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INTRODUCTION

For several decades there has been increasing interest in the audit and assurance profession in developing audit methods and standards that improve our ability to address the possibility of detect significant financial statement fraud. In the standards arena, SAS No. 82, *Consideration of Fraud in a Financial Statement Audit* (AICPA 1997), was promulgated in 1997.[1] This audit standard requires CPAs to assess and document the risk of fraud during audit planning and to document changes to audit programs resulting from that assessment. Unfortunately, both practice development and academic research have been handicapped by a lack of a rigorous framework to facilitate assessment of audits in contexts where the potential for fraud is significant.

The purpose of this paper is to develop a framework to assist audit planning and evaluation given explicit consideration of the possibility of fraud. The model development is based on an evidential network that has two major sub-networks: one to capture risk and evidential relationships for a conventional financial statement audit and another to capture the risk and evidential relationships for SAS No. 82 fraud risk assessment.

The framework is tested by considering and evaluating four audit cases. Two of these use case data taken from actual case studies of the implementation of SAS No. 82. The actual cases provide evidence of fraud-risk factors that were identified in actual audit engagements and information on the audit team's decisions concerning audit procedures that were modified to

[1] Recently, an exposure draft "Proposed Statement on Auditing Standards: Consideration of Fraud in a Financial Statement Audit" has been prepared by the AICPA Auditing Standards Board (AICPA 2002). This study is based on the prior standard, SAS No. 82.

address the identified fraud risk factors. The analysis shows that, in one of these cases, the audit program changes seem to properly reflect the identified audit risks. In the other, the audit program adjustments do not seem effective in addressing identified fraud risks. Sensitivity analysis is then used to investigate various features of the framework and cases studied.

PRIOR RESEARCH

Prior research relevant to this paper falls into two broad areas: research within the audit/assurance literature that deals with fraud identification and research into evidential reasoning and evidential modeling. SAS No. 82 introduces two new requirements into the audit process. The first is that auditors now must formally identify and document fraud risk factors and assess and document the corresponding risk of fraud. The second is that the auditor must evaluate the need to modify the audit program in response to the assessed fraud risk.

Because of the relatively recent release of SAS No. 82, little empirical evidence has been obtained regarding how auditors have responded to these requirements. In a study sponsored by the Auditing Standards Board of the AICPA, Mock and Turner (2001, 2002) examined a sample of 202 clients for two years each obtained from three large CPA firms. Results indicate that each of the three firms modified its audit planning procedures to include the required fraud risk assessment, although each implemented the assessment in a substantially different way. Each assessment approach involved identifying indicators of potential fraud (red flags) either from those included in SAS No. 82 or from indicators developed internally to the audit firm. Mock and Turner (2001) found that the firms frequently responded to the fraud risk assessment by modifying the nature, extent and/or timing of procedures or by assigning more experienced

personnel to the engagement. Changes in the audit approach were statistically related both to the overall fraud risk assessment and to the number of red flags identified.

Efficacy of Red Flags

Although Mock and Turner (2002) provide field evidence that audit firms made efforts to comply with SAS No. 82, other research raises questions as to the effectiveness of the use of red flags to assess fraud risk and as to the ability of auditors to respond appropriately to that assessment. For example, research as to the efficacy of red flags as reliable indicators of fraud risk do not provide consistent or reliable results across studies. As early as 1986, Albrecht and Romney surveyed audit partners in an attempt to identify such red flags. From a list of eighty-seven possible red flags, the audit partners identified thirty-one they felt to be significant. The five most cited red flags were too much trust in key executives (overlooking controls), key executives living beyond their means, domination of the company by one or two individuals, inadequate internal control system or failure to enforce controls, and significant related-party transactions.

In a later study, Persons (1995) attempted to identify specific characteristics of companies sanctioned by the SEC between 1974 and 1991. In examining common financial ratios and variables, only four characteristics were found to be statistically significant: total liabilities/total assets; sales/total assets; the natural log of total assets, and current assets/total assets. Persons concluded it is easier to detect companies with a high potential for fraud than it is to detect companies that actually have committed fraud.

In another study focusing on the red flag approach, Bell and Carcello (2000) develop a logistic regression model that estimates the likelihood of fraudulent financial reporting. Significant risk

factors in the final model are weak internal control environment, rapid company growth, inadequate or inconsistent relative profitability, management placing undue emphasis on meeting earning's projections, management lying to the auditors or being overly evasive, and the ownership status (public/private) of the entity.

Other red flag-oriented research has examined factors related to the board of directors (Beasley 1996) and insider trading (Summers and Sweeny 1998). The results of these various studies indicate that fraud risk may be correlated with many different entity characteristics, but that none appear to be consistently reliable as predictors.

Auditor Characteristics and Abilities

Even if a set of reliable fraud indicators can be identified, audit judgment research casts doubts as to the ability of auditors to recognize those indicators and to respond appropriately. Among the many factors potentially affecting the auditor's effectiveness are training and experience, the ability to deal with complex issues, time pressure, the structure of the audit team, and the willingness of the auditor to confront the client or to report fraud.

To examine if the use of red flag checklists is an effective method for identifying the potential for fraud, Pincus (1989) conducted an experiment using 137 audit seniors. Results indicate that users of questionnaires containing lists of red flags showed increased comprehensiveness and uniformity in data acquisition. However, questionnaire use had no significant impact on fraud risk assessment for a no-fraud case and was dysfunctional for a fraud case, that is, non-questionnaire users outperformed questionnaire users.

Hackenbrack (1993) conducted an experiment with audit seniors to examine the relationship between auditor experience with different size clients and the ability to rate red flags. Each subject reviewed 16 red flags and rated them on how each situation would increase the company's exposure to fraudulent financial reporting. Results indicate that subjects had no consensus on rating red flags.

