AUDITOR JUDGMENTS: A DESCRIPTIVE

STUDY OF THE ASSESSMENT

OF AUDIT RISK

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ii

PREFACE

This study is concerned with auditor assessments of ultimate risk. The methodology was of a descriptive nature, and I hope that the models developed herein will be useful in some way in improving auditor risk assessments in the future.

I wish to express my sincere gratitude to all the people who assisted me in this project and throughout my studies at Oklahoma State University. I am indebted to Dr. Wilton Anderson and Dr. Lanny Chasteen for encouraging me to enroll in the Ph.D. program in the first place.

I am especially grateful to my committee chairman, Dr. Chasteen, and my advisor, Dr. Janet Kimbrell, for their guidance throughout the program. They helped me maintain my enthusiasm and willingly reviewed and provided meaningful comments on numerous drafts of this study.

I am also thankful to my other committee members. Dr. James Gentry was especially helpful in the design of the questionnaire instrument and the analysis of the data. Dr. John Rea's classroom instruction and comments relating to the use of multiple regression were also invaluable.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

UR = The allowable audit risk that monetary errors equal to tolerable error might remain undetected in the account balance or class of transactions after the auditor has completed all audit procedures deemed necessary.

IH = The susceptibility of the account to error because of complex calculations, inherent estimates, misappropriation, etc.

IC = The auditor's assessment of the risk that, given errors equal to tolerable error occur, the system of internal control would fail to detect them.

AR = The auditor's assessment of the risk that analytical review procedures would fail to detect errors equal to tolerable error, given that such errors occur and are not detected by the system of internal accounting control.

TD = The allowable risk of incorrect acceptance for the substantive test of details, given that errors equal to tolerable error occur and are not detected by the system of internal accounting control or analytical review procedure and other relevant substantive tests.

CHAPTER I

THE RESEARCH PROBLEM

INTRODUCTION

The audit process involves a series of complex interrelated decisions, resulting in an opinion stating that the financial statements are fairly presented in accordance with generally accepted accounting principles or describing any departures therefrom. Throughout the process, the auditor strives to control the risk that he may unknowingly fail to appropriately modify his opinion on financial statements that are materially misstated (SAS 47). From the initial decision of whether to accept or continue an audit engagement, to the final choice of the type of audit report to render, the auditor is constantly gathering and evaluating qualitative and quantitative information affecting the client's financial statements. Although various models and guidelines have been developed to aid the auditor in the process of aggregating audit evidence and assessing audit risk, there have been few descriptive studies to determine the actual judgment process of audit risk assessment. We know little about what factors are actually considered by auditors in making an assessment of risk, the relative importance of the various factors or the method of combining them in the decision process.

In addition to having few practical guidelines for risk assessment decisions, the auditor has no way to evaluate the correctness of this decision at the time he renders an opinion on the financial statements. Generally, any feedback received will come later if material undetected errors are brought to light, resulting in professional embarrassment or even legal liability to the auditor.

Research in judgment and decision making advises us that we must first define a judgment process before significant changes or improvements in judgment outcomes can be effected. Einhorn (1980, p. 6) warns that "positive outcome feedback without knowledge of task structure tends to keep us unaware that our judgment is poor since there is very little motivation to question how successes were achieved." In a recent study of the effects of incomplete outcome feedback on auditor's self-perception of judgment ability, Waller and Felix (1984, p. 645) concluded that "a primary issue for auditing practice is how to restructure audit judgments for which less than complete outcome feedback is available such that divergencies between auditors' self-perceived and actual judgment ability are minimized."

The first step in improving auditor risk assessments is to describe the judgment processes used by auditors in these decisions. This study has been designed to provide information about the task structure for audit risk assessment decisions in the hope that such knowledge can be applied in later studies to refine and improve these judgments. Spe-

cifically, the objective of this study was to describe the factors involved and the functional form of the decision models used by auditors near the completion of the audit process in making an assessment of the risk of undetected errors in a financial statement component.

Statement of the Problem

Felix and Kinney (1982) portray the auditor's opinion formulation process as a series of nine steps (see Figure 1).

| Orientation | → | Preliminary Evaluation of Internal Accounting Controls | — | Tactical Planning of Audit Activities |

| Compliance Tests of Pertinent Controls | → | Evaluation of Internal Accounting Controls | → | Substantive Tests of Transactions and Balances |

