 1999) document that there does not appear to be a clear association between auditee risk and audit plans. Bedard and Johnstone (2004) find a clear link between earnings manipulation risk and the extent of testing, while Elder and Allen (2003) find a significant association between inherent risk and sample sizes, but only limited evidence of a relationship between control risk and sample sizes. Fukukawa, Mock and Wright (2006), as well as Mock and Turner (2005), document an association between some specific client business risks, and specific fraud risks, and the nature, timing, extent, and staffing decisions reached in an audit. However, Fukukawa et al. continue to find no association between the majority of specific client risks they examine and audit planning, and the majority of prior studies have been unable to test the link between client business risk and the nature and timing of audit effort.

Our study contributes to research on the links between risk assessment and audit evidence by linking two separate risks first to the evidence gathered in the audit, and finally by testing whether the

link between these individual risks and evidence is fully mediated by the auditor's assessed risk of material misstatement (RMM).

We choose to study the going-concern risk assessment and the fraud risk assessment for several reasons. First, standard setters have identified both going-concern and fraud as pervasive inherent risks that affect all areas of the audit (AICPA, 1990; IAASB, 2004A; IAASB, 2004D). Second, authoritative guidance specifically require the auditor to consider these risks, thus both client risk assessments should be relevant in all financial statement audits. (AICPA, 1988, 2002A; IAASB, 2004A; IAASB, 2004D) International Standards on Auditing 240 paragraph 64 specifically states that the auditor's response to fraud should affect the nature and extent of audit testing. Finally, the going-concern risk assessment and the fraud risk assessment have significantly different implications for the audit. Going-concern risk primarily affects the auditors' expectations regarding the client's future and assessments of current period disclosures, and is less clearly related to audit evidence, whereas authoritative standards on fraud risk suggest specific changes to the nature of audit procedures (e.g., AICPA, 2002A; IAASB, 2004A). Thus, studying two pervasive business risks with different implications within the Audit Risk Model allows us to analyze the auditor's assessment of different risks and how these risks affect judgments related to the RMM and resulting audit procedures.

We choose the revenue cycle for our testing for several reasons. First, the data-providing auditing firm considers revenue to be critical to the prevention of audit failure. Second, the revenue cycle is important to both fraud risk and going-concern risk. ISA 240 (IAASB, 2004A) paragraph 60 states that the auditor "presumes that there are risks of fraud in revenue recognition..." Third, risk assessment and audit testing is highly variable in the revenue cycle, thus this cycle will allow us to have more powerful tests due to the auditor's ability to significantly vary the nature, timing and extent

of substantive testing. Finally, choosing a single cycle enabled us to gather more detailed information regarding the persuasiveness (evidential independence), timing and extent of audit testing<sup>2</sup>.

Our study analyzes audit level data for 78 U.S. technology firms from a single office of a Big4 assurance services firm. Our sample provides an opportunity to examine fraud and going-concern risk in an industry where these risk factors are more prevalent. The analysis utilizes the different levels of going concern risk-assessment in an attempt to examine if there are differential relations between high and moderate levels of risk. Our results indicate that elevated fraud risk and going-concern risk are significantly related to changes in the persuasiveness and timing of audit evidence. Further, our results indicate that although the relation between fraud and high going-concern risk and audit evidence is fully mediated by assessments of RMM, moderate levels of going-concern risk, which were not statistically related to RMM, are significantly related to our proxies for the persuasiveness (nature) and timing of audit evidence, even after controlling for RMM. These results demonstrate the importance of studying different levels of auditee risk. In addition, we propose that the association between moderate going-concern risk and the collection of audit evidence beyond the mediating effects of RMM is indicative of the dynamic nature of the auditor's response to going-concern risk.

The remainder of the paper proceeds as follows. First, we discuss relevant literature and develop hypotheses. Next, we discuss the data and present results. Finally, we discuss implications, limitations, and conclusions.

## **HYPOTHESIS DEVELOPMENT**

An effective and efficient audit requires the proper assessment of auditee risks and the proper allocation of audit effort subsequent to risk assessment (Bedard, Mock, and Wright, 1999). The importance of auditee risk assessment can be seen in the attention paid by the Auditing Standards Board (2006A), the Public Company Accounting Oversight Board (PCAOB), and the International

Auditing and Assurance Standards Board (IAASB). SAS 47 (AICPA, 1983) proposes the Audit Risk Model (ARM) which allows the auditor to quantify overall audit risk by assessing two broad auditee risks (inherent and control risk), and planning the audit to control a third risk (detection risk).

International audit standards refer more generally to Risks of Material Misstatement. These risks could be categorized into the U.S. risk scheme of inherent and control related risks (e.g., Kizirian, Mayhew, and Sneathen, 2005).

### *Business Risk Assessment*

Two assessments of client business risk specifically mentioned in the audit standards are the auditor's consideration of a client's ability to continue (the going-concern assessment) and the auditor's consideration of the likelihood of fraud. The AICPA and the IAASB identify both of these risks as pervasive risk factors, meaning they affect many areas of the audit (AICPA, 1990; IAASB, 2004A; IAASB, 2004D). Although the ARM is widely used by practitioners as a guideline for audit planning, it does not specifically account for assessments of auditor or client business risks outside of the assessments of inherent risk (IR) and control risk (CR). Thus, as auditors identify risks in the audit, they must impound these risks in their assessment of control risk, inherent risk, or both (RMM). Because of this, the ARM has been criticized as not comprehensively representing the factors auditors consider in audit planning.