To examine how auditors might react to SAS No. 82, Zimbelman (1997) conducted an experiment involving 108 practicing auditors from two Big 6 firms. Auditors made two types of risk assessment—one group made a holistic decision in which risk was not considered intentional or unintentional, and the second group made a decomposed decision in which intent was considered. Results indicate that separately assessing fraud risk as required by SAS No. 82 does influence auditors' attention to fraud cues and audit planning decisions.

Among other effects noted by Zimbelman (1997), SAS No. 82 can be expected to lead to overall increases in budgeted hours. However, prior research into audit planning (e.g. Mock and Wright 1999) suggests that the nature of audit plans may not be significantly affected by audit risk assessments. These and the Zimbelman (1997) results contrast with the Mock and Turner (2001) study of SAS No. 82 fraud risk assessments where it was found that although auditors did not significant increase budgeted hours for clients with higher fraud risks, audit plans were modified more frequently for these clients.

Other studies have examined issues such as the ability of the auditor to evaluate management characteristics (Anderson and Marchant 1989), the effects of order of evidence regarding fraud (Krull et al.1993; Reckers and Schultz 1993), and the impact of the review process (Hoffman and Patton 1997). Other research has focused on issues related to characteristics of individual

auditors, such as the level of moral development (Bernardi 1994), or the influence of time pressure on judgments (Braun 2000).

In summary, prior research on red flags provides mixed evidence as to the reliability and usefulness of this approach. Several prediction models have been developed, but each uses different factors as input and predictive success rates vary widely. Additionally, surveys of auditors indicate that qualitative rather than quantitative factors may be better indicators of fraud risk. Experimental research focusing on auditor abilities also provide mixed results, but in general, indicate that auditors do not effectively identify and react to fraud risk factors in an experimental setting. Both the inability of the red flag approach to effectively predict fraud and the inability of the auditor to identify and to react appropriately in a controlled experimental situation raise doubt as to the effectiveness of standards such as SAS No. 82.

EVIDENTIAL REASONING AND BELIEF FUNCTIONS

The second broad area of research we will review briefly is research into evidential reasoning and evidential modeling.[2] In auditing, evidential reasoning relates to issues of evidential evaluation and belief formulation. There are two major issues to deal with in belief formulation. The first deals with the framework that can be used to express or measure uncertainty and ambiguity present in an audit. Shafer and Tversky (1985) describe this as a process of choosing a "formal language" or "semantics" to express the uncertainties in analyzing a task. There are many frameworks and formal languages that can be used such as those based on probability theory, fuzzy logic, possibility theory (Zadeh 1978, 1979) or belief functions (Shafer 1976, Smets 1990a, 1990b, 1998). These frameworks have different tradeoffs and thus seem to be more

[2] Recently, this approach has been used by Turner et al. (2002) to analyze auditor independence.

applicable in certain problem domains than in other domains. In this paper we use the semantics of Belief Functions to express the uncertainties.

Srivastava and Shafer (1992) argue that belief functions provide a more flexible and adaptable way to combine evidence (see also, Akresh et al. 1988). One aspect of this flexibility is that the belief function framework reduces to the Bayesian framework under a special condition. Belief functions also provide a coherent way of mapping uncertainty judgments in auditing (Harrison 1999, and Harrison, et al. 2002), and incorporating ambiguity within decision-making (Srivastava 1997a, Srivastava and Mock 2000).

The second issue deals with the calculus through which we combine information to make a judgment or decision. In the evidential network approach under belief functions, items of evidence are combined using Dempster's rule of combination. We have used the computer program "Auditor's Assistant" (Shafer et al. 1988) and Excel spreadsheets to draw the evidential network and to perform our analyses.

FRAMEWORK FOR AUDIT PLANNING GIVEN THE POTENTIAL FOR FRAUD

To see how the more formal fraud risk assessments required by SAS No. 82 have affected financial statements audits, we begin with a "pre-SAS NO. 82 model" depicted in Figure 1. Prior to SAS No. 82, it can be argued that financial statement audits necessarily were conducted by assuming that the financial statements were not the result of significant fraud. Figure 1 presents an evidential diagram for such a Pre-SAS NO. 82 case.

The oval shaped boxes in our model represent assertions and sub-assertions and the rectangular boxes represent items of evidence linked to the corresponding assertion(s) to which they pertain.

The first and second numbers in an evidential node, respectively, represent the assessed support for and against the corresponding assertion or sub-assertion. For instance, the values (0.40; 0) in the evidence node labeled Analytical Procedures imply that after evaluating the findings of analytical procedures, the auditor believes that those procedures provide a 0.40 level of support, on a scale of 0 to 1, in favor of the assertion that the financial statements are fairly stated and no support for the assertion that the financial statements are materially misstated.

Similarly, numbers in an assertion or sub-assertion node represent, respectively, an overall (having combined all the evidence in the evidential diagram) level of support in favor of and against the assertion. In Figure 1, where it is assumed that no negative evidence is observed and that sufficient analytical, control and substantive evidence has been obtained, the model calculates support of 0.948 for the assertion that the financial statements are fairly stated and no support for the assertion of material financial statement error.[3]