| Aggregation of Results | → | Forming Opinion | → | Report |
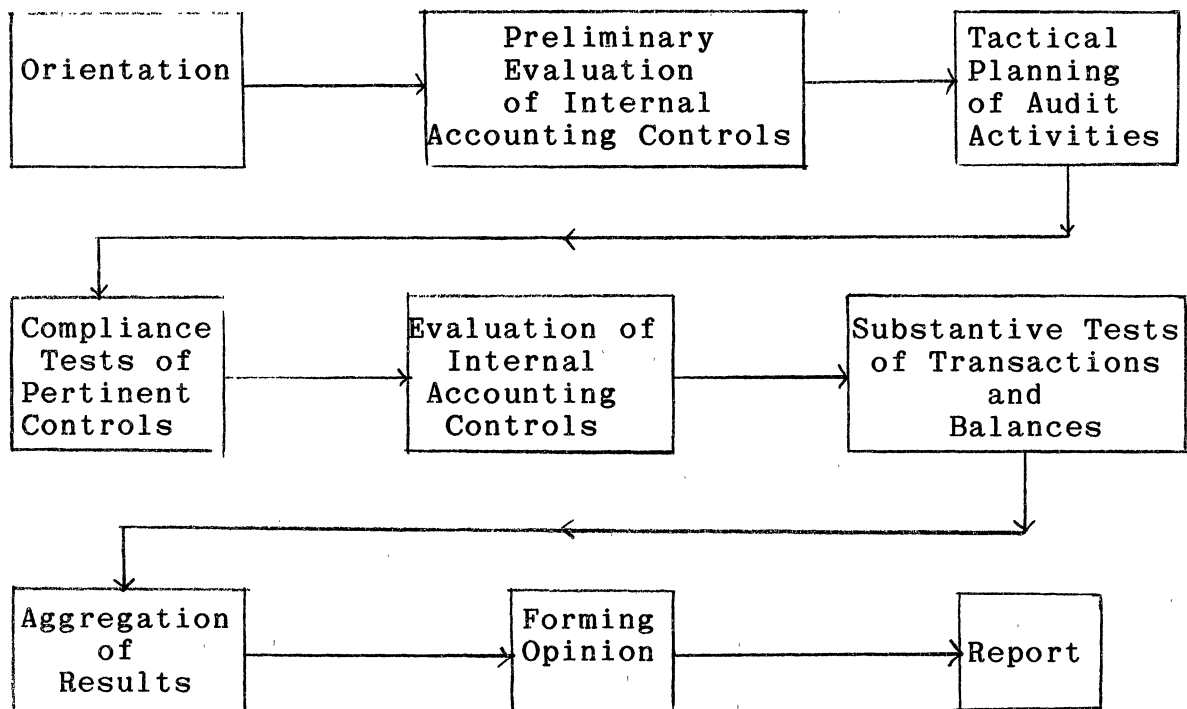
Figure 1. The Auditor's Opinion Formulation Process

The audit begins with an orientation process in which the auditor assimilates information about the client's physical and economic environment. This includes information about the industry, operations, management, and general financial structure of the client, which is used in the development of a general audit plan or strategy. The auditor then reviews the internal accounting controls and makes a preliminary evaluation to determine which controls are to be relied on in planning the substantive tests. At this point, the auditor designs a tactical plan of audit activities, which consists of a tentative mix of compliance tests and substantive procedures that may be revised and refined as additional information is obtained. The auditor then performs the planned compliance tests, makes a final evaluation of the internal accounting controls, and re-evaluates the audit strategy to assess whether the planned substantive procedures will provide the most effective and efficient means of gathering evidence to support an opinion on the client's financial statements.

After this re-evaluation, substantive testing is performed. In some audit situations compliance and substantive testing may be performed simultaneously through the use of dual purpose tests. Other situations may involve an iterative process of reassessing controls and gathering additional evidence from substantive tests. This process is common if the procedures identify monetary errors which indicate that a material error may exist in the financial state-

ments. The auditor may then need to re-evaluate the tactical plan and perform other tests to identify and correct the errors or resolve that they are not material. At this time the auditor determines the sufficiency of audit coverage for each financial statement component and assesses the risk that a material undetected error may exist in the component. This risk assessment at the component or account balance level is the judgment process upon which this study was focused.

After the auditor has assessed the sufficiency of coverage for each component of the financial statements, the evidence from all components is aggregated to assist the auditor in forming an opinion on the fairness of the financial statements as a whole. The auditor aggregates this information, and a final assessment is made of the risk that a material unadjusted error exists in the financial statements as a whole. If this final assessment of risk indicates an acceptable level, the auditor makes an opinion choice from the alternatives outlined in the professional auditing standards and issues the audit report.

Research Objective

The objective of this study was to describe the auditor's decision process in assessing the risk that an undetected material error may exist in a particular account or financial statement component. The approach used was to first decompose the audit risk assessment decision into the

components of inherent risk, internal control risk, the risk from analytical review procedures, and the risk from tests of details, as discussed in Statements of Auditing Standards 39 and 47. Risk assessments for each of these four components as well as the overall audit risk for an account were solicited from a sample of audit managers with respect to an actual audit engagement they had recently completed. Various questions pertaining to inherent risk and internal control risk also were answered. This information was then analyzed to determine how the component risk assessments were combined to assess audit risk and what factors were most important to the assessments of inherent risk and internal control risk.

Since the study focused on risk assessments at the financial statement component level, accounts receivable was selected as the account to be examined because it is generally an important component of current and total assets. It is also directly related to sales, a major component of the income statement. Because of the relatively high dollar magnitude of sales and accounts receivable and the volume of transactions in these accounts, the audit procedures related to receivables often involve a combination of internal control testing and various tests of details. including sampling procedures and analytical review procedures. Therefore, using this account facilitated the study of how information from these various tests were combined with other qualitative and quantitative information in assessing the risk of

an undetected error in a specific financial statement component.