### *Risk assessment and audit evidence*

Identified auditee risk is explicitly linked to audit procedures in Generally Accepted Auditing Standards (AICPA, 1983). Auditors are able to adjust three primary characteristics of audit evidence to improve the sufficiency of testing: the nature of audit evidence collected, the timing of evidence collection and the extent of evidence collected (AICPA, 2006B; IAASB, 2004C). Standard setters specifically address the issue of linking risks to the nature, timing and extent of audit procedures

(AICPA, 2006B; IAASB, 2004B)<sup>3</sup>. The AICPA standard on audit evidence (2006A) was issued with the intent to improve the link between assessed risk and audit testing by requiring auditors to document the purpose of audit tests and how the test relates to an assessed auditee risk. This association between the risk being addressed and the purpose of the test implies that audit procedures should be chosen by auditors to specifically test assertions relevant to specific risks. This does not necessarily imply that auditors will perform **more** substantive procedures when faced with pervasive client business risks, but will perform procedures targeted directly to address the risks. Although prior literature on audit effort has sometimes found significant links between risk and the extent of testing, the majority of these risks are related to specific risks at the assertion level, not pervasive risks (e.g. Houston, 1999; Quadackers, Mock, and Maijoor, 1996). Although Bedard and Johnstone (2004) find a clear association between earnings management risk and audit hours and Kizirian et al. (2005) document an association between management integrity and audit planning, the majority of prior archival research related to pervasive risk factors has found a weak association between risk assessment and the extent of testing (e.g. Mock and Wright 1993, 1999; Fukukawa et al., 2005). In addition, neither Elder and Allen (2003) nor Johnstone and Bedard (2001) find evidence of a link between fraud risk assessment and extent of testing. One potential explanation for this is that pervasive business risk factors, such as going-concern risk and fraud risk, affect the nature and timing of auditor's substantive procedures, but not the extent of testing. As an example, Summers and Sweeney (1998) suggest that the collection of external audit evidence may improve the likelihood of detecting fraud. This would result in a shift in the persuasiveness (nature) of audit evidence. This argument is consistent with SAS 99 (AICPA, 2002A) and ISA 500 (IAASB, 2004D), which indicate that auditors should evaluate evidence critically, carefully considering the source of the evidence. Thus, based on prior literature and auditing standards, we hypothesize that the persuasiveness aspect of the nature of audit evidence will be affected by going-

concern and fraud risk. Likewise, SAS 59 (AICPA, 1988) and ISA 570 (IAASB, 2002E) indicate that subsequent results often provide evidence related to the client's ability to continue, thus going-concern risk would be closely related to the timing of tests. The above discussion suggests the following hypotheses:

- H1: a. The *persuasiveness* of audit evidence is affected by fraud and going-concern risk.**
- b. The *timing* of audit testing is affected by fraud and going-concern risk.**
- c. The *extent* of audit testing is not affected by fraud and going-concern risk.**

The hypotheses above predict a direct link between pervasive client risks and the persuasiveness and timing of audit evidence. However, audit risk in the U.S. is defined as a function of inherent risk, control risk, and detection risk, implying that the interaction of IR and CR encompasses all auditee risks helping to determine what testing (detection risk) is necessary to achieve sufficient, competent audit evidence. Similar conclusions can be reached from International Auditing Standards related to RMM. As such, once the effect of specific pervasive risks, such as fraud and going-concern risk, on assessed RMM is controlled for, the predictions made in H2 may no longer hold. However, there is no empirical evidence that directly tests this relation.

Thus, an additional research question we address is whether the auditors' assessment of RMM mediates the effect of specific pervasive risks on audit evidence. A construct is a mediator if it accounts for a relation between an independent and a dependent variable (Baron and Kenny, 1986). Figure 1 presents a model of the effects of going-concern and fraud risk on audit evidence. Baron and Kenny (1986) indicate that three relations must be shown to demonstrate that RMM mediates the relation between fraud and going-concern risk and audit evidence: (1) going-concern and fraud risk are associated with RMM; (2) RMM is associated with audit evidence; and (3) after controlling for RMM, a previously significant association between going-concern and fraud risk with audit evidence is no



longer significant. Evidence that RMM fully mediates the association between pervasive risks and audit evidence could provide some indication that the general framework for audit risk assessment adequately describes current practice. However, evidence that specific pervasive risks affect audit procedures beyond their effect on RMM could provide evidence that the current standards should be extended to include guidance on linking specific pervasive risks and RMM. In line with current standards, we propose the following hypotheses<sup>4</sup>:

**H2: a. RMM fully mediates the association between fraud and going-concern risk and the persuasiveness of audit evidence.**

**b. RMM fully mediates the association between fraud and going-concern risk and the timing of audit evidence.**

### **III. Research Design and Analysis**

#### *Data*

The data for this study was obtained from a participating Big 4 firm in the U.S. The firm allowed access to all of its audit files from a single office under a confidentiality agreement. We selected audits randomly using a number generator, and arrived at a sample of 78 audits from 1996-1999. The clients selected were all U.S. technology-based firms, which provided an appropriate sample for examining going-concern risk and fraud risk<sup>5</sup>. No client was selected twice, and 66 of the clients are publicly traded<sup>6</sup>. No audit was a first-year audit, and the average time the firm served as auditor was seven years. All audits had December 31 year ends. Among the audits, 14 received audit opinions modified for going-concern uncertainty, the remainder received standard unqualified opinions. In making risk assessments, the firm assesses auditee risk at both the financial statement level and at the cycle level. For the purposes of this study, we chose to use the revenue cycle because of the importance of going-concern risk and fraud risk in that cycle<sup>7</sup>.