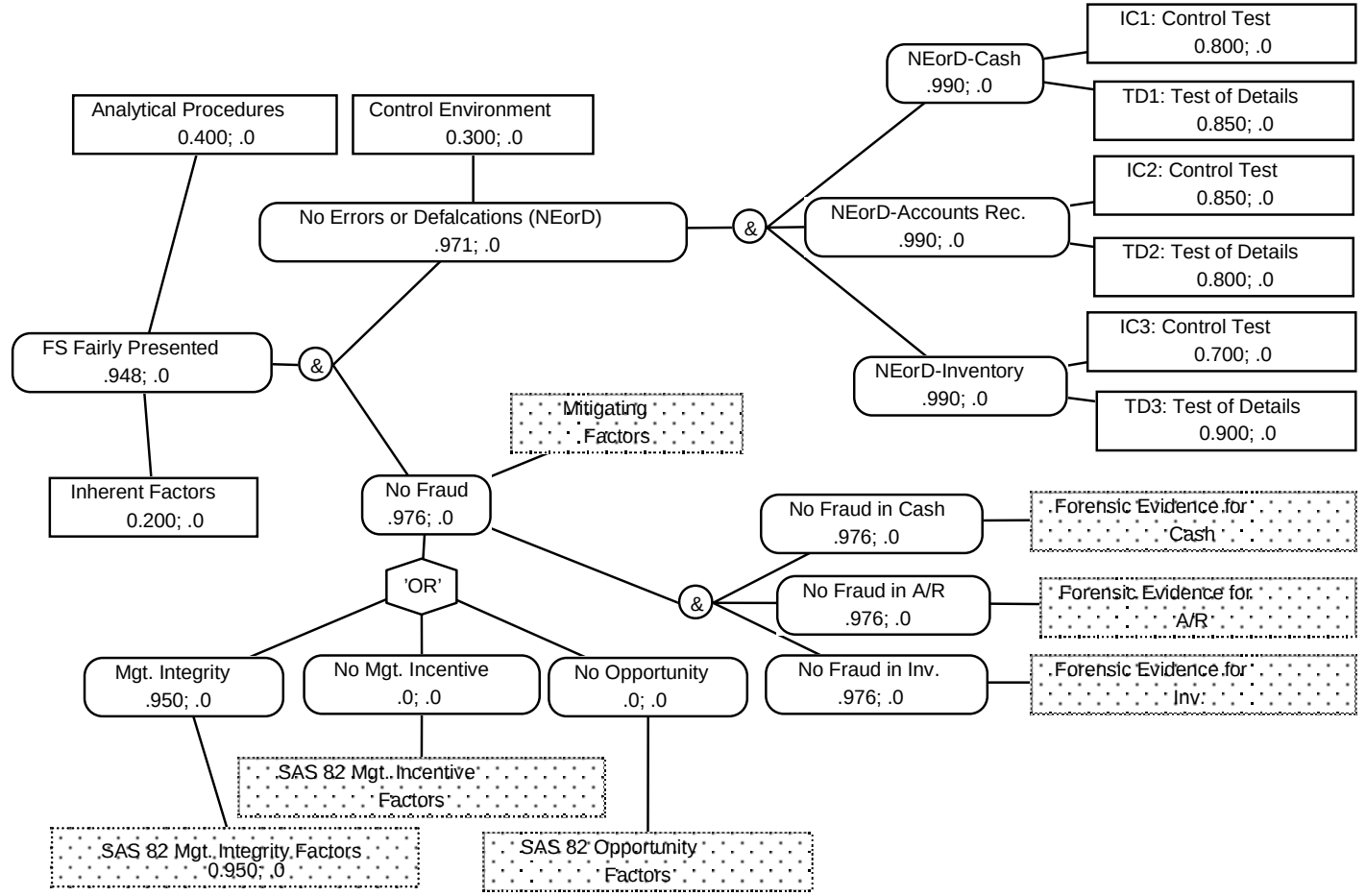
Figure 1 is a generic model that contains nodes for forensic evidence and assertions related to fraud. However, audits conducted prior to SAS No. 82 implicitly assumed they were dealing with management that had high integrity (assumed at 0.95 in Figure 1). Given this assumption, it would not be necessary to collect forensic evidence or evidence related to management incentives or opportunity for fraud. Thus in Figure 1, the evidential nodes related to these aspects are null.[4]

[3] By implication, 0.052 (i.e. 1.0 – 0.948) represents the amount of unresolved ambiguity.

[4] Of course this is overly simplified given that even prior to SAS No. 82, evidence that might indicate fraud was being collected and standards indicated that auditors should follow up on such observations.

Figure 1: Generic Evidential Framework

Case 1-Pre-SAS No. 82 where the auditor has full confidence in the client that there is no fraud. The oval shaped boxes represent assertions and sub-assertions and the rectangular boxes represent items of evidence linked to the corresponding variables they pertain to. The first and second numbers in these boxes, respectively, represent the level of support in favor of and against the corresponding assertion or sub-assertion.



Such an evidential network approach for audit decisions is a comprehensive way to capture all the evidence and their interrelationships and also to consider the relationships among assertions and financial statements accounts.

In practice, auditors may not express uncertainties in terms of numerical values, but may use discrete scales such as "high" or "low" risk. Although continuous values may be elicited to quantify these beliefs, discrete values may be obtained and used (e.g., high, medium, and low risk). Prior research has shown that elicitation using discreet scales may lead to greater acceptability and ease of use among auditors than continuous probability scales (Mock et al. 1998).

RESEARCH QUESTIONS

As indicated, a formal, evidential modeling approach appears to have significant promise in assisting auditors in formally assessing audit evidence including that produced from forensic audit procedures and in assessing fraud risk. In addressing this possibility, four research questions are examined. The first explores the design of an evidential model:

RQ1: What are the structures of evidential models for pre- and post-SAS audits?

The remaining three research questions examine the sensitivity of the model developed in RQ1 to the levels of evidence regarding management integrity:

RQ2: What is the impact of positive and mixed (both positive and negative) evidence regarding management integrity on fraud risk and audit risk?

RQ3: What is the impact of positive evidence regarding management integrity on fraud risk and audit risk when red flags are present?

RQ4: What is the impact of positive evidence regarding management integrity on fraud risk and audit risk if inappropriate forensic procedures are performed?

We use a formal, evidential modeling approach to audit program planning to examine four audit scenarios as discussed in detail in the following sections. Research Question 1 involves developing an evidential model (Figure 1) and instantiating the model based on an actual pre-SAS No. 82 case. For the remaining three research questions, using actual post-SAS No. 82 cases, we perform various types of sensitivity analyses to evaluate the model.

RQ1: What are the structures of evidential models for pre- and a post-SAS audits?

Research question 1 is addressed by developing an evidential model for financial statement audits. This model reflects the conditions existing prior to SAS No. 82 in the upper branch and assertions and evidence that reflect the kinds of analyses indicated by SAS No. 82 in the lower branch.