All variables used in this study were gathered by the authors from the audit files for these clients. Firm personnel assisted and indicated that all risk judgments are made by auditors at the senior level or above, and that the auditors making the risk assessments were actively involved in the planning of the audit. The variables used in this study were coded with the firm, and independently corroborated by 2 of the researchers with no disagreement. The firm described the precise meaning of each risk assessment and audit procedure, thus no researcher judgment was used in determining the actual meanings of any variables.

*Models and variable specification*      Audit evidence

We hypothesized that fraud risk and going-concern risk would be related to the persuasiveness (nature) and timing of audit evidence gathered, but not related to the extent of evidence gathered. To test these hypotheses, we estimated the following regressions:

$$\begin{aligned} \text{PERSUASIVE}_i = & \beta_{0i} + \beta_1 \text{GC\_HI}_i + \beta_2 \text{GC\_MOD}_i + \beta_3 \text{FRAUD}_i + \beta_4 \text{REVRANK}_i \\ & \quad (?) \quad (+) \quad (+) \quad (+) \quad (?) \\ & + \beta_5 \text{TENURE}_i + \beta_6 \text{PUBLIC}_i + \beta_7 \text{INDUSTRY}_i + \beta_8 \text{ROA}_i + \beta_9 \text{PROFIT}_i + e_i \\ & \quad (?) \quad (?) \quad (?) \quad (?) \quad (?) \end{aligned} \quad (1)$$

$$\begin{aligned} \text{TIMING}_i = & \beta_{0i} + \beta_1 \text{GC\_HI}_i + \beta_2 \text{GC\_MOD}_i + \beta_3 \text{FRAUD}_i + \beta_4 \text{REVRANK}_i \\ & \quad (?) \quad (+) \quad (+) \quad (+) \quad (-) \\ & + \beta_5 \text{TENURE}_i + \beta_6 \text{PUBLIC}_i + \beta_7 \text{INDUSTRY}_i + \beta_8 \text{ROA}_i + \beta_9 \text{PROFIT}_i + e_i \\ & \quad (-) \quad (?) \quad (?) \quad (?) \quad (?) \end{aligned} \quad (2)$$

$$\begin{aligned} \text{EXTENT}_i = & \beta_{0i} + \beta_1 \text{GC\_HI}_i + \beta_2 \text{GC\_MOD}_i + \beta_3 \text{FRAUD}_i + \beta_4 \text{REVRANK}_i \\ & \quad (?) \quad (+) \quad (+) \quad (+) \quad (+) \\ & + \beta_5 \text{TENURE}_i + \beta_6 \text{PUBLIC}_i + \beta_7 \text{INDUSTRY}_i + \beta_8 \text{ROA}_i + \beta_9 \text{PROFIT}_i + e_i \\ & \quad (-) \quad (?) \quad (?) \quad (?) \quad (?) \end{aligned} \quad (3)$$

Because persuasiveness, timing and extent cannot be directly measured, we used proxies from the audit file to represent the constructs. To proxy for persuasiveness, we use a measure of the independence of the evidence (PERSUASIVE), in line with SAS 31's hierarchy of audit evidence that

indicates evidence from independent sources is more reliable than evidence collected from the client. We categorized all audit procedures from the revenue cycle using a three-point scale with the least independent evidence (internal evidence) equal to one, and the most independent evidence (external evidence) equal to three. Mixed evidence, such as a bank statement obtained directly from the client, was coded as a two. The PERSUASIVE variable was calculated as the average rating of all evidence documented in the audit file for the revenue cycle. The higher the value of PERSUASIVE, the more independent the evidence collected, on average<sup>8,9</sup>.

TIMING equals the proportion of revenue cycle audit hours conducted at the client's fiscal year-end relative to total revenue cycle audit hours. As an example, if the firm conducted 40 percent of the audit hours at year-end, and 60 percent during interim testing, the TIMING variable would have a value of 40. This definition is consistent with both SAS 110 (AICPA, 2006C) and ISA 330 (IAASB, 2004C), which define timing as "when audit procedures are performed." ISA 330 states, "The higher the risk of material misstatement, the more likely it is that the auditor may decide it is more effective to perform substantive procedures nearer to, or at, the period end." Thus, we would expect that an increase in risk would shift the proportion of audit hours closer to fiscal year-end. Because all observations in our sample have December 31 year ends, and all observations are technology based, this provides us with some assurance that the risks in the audit, and not staffing or other concerns, is the driving factor in the timing decision. In addition, we control for other possible explanations, such as public companies or loss firms. Consistent with prior literature, we use total revenue cycle audit hours as the EXTENT variable (e.g., Joyce, 1976; Houston, 1999). This is also consistent with the definition of extent as the quantity of information gathered (IAASB, 2004C; AICPA 2006C)

Going-concern risk (GC) and fraud risk (FRAUD) are assessed by the auditor during audit planning on a 0-2 scale of low, moderate or high. Because the audit firm does not in general accept

clients with high fraud risk, we define fraud risk as either low or moderate in our study<sup>10</sup>. To enable us to determine differential effects of risk levels on evidence gathering, we include separate dummy variables for moderate and high going-concern risk (GC\_MOD and GC\_HIGH)<sup>11</sup>. To control for other possible explanations, we include variables that may be related to auditee risk, risk of errors and evidence gathering in the revenue cycle.

To control for client size, we rank the firms in the sample based on total revenues (REVRANK) for the audit year. Prior research has shown that firm size is correlated with both risk and audit evidence (Bell et al. 1994). Larger companies often have more sophisticated internal control systems and more outside regulation, leading to lower levels of inherent and control risk. However, greater revenues may also increase the inherent risk in the revenue cycle. We predict that for larger clients (REVRANK), more testing will be performed, but that because of the size of the audit, a larger percentage will be conducted at interim. Therefore, we predict that REVRANK will be negative in equation (2) and positive in equation (3).

Auditor tenure (TENURE) is also significantly related to risk in the audit due to learning over time (O'Keefe et al. 1994), although findings indicate that audit failures also increase with longer auditor tenure. Increased auditor tenure will result in the auditor having a better understanding of the client, thus leading to less testing at an earlier time. Therefore, we predict that TENURE will be negative in equations (2) and (3).

We also control for whether the client is publicly traded (PUBLIC). Although publicly traded clients may be subject to more regulation, litigation is also more common for publicly traded companies (Palmrose, 1988). Thus, although better controls may decrease the RMM, more litigation risk may increase auditor risk. In our sample, 66 of the 78 audits are of publicly traded clients, thus

there is very little variability in the sample and therefore we may not obtain a significant association between public status and audit evidence.

To control for any systematic differences in risk between industries, we also include a 0/1 dummy variable for industry (INDUSTRY). All the firms in our sample were technology-based, however they were distributed between biotech and computer technology. We do not hypothesize a sign on the industry variable.

As final controls, we include firm return on assets (ROA) and a 0/1 dummy variable for positive net income (PROFIT). Prior literature has shown a positive association between financial distress and assessed auditee risk (Carcello and Palmrose, 1994). Therefore, to control for any effects of financial distress, and profitability in general, we include the ROA control variable and the PROFIT dummy. We do not make predictions on a sign for the profitability control variables.

To further test the *incremental* effect of fraud risk and going-concern risk on the gathering of audit evidence, we re-estimated equations (1) - (3) including a variable to represent the risk of material misstatement. Inherent risk (IR) and control risk (CR) are measured as the auditor's preliminary assessed level of inherent risk and control risk in the revenue cycle on a 0-2 scale of low, moderate, or high. IR and CR are multiplicative in the ARM, indicating that the *interaction* of these assessed risks is critical in assessing detection risk. A client with a high level of IR, but a low assessed CR would therefore have substantially reduced testing relative to a client with high assessed levels of both risks. Therefore, to test whether the ARM adequately describes the effect of pervasive risks such as fraud and going-concern, we include a variable, RMM, equal to  $IR \times CR$ <sup>12</sup>. According to the ARM, since the auditor's detection risk is determined based on the interaction of IR and CR, we hypothesize that the coefficient on RMM will be positive in modified equations (1) - (3). We earlier hypothesized that

if RMM fully mediates the effect of pervasive business risks on audit evidence, the coefficients on GC\_HI, GC\_MED and FR should be insignificant in the re-estimation of equations (1) – (3).

## *Results*

### Univariate descriptives

Table 1, Panel A, presents basic descriptive statistics. As shown, the overall level of IR was .51, or relatively low. Similarly, the mean for CR was .43, also relatively low. The mean value of PERSUASIVE was 1.67, indicating that the majority of evidence gathered was internal, and over 83 percent of the evidence was gathered at year end, as shown by the mean value of the TIMING variable. The average number of revenue cycle audit hours, or EXTENT, was 74.8. Table 1, Panel B, presents a 3 x 2 matrix of going-concern risk and fraud risk assessments. As can be seen, 47 of the 78 clients received low risk ratings for both fraud risk and going-concern risk. Ten clients received “high” ratings for going-concern risk<sup>13</sup>. Table 1, Panel C presents a 3 x 2 matrix of assessed inherent and control risk. As shown, 46 of the 78 clients received low risk ratings for both assessments.

Table 1, Panel D presents a simple correlation table for the variables. As shown and expected, many of the variables are significantly correlated<sup>14</sup>.

### The association between pervasive risk factors and audit evidence

We hypothesized that specific pervasive risks such as going-concern risk and fraud risk would affect the persuasiveness and timing of audit evidence, but not the extent. Our results support this hypothesis. Table 2 presents the results of assessed going-concern and fraud risk on audit effort. As hypothesized, both moderate ( $p < 0.04$ ) and high levels ( $p < 0.02$ ) of going-concern risk result in auditors gathering more independent evidence. In addition, more of the evidence was gathered at year-end ( $p < 0.03$  and  $p < 0.06$ ), providing support for Hypotheses 2a and 2b. As predicted, higher going-concern risk is not significantly related to the extent of evidence gathered in the revenue cycle, providing

support for Hypothesis 2c. Client revenue and auditor tenure maintain their predicted signs. Firm profitability (PROFIT) is negatively related to extent of audit evidence. No other control variables were significant, nor were they predicted to be significantly related to the persuasiveness, timing or extent of evidence gathered<sup>15,16</sup>

Similarly, higher levels of fraud risk result in auditors gathering more independent evidence ( $p=0.05$ ) at year-end ( $p<0.01$ ), providing support for Hypotheses 1a and 1b. Again, as predicted, there is no significant association between fraud risk and the extent of audit evidence gathered in the revenue cycle, providing support for hypothesis 1c. The increased risk resulted in a shift in audit effort, but not an increase in the total time expended.

#### The mediating effect of RMM

Auditing standards indicate that auditors are to assess the RMM based on client risk characteristics, and that audit evidence should be linked to RMM (e.g., SAS 47 (AICPA 1983), ISA 330 (IAASB 2004C), ISA 500(IAASB 2004D)). We hypothesized, based on these standards, that RMM would fully mediate the effect of two specific pervasive risks on gathered audit evidence. To demonstrate that RMM fully mediated the association, we must additionally show that going-concern and fraud risk are association with RMM, that audit evidence is significantly associated with RMM and that the previously shown association between going-concern risk, fraud risk, and audit evidence disappears upon including RMM as an additional independent variable (Baron and Kenny, 1986).