In general, there are three steps involved in developing an evidential model for an audit engagement: 1) identifying the relevant variables of interest in the audit—in this case these variables consist of various audit assertions and sub-assertions; 2) identifying the relationships among assertions and sub-assertions; and 3) identifying items of evidence relevant to the audit engagement.

As a first step, we specify in Figure 1 relevant financial statement assertions pertinent to the audit engagement. The resulting *generic* model consists of twelve assertions and sub-assertions: 'The Financial Statements (FS) are Fairly Presented', there are 'No Errors or Defalcations (NEorD)', there is 'No Fraud', there is no error or defalcations in the cash accounts ('NEorD-Cash'), there is no error or defalcations in accounts receivable ('NEorD-Accounts Rec.'), there is no error or defalcations in the inventory accounts ('NEorD-Inventory'), management has integrity ('Mgt. Integrity'), there are no significant incentives for management to perpetrate a

fraud ('No Mgt. Incentive'), there is no real opportunity for management to perpetrate a fraud ('No Opportunity'), there is no fraud in the cash account ('No Fraud in Cash'), there is no fraud in accounts receivables ('No Fraud in A/R'), and there is no fraud in the inventory accounts ('No Fraud in Inventory'). Note that the first six assertions relate to traditional financial statement items and the last six assertions relate to the possibility of fraud.

For simplicity, we limit our model to three balance sheet accounts and also limit the structure to only the balance sheet level. However, one can incorporate a fuller model by considering all the accounts and their relevant assertions both at the balance sheet level and at the transaction level (see, e.g., Srivastava et al. 1996, and Srivastava and Lu 2001).

As noted, there are two distinct branches in the evidential diagram, one specifically for the assertion that there are 'No Errors or Defalcations' and the other for the assertion of 'No Fraud'. One reason for the two distinct branches is to model explicitly the requirements of SAS No. 82.

To determine that there are no material errors or defalcations in the financial statements, the auditor needs to collect sufficient competent evidential matter to determine whether in the aggregate there is no material misstatement in the financial statements due to errors or defalcations. However, for determining whether the financial statements are materially misstated due to management fraud, the auditor needs to collect very different kinds of evidence—evidence that would include forensic evidence as depicted in the second branch in Figure 1.

The second step in developing the evidential model is to establish logical relationships among the various assertions and sub-assertions. For example, in Figure 1 we use an 'and' relationship between the main financial statement assertion that the financials are fairly presented and the sub-assertions. The 'and' relationship appears to be logical in many auditing contexts. For

example, it can be argued that the financial statements are free from material misstatements only when there is no misstatement due to fraud and when there are no material misstatements due to errors and defalcations. Similarly, the financial statements have no material misstatements due to errors and defalcations when each account has no material misstatement due to errors and defalcations. Also, the financial statements have no material misstatements due to fraud only when all the accounts have no material fraudulent misstatements.[5]

However, other relationships may be appropriate in audit contexts. For instance, in Figure 1 we have assumed an 'or' relationship between the assertion 'No Fraud' and the three sub-assertions: 'Mgt. Integrity', 'No Mgt. Incentive', and 'No Mgt. Opportunity'. This relationship is based on concepts discussed in SAS No. 82.

It can be argued that management will commit fraud only when management lacks integrity, has the incentive and has opportunity. This relationship implies that the assertion of 'No Fraud' will be appropriate if either management has integrity or if there is no incentive for fraud or if there is no opportunity to commit fraud. This relationship is modeled as an 'or' relationship among these three assertions.

Also, we assume in Figure 1 that 'Integrity' is not directly related to the assertion 'No Mgt. Incentive'. This assumption means that if management has integrity, no level of incentives to commit fraud will overcome his or her integrity.

The last step in developing the model is to identify relevant items of evidence, i.e., the audit procedures that are relevant to various assertions and sub-assertions. The rectangular boxes in

[5] However, some issues and concerns related to the 'and' relationship are discussed in Srivastava et al. 1995, Gillett 1996, and Sun et al. 2001.

Figure 1 represent various items of evidence and the line connecting an item of evidence to an assertion or sub-assertion implies that the evidence is relevant to that particular assertion or sub-assertion. For example, the evidence 'Analytical Procedures' usually is relevant to the assertion 'FS Fairly Presented' and the evidence 'Mitigating Factors' pertains to the variable 'No Fraud'.

Instantiation and Analysis of the Generic Model

In order to analyze the Figure 1 framework, we next need to assign values to the evidential nodes and then calculate the effects of such evidence on the various assertions in the model. To provide some empirical substance to the analyses, we use data obtained from an actual audit case as a starting point. Since the evidential model developed in Figure 1 has a simple tree[6] structure, one can program Dempster's rule of combination for aggregating evidence in a spreadsheet such as Lotus or Excel using Srivastava et al. (1995a). In the following section we use the Srivastava et al. (1995a) approach in an Excel spreadsheet to aggregate all the evidence and analyze the findings.

The starting point in analyzing the model is to estimate what the evidence obtained from the audit activities implies about the various assertions. The relationship included in Figure 1 indicates to which assertion or assertions each item of evidence relates directly. For example, evidence obtained from an evaluation of the 'control environment' is directly relevant to the assertion 'No Errors or Defalcations'.[7] If the control environment is strong, the auditor may believe that the likelihood of material errors or defalcations is reduced substantially and assign a

[6] The evidential model will become a network when one item of evidence pertains to more than one variable in the diagram.

[7] Because such models are either trees or networks, such evidence also bears indirectly on other assertions.

moderate value, i.e. 0.50, as the strength of evidence provided by the evaluation of the control environment.