In untabulated results, we directly tested the association between going-concern risk, fraud risk, and RMM. The results indicate that, as expected, high going concern risk ( $p<0.03$ ) and fraud risk ( $p<0.02$ ) are associated with RMM. However, moderate going-concern risk is not significantly associated with RMM. RMM is also significantly related to persuasiveness, timing and extent of

evidence ( $p < 0.001$  in all three untabulated regressions) without the going-concern and fraud risk variables, thus satisfying the second link in the mediation requirements.

Table 3 presents the results of the association between going-concern risk, fraud risk, and audit evidence after controlling for assessed auditee risk. As predicted, RMM is positively related to persuasiveness ( $p < 0.01$ ), timing ( $p < 0.01$ ), and extent ( $p < 0.01$ ) of evidence gathered. After controlling for RMM, high going-concern risk and fraud risk are no longer significantly related to either persuasiveness or timing. However, contrary to our null, moderate going-concern risk remains significantly related to persuasiveness ( $p = 0.04$ ) and timing ( $p = 0.03$ ). The revenue and audit tenure control variables maintain their predicted signs in the timing and extent regressions. Thus, RMM fully mediates the association between high going-concern risk and fraud risk and the persuasiveness and timing of audit evidence, but not the effect of moderate going concern risk.

These conflicting findings on going-concern risk and fraud risk provide an interesting commentary on the ARM and certainly leave room for future research on the association between pervasive risk factors and the ARM. Although RMM appears to subsume fraud risk and high going-concern risk, moderate going-concern risk appears to be a different construct and provide incremental information to the auditor in performing the audit. One possible explanation for this finding is the nature of the pervasive risk. Although initial assessments of moderate fraud risk likely affects the planning of the audit (AICPA, 2002A; IAASB, 2004A), the risk of going-concern may change substantially as the audit progresses. Therefore, when the auditor initially assesses auditee risk, the persuasiveness and timing of tests related to an audit with moderate going-concern risk may not be accurately determinable, and it is likely that the elements that determine these tests are not discovered until later in the audit. Thus, preliminary assessments of IR and CR are not able to subsume moderate



going-concern risk. However, the presence of increased fraud risk or high going-concern risk guides the auditor in the planning of the audit procedures (AICPA, 1988, 2004A; IAASB, 2004A, E).

### **SENSITIVITY ANALYSIS**

Because the nature, timing, and extent of audit evidence are simultaneously determined, we re-estimated our tests related to Hypotheses 1 and 2 using Seemingly Unrelated Regression estimation to control for correlated error terms and simultaneous determination of dependent variables. We tested for the overall effect of GC\_MED, GC\_HIGH, and FRAUD on the system of equations. F-tests indicated that GC\_MED ( $p < 0.02$ ), GC\_HIGH ( $p < 0.02$ ), and FRAUD ( $p < 0.10$ ) all significantly affect the overall determination of the persuasiveness, timing, and extent of audit evidence when RMM was not included, thus providing additional overall support for Hypothesis 1. Similarly, GC\_MED remained significant ( $p < 0.03$ ) in the overall determination of persuasiveness, timing, and extent of audit evidence when including RMM, thus providing additional support for Hypothesis 2.

### **DISCUSSION AND IMPLICATIONS FOR FUTURE RESEARCH**

We investigate the association between two specific pervasive risks, fraud and going-concern risk, and the Audit Risk Model. Our results indicate that in line with our expectations, fraud risk and high going-concern risk increase the persuasiveness of audit evidence gathered, and result in later gathering of that evidence. In addition, after considering the effects of RMM, fraud risk and high going-concern risk are no longer significantly associated with the gathering of audit evidence, providing some evidence that the current ARM provides an adequate approximation for audit practice related to fraud risk and high going-concern risk.

We also find that the association between moderate going-concern risk and audit effort remains strong even after controlling for RMM. This provides an indication that some aspect of going-concern risk is not subsumed by the current ARM. One possible explanation is that our tests of the ARM

assume a static risk that can be accurately assessed at the planning stage. Moderate going-concern risk indicates that as of the planning stage, the auditor has some level of doubt about the entity's ability to continue, but is unsure of the magnitude of the risk. As the audit proceeds, this level of doubt often changes dynamically, either in one direction or the other. The opinion formulation process is a complex, sequential, and iterative evidential exercise (Felix and Kinney, 1982). Changes in IR and CR are associated primarily with companies where some doubt existed at the planning stage. Preliminary risk assessments cannot subsume all changes to the audit plan as a result of changing circumstances. As further support for this notion, of the 14 companies in our sample receiving modified opinions, only eight were rated as high risk of going-concern during preliminary planning. The remaining six clients receiving going concern modifications had moderate assessed risk of going-concern problems in audit planning. Thus, our findings are not as much an indication that assessment of going-concern risk does not flow through RMM, but suggest that the ARM cannot capture the effects on audit evidence as a result of dynamic changes in risk factors. This notion would also help explain inconsistent results in prior research.

Our combined results provide some evidence that specific pervasive client business risk factors are incorporated into auditor judgments about RMM, and that RMM does an adequate job of characterizing risks that are either high or are pervasive to the audit at the planning stages of the audit.

Our findings do have significant limitations. First, our results are based on 78 U.S. technology-based audits conducted by one office of one Big 4 assurance services firm, and hence are not necessarily generalizable to the population of audits. In addition, although we are able to obtain direct measures of IR, CR, fraud risk, and going-concern risk, our measures of the persuasiveness, timing and extent of evidence are proxies that potentially contain significant measurement error. In particular, the nature of audit evidence is difficult to assess empirically. We chose to use the average independence

of the gathered evidence as opposed to other measures of nature, as this is a main consideration of the persuasiveness of audit evidence. We consider persuasiveness of evidence to be the most relevant aspect of nature involving fraud and going-concern risk. However, other specifications, such as analytical procedures versus detail tests, or audit staffing decisions could also provide additional evidence and potentially different results (see Bedard et al., 1999). In addition, it is possible that using an average measure for persuasiveness could produce inconsistent statistical results. Our study is also unable to control for the many factors that we do not measure that vary across audits. Experimental evidence in a controlled setting may also provide different results, although our findings support many of the general conclusions reached in experimental research on audit evidence. Finally, our data was collected between the years of 1996-1999, and was prior to significant reform in the U.S. audit industry. However, because our results demonstrate significant links among the risks and audit planning, we have no reason to believe that these links would disappear in a regime focusing closely on audit risk and audit evidence.

Future research can further improve our understanding of the association between specific pervasive risks, the ARM, and audit evidence. For example, we find that moderate going-concern risk remains significantly related to the persuasiveness and timing of audit evidence after controlling for RMM. If our conjecture that the result is due to dynamic versus relatively static risk factors, this has implications to standard setters in relation to audit documentation. Standard setters can provide guidance to auditors on how to adjust the audit plan for changing risk factors and how to document these changes.

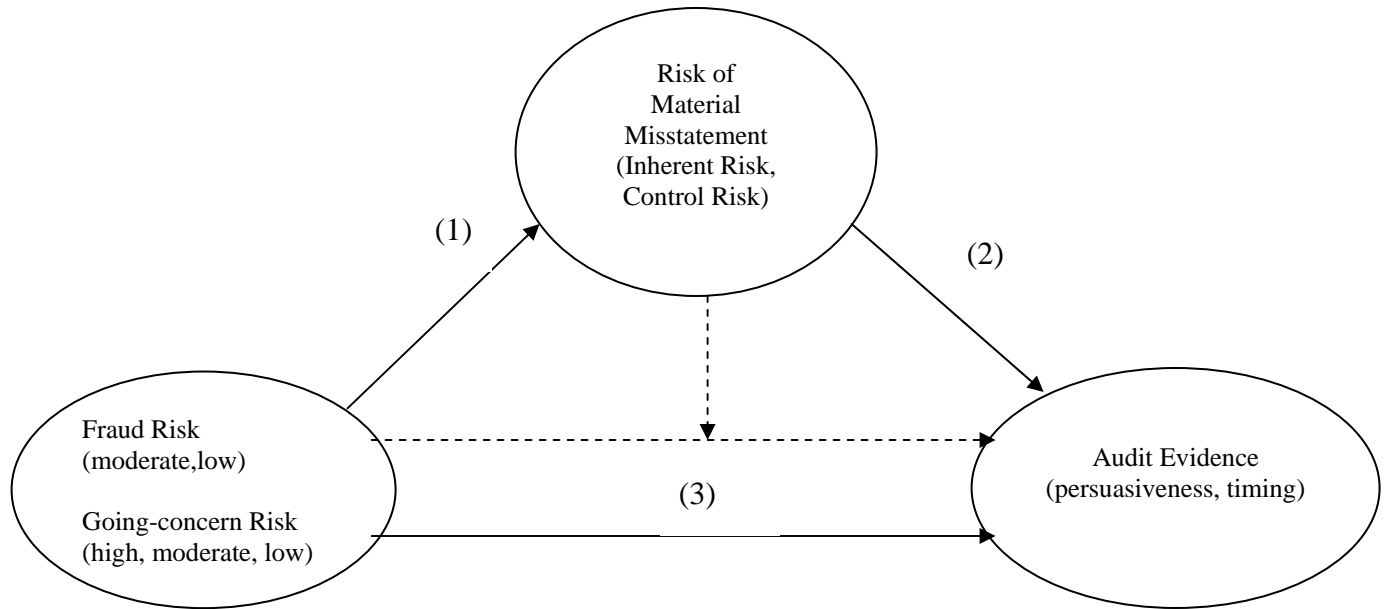
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**Figure 1**  
**Hypothesized Associations Among Going-concern Risk, Fraud Risk, Risk of Material Misstatement and Audit Evidence**



Notes:

This figure presents the hypothesized effect of risk on audit evidence. Extent is not included in the model because no significant association between fraud or going-concern risk and extent was predicted. To demonstrate a mediating relationship:

- (1) Going-concern and fraud risk are associated with the risk of material misstatement (RMM).
- (2) Risk of Material Misstatement is associated with audit evidence.
- (3) After controlling for risk of material misstatement, the previously hypothesized significant association between going-concern/fraud risk and audit evidence (Hypotheses 1a and 1b) is no longer significant (Hypotheses 2a and 2b).