Table 1 shows the assumed strength of evidence used in our analyses. For example for Case 1, the evidence provided by the tests of controls is assumed to provide 0.50 level of confidence on a scale of zero to 1.0 that there are no material errors or defalcations in the cash accounts and zero negative evidence, i.e., zero level of confidence that the cash accounts are materially misstated. Tests of details are assumed to provide even stronger positive support, 0.90, for this assertion. In Case 1 we assume all of the collected evidence is positive—that is, supports the various assertions of no material misstatements.

To allow comparison between cases, the following assumptions have been made for Case 1 and for the three cases examined in the subsequent sensitivity analysis:

- Auditors wish to reduce overall audit risk to a level no greater than 0.05.
- Analytical procedures provide a moderate level of support of 0.40 that the financial statements are fairly presented.
- Inherent factors provide a low level of support of 0.20 that the financial statements are fairly presented
- Mitigating factors will have no influence, either positive or negative, on fraud risk or audit risk.
- Tests of controls for each of the three balance sheet accounts provide a moderate level of support of 0.50 that each account is fairly presented

Table 1 details these values along with the other values varied in the analyses.

Table 1 – Values for Variables by Case

	Case 1			Case 2A			Case 2B			Case 3			Case 4		
	Pos[1]	Neg[2]	Amb[3]	Pos	Neg	Amb	Pos	Neg	Amb	Pos	Neg	Amb	Pos	Neg	Amb
Error Detection Procedures															
Cash – Controls	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50
Cash – Tests of Details	0.90	0.00	0.10	0.90	0.00	0.10	0.90	0.00	0.10	0.90	0.00	0.10	0.95	0.00	0.05
Accts Rec – Controls	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50
Accts Rec – Tests of Details	0.90	0.00	0.10	0.90	0.00	0.10	0.90	0.00	0.10	0.90	0.00	0.10	0.95	0.00	0.05
Inventory – Controls	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50	0.50	0.00	0.50
Inventory – Tests of Details	0.90	0.00	0.10	0.90	0.00	0.10	0.90	0.00	0.10	0.90	0.00	0.10	0.95	0.00	0.05
Analytical Procedures	0.40	0.00	0.60	0.40	0.00	0.60	0.40	0.00	0.60	0.40	0.00	0.60	0.40	0.00	0.60
Inherent Factors	0.20	0.00	0.80	0.20	0.00	0.80	0.20	0.00	0.80	0.20	0.00	0.80	0.20	0.00	0.80
Mitigating Factors	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00
Fraud Assessment (Red Flags)															
Management Integrity	Var[4]	0.00	Var[5]	Var[4]	0.00	Var[5]	Var[6]	0.25	Var[7]	Var[6]	0.25	Var[7]	Var[6]	0.25	Var[7]
Incentives	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Opportunities	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Forensic Procedures															
Cash	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.95	0.00	0.05	0.00	0.00	1.00
Accts Rec	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.95	0.00	0.05	0.00	0.00	1.00
Inventory	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.95	0.00	0.05	0.00	0.00	1.00

[1] Strength of positive evidence
[2] Strength of negative evidence
[3] Residual uncertainty representing ignorance or ambiguity
[4] The values vary from 0.00 to 1.00 in steps of 0.05.
[5] The values vary from 1.00 to 0.00
[6] The values vary from 0.00 to 0.75 in steps of 0.05
[7] The values vary from 0.75 to 0.00

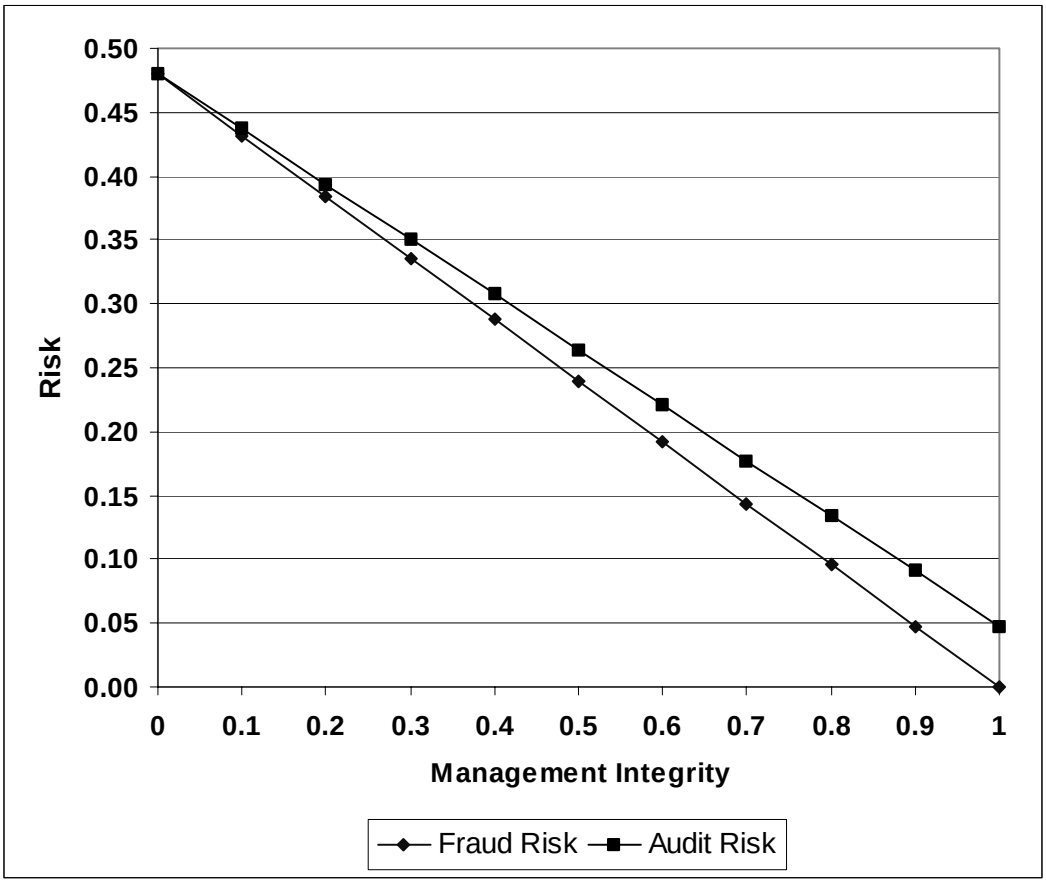
Prior to SAS No. 82, no specific separate assessment of the risk of fraud was required. As a result, evidence as to the fairness of presentation came from four sources: evaluation and testing of the system of controls, tests of transactions and balances (TD), analytical procedures, and professional judgments about inherent factors. For Case 1 (see Table 1), if we assume that tests of transactions and balances provide positive evidence of 0.90 for each of the accounts, and these values are combined with the 0.50 positive evidence from tests of controls, 0.40 for analytical procedures, and 0.20 for inherent factors, then an audit risk of 0.05 results. This model and the assumed values represent the traditional, pre-SAS NO. 82 approach to auditing and thus a benchmark with which to compare other situations. As the calculation based on the assumed data show an overall confidence that the financial statements are fairly presented exceeding 0.95, the auditor is able to control audit risk to an acceptable 0.05 level.

The Effect of Management Integrity on Audit and Fraud Risk

Even though a formal assessment of fraud risk was not required prior to SAS No. 82, it does not follow that fraud risk did not exist. An analysis of the model depicted in Figure 1 including the risk of fraud shows that for the audit risk actually to be 0.05, the auditor must have an almost absolute level of confidence in the integrity of client management. This analysis is plotted in Figure 2 where audit and fraud risk are plotted against various levels of confidence that management has integrity. As shown in Figure 2, only when management integrity is assigned a positive level of 0.99 or greater does audit risk remain at or below 0.05.

Figure 2 – The Relationship between Audit Risk, Fraud Risk and Management Integrity

Case 1: No Fraud Assessment Performed



As it is unlikely that any management group can be considered to have zero likelihood of committing fraud, it seems apparent that including assertions and evidence that explicitly relate to fraud will provide a better assessment and control of overall audit risk. The following research questions, as mentioned earlier, explicitly model these effects.

RQ2: What is the impact of positive and mixed (both positive and negative) evidence regarding management integrity on fraud risk and audit risk?

While SAS No. 82 requires an assessment of fraud risk during the planning process, no specific response to the risk assessment is required. Instead, the auditor may use professional judgment in determining how to respond appropriately. As detailed in Mock and Turner (2001, 2002), even though fraud risk factors are identified in many post SAS No. 82 audits, in 75 percent of the audits examined, no specific change in the audit program or in the staff assigned to the audit results. To examine this typical situation, the following assumptions are made (see Table 1, Cases 2A and 2B):

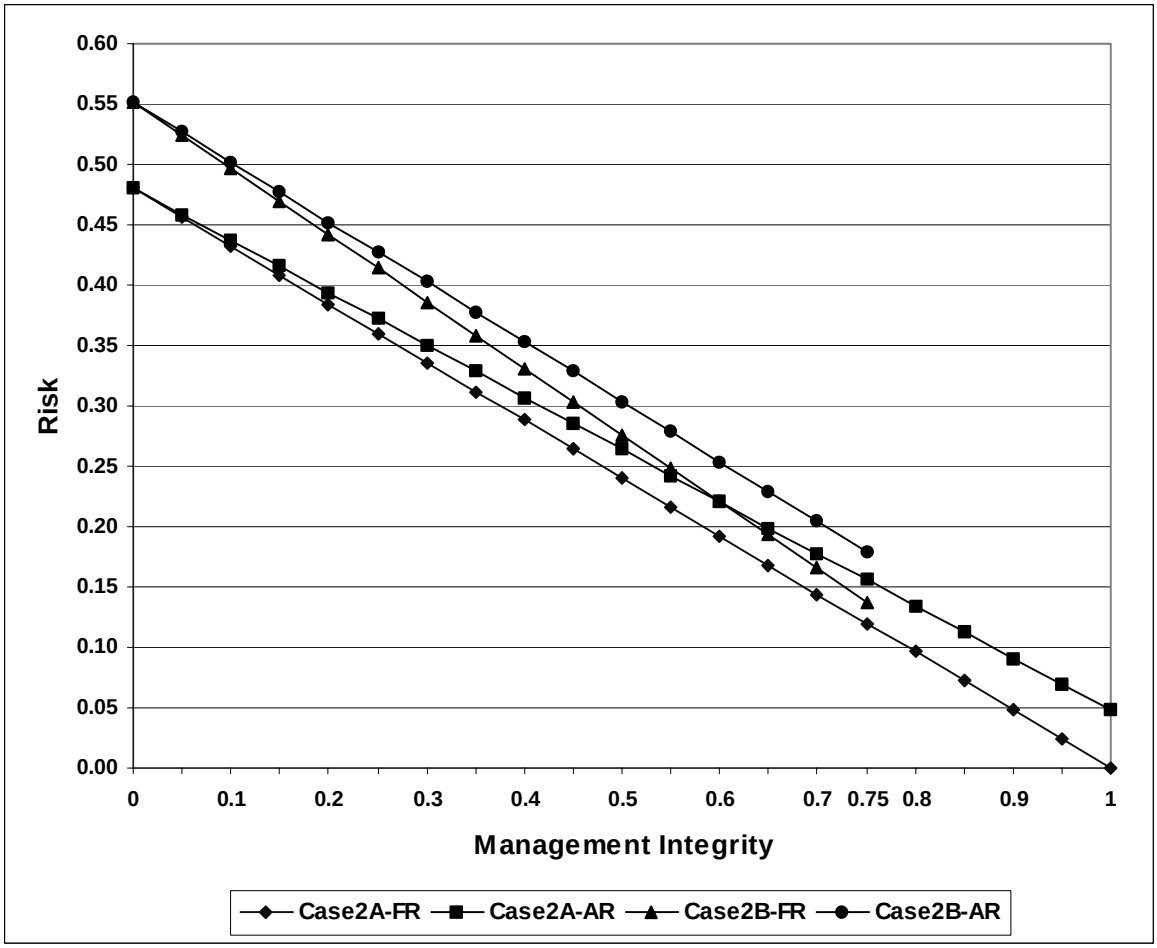
- Positive evidence related to control system evaluation and tests of transactions and balances are the same as those for Case 1.
- Positive evidence for analytical procedures and inherent factors are the same as for Case 1.
- During fraud risk assessment, strong evidence is found indicating that there is both Management Incentive and Opportunity.
- No forensic procedures are performed.