**Table 1 Descriptive Statistics****Panel A: Variable Means and Standard Deviations**

Variable	Mean	Standard Deviation
GC	0.48	0.71
FRAUD	0.24	0.46
PERSUASIVE	1.67	0.33
TIMING	83.50	14.35
EXTENT	74.83	112.30
IR	0.51	0.70
CR	0.43	0.65
RMM	0.56	0.47
Log of Total Rev	11.04	2.72
TENURE	6.12	4.10
PUBLIC	0.85	0.36
INDUSTRY	0.56	0.40
PROFIT	0.39	0.49

**Panel B: Fraud Risk Assessment by Going-concern Risk Assessment**

Going-Concern Risk	Fraud Risk		TOTAL
	LOW	MODERATE	
LOW	47	3	50
MODERATE	9	9	18
HIGH	4	6	10
TOTAL	60	18	78

**Panel C: Inherent and Control Risk Assessment**

Control Risk	Inherent Risk		HIGH	TOTAL
	LOW	MODERATE		
LOW	46	0	1	47
MODERATE	4	16	2	22
HIGH	1	4	4	9
TOTAL	51	20	7	78



**Table 1 Descriptive Statistics (continued)****Panel D: Correlation Table**

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	ROA
1. GC	0.52*	0.48*	0.57*	-0.17	0.43*	0.57*	-0.43*	-0.40*	-0.16	-0.16	-0.30*	-0.39*
2. FRAUD		0.31*	0.49*	-0.18*	0.43*	0.57*	-0.43*	-0.32*	-0.36*	-0.26*	-0.07	-0.1
3. PERSUASIVE			0.55*	0.18*	0.61*	0.48*	-0.41*	-0.37*	-0.10	-0.14	-0.17	-0.14
4. TIMING				-0.21	0.72*	0.68*	-0.77*	-0.69*	-0.28*	-0.34*	-0.21	-0.14
5. EXTENT					-0.04	-0.02	0.43*	0.12	0.19	0.29*	0.02	0.17
6. IR						0.75*	-0.64*	-0.44*	-0.25*	-0.21	-0.30*	-0.30*
7. CR							-0.24	-0.42*	-0.26*	-0.25*	-0.26*	-0.24
8. Log of Tot Rev								0.59*	0.36*	0.47*	0.35*	0.45*
9. TENURE									0.17	0.32*	0.18	0.26*
10. PUBLIC										0.13	0.06	0.06
11. INDUSTRY											0.19	0.22
12. PROFIT												0.85*

\* Significantly correlated,  $p < 0.05$ .

Note: Fraud risk, going-concern risk, IR and CR were assessed during audit planning on a scale of 0-2, with 0 being low and 2 being high.

Variable Definitions:

GC = Planning going-concern risk assessment, scaled from 0 (low) to 2 (high)

FRAUD = Planning fraud risk assessment, scaled from 0 (low) to 2 (high)

PERSUASIVE = Average independence of revenue cycle audit evidence: 1 (internal), 2(mixed), 3(external)

TIMING = Percentage of revenue cycle audit testing performed at fiscal year-end

EXTENT = Total audit hours in the revenue cycle

IR = Revenue cycle inherent risk assessment

CR = Revenue cycle control risk assessment

RMM= IRxCR

TENURE = # of years of auditor tenure

PUBLIC = 1 if client is publicly traded, 0 otherwise

INDUSTRY = 0/1 dummy variable for the two industries in the sample

PROFIT = 0/1 dummy variable for whether the firm had positive net income

ROA = Rank of net income/total assets

**Table 2**  
**Association Between Audit Effort and Assessed Going-Concern and Fraud Risk**

Independent Variables	<u>Dependent Variables</u>					
	Persuasive		Timing		Extent	
<i>Intercept</i>	1.58###	<0.0001	95.99###	<0.001	-55.16	0.30
<i>GC_MOD</i>	0.21**	0.04	6.19**	0.03	21.57	0.60
<i>GC_HIGH</i>	0.38**	0.02	7.63*	0.06	36.99	0.55
<i>FRAUD</i>	0.15**	0.05	8.22***	0.01	-4.38	0.94
<i>REVRANK</i>	-0.01	0.19	-0.32***	<0.001	2.66***	0.01
<i>TENURE</i>	0.01	0.25	-1.11***	<0.001	-5.99#	0.10
<i>PUBLIC</i>	0.05	0.68	0.98	0.74	7.44	0.84
<i>INDUSTRY</i>	0.04	0.67	0.32	0.88	29.80	0.29
<i>ROA</i>	0.01#	0.09	0.07	0.42	1.79**	0.05
<i>PROFIT</i>	-0.19	0.19	-0.07	0.99	-99.41**	0.02
<i>Adjusted R<sup>2</sup></i>	31%		69%		27%	

GC\_MOD = 1 if auditor assessed going-concern risk is moderate, 0 otherwise

GC\_HIGH = 1 if auditor assessed going-concern risk is high, 0 otherwise

FRAUD = Planning fraud risk assessment, 1 if assessed as moderate, 0 if assessed as low

PERSUASIVE = Average independence of revenue cycle audit evidence: 1 (internal), 2(mixed),3(external)

TIMING = Percentage of revenue cycle audit testing performed at fiscal year-end

EXTENT = Total audit hours in the revenue cycle

REVRANK = Rank of total client revenues

TENURE = # of years of auditor tenure

PUBLIC = 1 if client is publicly traded, 0 otherwise

INDUSTRY = 0/1 dummy variable for the two industries in the sample

ROA = Rank of net income/total assets

PROFIT = 0/1 dummy variable for whether the firm had positive net income

Statistical significance for parameter estimates are indicated at the 1% (\*\*\*), 5% (\*\*) and 10% (\*) levels for one-tailed tests, and 1% (###), 5% (##) and 10% (#) levels for two-tailed tests.