For Case 2A, we assume that no negative evidence is identified for Management Integrity. Under these assumptions, the weightings for Incentive and Opportunity have no effect either on fraud risk or audit risk. This is because of the assumption that fraud will occur only when management lacks integrity and there is incentive and opportunity. This result is shown in Figure 3, Case 2A, where both fraud risk and audit risk are identical to those for the pre-SAS No. 82 values shown for Case 1.

Evidence related to Management Incentive and Opportunity does have an impact, however, if the assessment of Management Integrity indicates negative factors such as a criminal background, a poor reputation in the community, allegations of misappropriations or fraud, or recent "opinion shopping."

Figure 3 – The Relationship between Audit Risk (AR), Fraud Risk (FR) and Management Integrity*

Cases 2A and 2B: Fraud Assessment Made – No Forensic Procedures



* In Case 2A, there is no evidence of lack of management integrity. In Case 2B, there is evidence assessed to be 0.25 of lack of management integrity.

Case 2B in Figure 3 shows that when there is a lack of Management Integrity, assessed to be 0.25 for this case, both fraud risk and audit risk increase by 15 percent over Case 2A. Although not shown, this difference increases substantially as the weight of the negative evidence increases.

Since in a Belief Function framework, the positive, negative and unknown values for each assertion must have a combined value of one, when a negative value of 0.25 is assigned to Management Integrity (i.e., 0.25 level of confidence that the management lacks integrity), the largest possible positive value for Integrity cannot exceed 0.75. In this circumstance, Figure 3 shows that the smallest audit risk achievable without performing forensic procedures or identifying mitigating factors is approximately 0.18, well above the assumed desired threshold combined audit risk of 0.05.

Analysis of these two cases indicates that the outcomes are intuitively consistent. Even though management may have a high incentive to commit fraud and the opportunity clearly is available, individuals of high moral character will not take advantage of such opportunities to perpetrate frauds.

When management may be predisposed to improper behavior, however, existence of incentive and opportunity may result in attempts to misstate financial statements or to misappropriate assets. Case 2B analyses show that in such an environment, the auditor cannot rely solely on standard audit procedures to achieve an acceptable level of audit risk.

RQ3: What is the impact of positive evidence regarding management integrity on fraud risk and audit risk when red flags are present?

Case 3 represents an actual audit where the potential for fraud was identified during the planning process. After discussing the issue with management, additional forensic procedures were added to the audit plan and were completed. Results of the audit procedures indicated that fraud was not present, but that weaknesses in certain controls over inventory production allowed unintentional errors to occur. Working in conjunction with management, the auditors determined the magnitude of a proposed adjustment to inventory and management subsequently recorded the adjustment.

Based on this audit, as shown in Table 1, the following assumptions are made in our model:

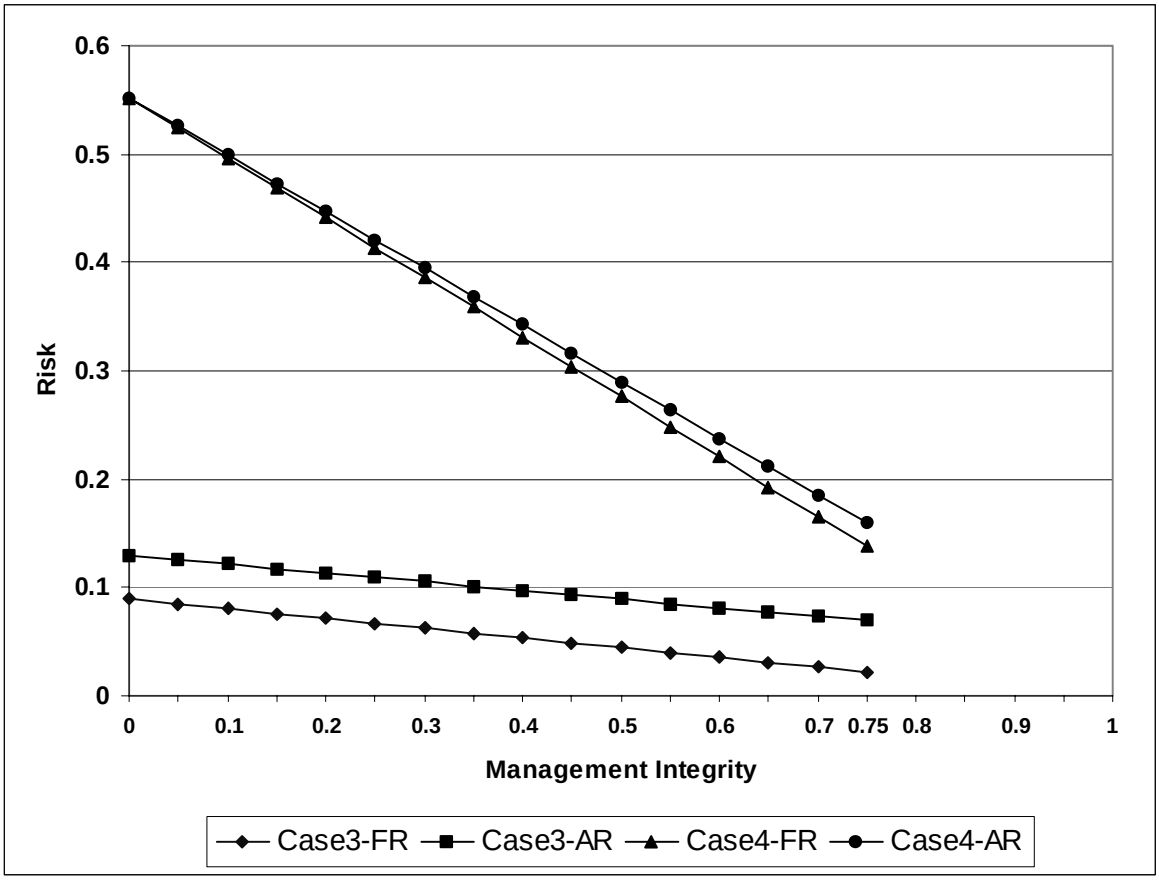
- Positive evidence related to control system evaluation and tests of transactions and balances are the same as those for Case 1.
- Positive evidence for analytical procedures and inherent factors are the same as for Case 1.
- A value of 0.25 is assumed for lack of Management Integrity, reflecting suspicion by the auditor as to management's involvement in a potential fraud.
- Appropriate forensic procedures provide strong positive evidence as to the absence of fraud. Accordingly, positive evidential values of 0.95 are included for all three forensic procedures included in the model.
- During fraud risk assessment, strong evidence indicates there is both Management Incentive and Opportunity. Since forensic procedures are performed, however, it is found that the red flag evidence was a false positive in regard to fraud. Accordingly, neither positive nor negative values are included in the model for Incentive and Opportunity.