**Table 3**  
**Mediating Effects of RMM on Association between Specific Risks and Audit Evidence**

Independent Variables	<u>Dependent Variables</u>					
	Persuasive	Timing		Extent		
<i>Intercept</i>	1.25###	<0.0001	86.10###	<0.0001	-170.79###	0.004
<i>GC_MOD</i>	0.23##	0.04	6.80##	0.03	28.67	0.45
<i>GC_HIGH</i>	0.23	0.18	3.00	0.52	-17.18	0.77
<i>FRAUD</i>	-0.13	0.44	3.96	0.39	-54.14	0.35
<i>REVRANK</i>	0.00	0.62	-0.18***	0.01	4.28***	<0.0001
<i>TENURE</i>	-0.01	0.34	-1.03***	0.01	-5.04	0.13
<i>PUBLIC</i>	0.12	0.91	-0.05	0.98	-4.69	0.89
<i>INDUSTRY</i>	-0.01	0.89	-1.09	0.59	13.33	0.61
<i>ROA</i>	0.00	0.36	-0.01	0.91	0.84	0.42
<i>PROFIT</i>	-0.05	0.71	4.05	0.26	-51.27	0.26
<i>RMM</i>	0.14***	0.001	4.27***	0.001	49.96***	0.001
<i>Adjusted R<sup>2</sup></i>	42%		74%		30%	

GC\_MOD = 1 if auditor assessed going-concern risk is moderate, 0 otherwise

GC\_HIGH = 1 if auditor assessed going-concern risk is high, 0 otherwise

FRAUD = Planning fraud risk assessment, 1 if assessed as moderate, 0 if assessed as low

PERSUASIVE = Average independence of revenue cycle audit evidence: 1 (internal), 2(mixed),3(external)

TIMING = Percentage of revenue cycle audit testing performed at fiscal year-end

EXTENT = Total audit hours in the revenue cycle

REVRANK = Rank of total client revenues

TENURE = # of years of auditor tenure

PUBLIC = 1 if client is publicly traded, 0 otherwise

INDUSTRY = 0/1 dummy variable for the two industries in the sample

ROA = Rank of net income/total assets

PROFIT = 0/1 dummy variable for whether the firm had positive net income

RMM = Auditor assessed inherent risk x auditor assessed control risk

Statistical significance for parameter estimates are indicated at the 1% (\*\*\*), 5% (\*\*) and 10% (\*) levels for one-tailed tests, and 1% (###), 5% (##) and 10% (#) levels for two-tailed tests.

## ENDNOTES

1. Client business risk is typically defined as the risk that the client's business will suffer in terms of profitability (Huss and Jacobs, 1991). Both financial failure and fraud can affect the future profitability of the client, thus we consider the auditor's assessments of going-concern risk and fraud risk to be measures of the client's business risk.
2. Our construct for the nature of audit evidence is evidential independence, thus throughout the paper we use the term persuasiveness to refer to the evidential independence construct of the nature of audit evidence.
3. The Public Company Accounting Oversight Board determined that existing audit standards are applicable to public companies. Therefore, the AICPA Exposure Draft does not apply to these companies. However, it is indicative of current thought within the profession and therefore is relevant to a discussion of audit risk.
4. Because we do not predict an association between going-concern risk, fraud risk, and extent of evidence, we cannot make a mediation prediction since there is no association to mediate. However, for completeness, we will include the mediation tests related to extent of evidence in our results section.
5. The practice office almost exclusively audits technology-based clients.
6. Because audit risk is likely to be different between public and non-public firms, we include a control in all our analysis. However, eliminating the 12 non-public observations does not alter the substance of our results.
7. The revenue cycle includes all tests related to sales, accounts receivable and cash receipts.
8. There obviously are other possibilities for investigating the nature of audit evidence. One example would be analytical procedures compared to detail tests. We chose to use independence or persuasiveness of evidence because it would likely be an aspect of the nature of evidence that would be adapted in cases of fraud risk or going-concern risk.
9. An additional concern about our PERSUASIVE measure is that an average could result in inconsistent statistical results. As an example, an audit with one external piece of evidence would have a higher PERSUASIVE measure than an audit with the same piece of external evidence and an additional piece of internal evidence. This suggests that a correlation between PERSUASIVE and EXTENT could produce inconsistent results. A correlation analysis

indicates that PERSUASIVE and EXTENT are not correlated at statistically significant levels ( $\rho=.18$ ,  $p>.15$ ). However, measurement error in the audit evidence variables remains as a potential limitation to our results.

10. There was one sample firm with high fraud risk. The results presented do not change by excluding this observation.

11. Statistically, GC\_LOW is included in the intercept, thus these variables indicate increases relative to a firm with low risk of failure.

12. We confirmed our specification by regressing the effect of IR and CR on our evidence variables, first as separate variables, and second as an interaction term. In all regressions, the interaction variable for RMM (IR x CR) increased the adjusted  $R^2$  compared to including IR and CR as separate variables.

13. The proportion of financially distressed firms in our sample is substantially higher than in the overall population of Big 4 audits. This is directly related to our choice of technology firms as our sample pool. While this concentration of distress enables us to better study going-concern risk assessments and the effect on audit evidence, this potentially limits the generalizability of our study.

14. Because of the high degrees of correlation among the independent variables, we performed multicollinearity analysis. Although multicollinearity reduces the likelihood of significant coefficients on independent variables, and therefore does not affect the validity of significant results (Greene 1993, p 267), a misspecified model prevents a true understanding of the auditor's risk assessment decision and could potentially hide other significant variables. For this reason, we analyzed all models presented in this paper for evidence of multicollinearity concerns. In none of the regressions presented did any variable have a variance inflation factor greater than 10, nor did any regression have a condition index greater than 20 (Greene 1993, p. 269). Thus, it is unlikely that multicollinearity strongly affected the results presented.

15. We also included interaction variables of both levels of GC risk with fraud risk in all regressions run. None of these variable obtained statistical significance, so we neither report them nor discuss them further.

16. Kizirian et al. (2005) document that prior year errors are highly correlated with management integrity risk assessments. When we control for prior year errors in all tests, the results presented do not change.