Figure 4, Case 3 shows that by performing appropriate forensic procedures, both fraud risk and audit risk can be reduced substantially. In this case, however, since lack of Management Integrity was assigned a value of 0.25, the minimum audit risk achievable is 0.07. To reduce

audit risk further, the auditor may identify mitigating factors that reduce fraud risk, may attempt to increase analytical procedures, may find increased comfort in inherent factors, or may reassess management integrity.

Figure 4 – The Relationship between Audit Risk (AR), Fraud Risk (FR) and Management Integrity for Cases 3 and 4*

Case 3: Fraud assessment made - Forensic procedures performed
Case 4: Fraud assessment made – No forensic procedures performed



* In both Cases 3 and 4, there is evidence assessed to be 0.25 level of confidence that the management lacks integrity.

RQ4: What is the impact of positive evidence regarding management integrity on fraud risk and audit risk if inappropriate forensic procedures are performed?

The facts of Case 4 also are taken from an actual audit and are similar in many respects to Case 3. For Case 4, however, as part of their SAS No. 82 assessments, the auditors identify a red flag that management might be receiving kickbacks from vendors in return for directing purchases. In response to this assessment, the auditors modify the audit program. Instead of adding appropriate forensic procedures focusing on potential kickbacks, however, the auditors modify planned tests of transactions and balances. As shown in Table 1, Case 4, the following assumptions are used to evaluate this case:

- Positive evidence for analytical procedures and inherent factors are the same as for Case 1.
- A negative value of 0.25 is assumed for Management Integrity, reflecting suspicion by the auditor as to management's involvement in a kickback scheme.
- No appropriate forensic procedures were performed.
- Tests of transactions and balances were increased to achieve a 0.95 positive value for each audited account.
- During fraud risk assessment, strong evidence indicates there is both Management Incentive and Opportunity. Since appropriate forensic procedures were not performed, the red flag evidence remains in the model. Accordingly, values of 1.0 are included in the model for Management Incentive and Opportunity.

Audit risk and fraud risk for Case 4 also are plotted in Figure 4. It can be seen that simply increasing normal audit procedures has no effect on fraud risk and only a slight effect on overall audit risk.

SUMMARY AND CONCLUSIONS

This paper addresses four research questions listed earlier. For Research Question 1, we consider the structures of the inherent evidential models underlying audit risk assessments that include explicit assessment of fraud risk and develop a generic model. This model extends prior work (e.g. Srivastava et al. 1996 and Mock et al. 1998) by adding explicit assertions and evidential nodes related to SAS No. 82 fraud risk assessments. To instantiate the model, in Case 1 we examine a typical pre-SAS No. 82 audit by assuming that no specific fraud risk assessment is performed. This case shows that prior to SAS No. 82, in order to achieve an acceptably low audit risk the auditor was implicitly assuming a very high (0.99) level of management integrity.

To examine the sensitivity of the model, the effects of various levels of assumed management integrity on fraud risk and overall audit risk are calculated (see figures 2, 3 and 4). Cases 2A and 2B show that when there is no question as to the integrity of management, the existence of management incentives and opportunity to commit fraud have little effect either on fraud risk or audit risk. However, with the assumed values for the various items of evidence, the calculated fraud risk exceeds the traditional 0.05 threshold if forensic procedures are not performed. In addition, if the auditor questions management integrity to some degree, management incentive and opportunity substantially increase both fraud risk and audit risk.

The analysis based on Case 3 shows that when there is both management incentive and opportunity in conjunction with a question as to the integrity of management, adding forensic procedures is the only viable option to reduce fraud risk and audit risk. Even in the presence of forensic procedures, however, additional mitigating factors may need to be identified to reduce audit risk.

The analysis of Case 4 shows that when there is both management incentive and opportunity in conjunction with a question as to the integrity of management, simply modifying or extending normal audit procedures without adding appropriate forensic procedures does little to reduce either fraud risk or audit risk.

Although there are significant limitations in modeling efforts such as that described here, this paper represents a first attempt at formal modeling of the nature of financial statement audits where explicit SAS No. 82 type fraud risk assessments are required. As can be seen, management integrity is a critical factor in such models as is the potential use of appropriate forensic procedures in cases where management integrity is even somewhat questioned and where fraud risk factors are indicated. Future research is needed to consider how the new requirements of the AICPA exposure draft (AICPA 2002) affect our framework and also to consider variable interactions such as those between integrity, incentives and opportunities.

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