The remaining chapters are organized as follows. Chapter two surveys the prior research relating to the assessment and aggregation of audit risk. Chapter three describes the theoretical framework underlying this research and sets forth the hypotheses, research design, and methodology used in the study. Chapter four presents the results of this analysis. A summary of the conclusions appear in Chapter five, along with the limitations of the study.

CHAPTER II

REVIEW OF THE LITERATURE

The survey of prior research on audit risk focused in three areas: (1) the authoritative literature provided by the Auditing Standards Board (ASB) concerning audit risk and descriptive studies relating to these pronouncements; (2) aggregation models developed to assist auditors in determining the sufficiency of audit coverage and assessing the risk of audit testing; and (3) empirical studies of auditors' materiality judgments.

The standards provided by the ASB in Statements of Auditing Standards 39 and 47 consist of very general guidelines for auditors about what factors to consider in assessing audit risk. Four components of audit risk are outlined, but there are few specific instructions as to how to measure the risk associated with each of these components. Empirical studies conducted since the issuance of these standards have indicated that current practice does not follow a strict interpretation of the simple risk aggregation models suggested in these standards.

On the other hand, the more explicit aggregation models that have been suggested by auditing researchers have often been viewed by practitioners as too complicated and rigorous to apply in practice. Although many of the models have merit and probably could be applied to some degree, there

has been no widespread acceptance of any of them. The studies of materiality, while somewhat related to audit risk, have been focused primarily on the financial statement user and have provided little guidance for auditors with respect to audit risk assessments.

This study has taken the guidelines provided in the prior research as a starting point to describe the current state of practice for assessing audit risk. Unlike previous studies, the emphasis was not on deriving a normative risk assessment model. Rather, the focus of this study was on describing the risk assessments made on a sample of actual audit engagements.

Authoritative Literature and Descriptive Studies Relating to Auditor Risk Assessments

The primary authoritative sources for guidance on audit risk assessment decisions were provided by the Auditing Standards Board in SAS 39 and SAS 47.

The major emphasis of SAS 39 was on audit sampling. The Statement outlined several factors that the auditor should consider in designing sampling plans for substantive tests of details. These factors included the risk of incorrect acceptance, the risk of incorrect rejection, the characteristics of the population being sampled, the relationship of the sample to the relevant audit objective and the expected size and frequency of errors. Other considera-

tions included the amount of reliance placed on internal accounting controls, reliance on other substantive tests related to the same account balance or class of transactions, and preliminary estimates of materiality levels and tolerable error for the account involved.

The Appendix to SAS 39 suggested a formula that may be used in aggregating some of these factors to compute the allowable audit risk. The formula described allowable risk as a multiplicative function of three factors or elements of risk such that

$$UR = IC \times AR \times TD \tag{1}$$

where

UR = The allowable audit risk that monetary errors equal to tolerable error might remain undetected in the account balance or class of transactions after the auditor has completed all audit procedures deemed necessary.

IC = The auditor's assessment of the risk that, given errors equal to tolerable error occur, the system of internal control would fail to detect them.

AR = The auditor's assessment of the risk that analytical review and other relevant substantive procedures would fail to detect errors equal to tolerable error, given that such errors occur and are not detected by the system of internal accounting control.

TD = The allowable risk of incorrect acceptance for the substantive test of details, given that errors equal to tolerable error occur and are not detected by the system of internal accounting control or analytical review procedure and other relevant substantive tests.

The Statement also provided a table illustrating the quantification of these risks into probabilities and the resulting effect on the allowable risk of incorrect acceptance for the substantive test of details.

Jiambalvo and Waller (1984) tested the effects of decomposing audit risk into the components suggested in SAS 39. Thirteen practicing auditors from one Big Eight firm were asked to complete a questionnaire containing four cases. Each case provided a brief description of a hypothetical client's business, comparative balance sheets, comparative income statements, weaknesses in internal control, and a specific dollar value of tolerable error for accounts receivable. After reviewing the case information, the subjects assumed the role of the in-charge accountant and responded to questions concerning audit risk for each case.

The subjects were assigned to two experimental groups. The first group was asked to respond to a single question that elicited a holistic assessment of TD. The second group was asked to first assess UR, IC, and AR, then provide an assessment of TD which was considered to represent a decomposition/intuitive approach. The assessments of UR, IC, and AR from the second group were combined using the formula suggested by SAS 39 to provide a third value for TD which represented a decomposition/algorithmic approach. Comparisons of these assessments of TD revealed that although there was no significant difference between the assessments of TD using the holistic/no decomposition approach and the decom-

position/intuitive approach, there were significant differences between the two decomposition approaches. This indicated that the multiplicative formula suggested by SAS 39 was probably not being strictly applied by the auditors.

The authors offered two explanations for the lack of correspondence between the intuitive combination of risk components and the type of combination outlined in SAS 39. If the model in SAS 39 is assumed an appropriate framework for decomposing audit risks, the auditors' assessments of the various risk components were not consistent. This conclusion may indicate the need for audit practitioners to develop their abilities to quantify these risk assessments and combine them algorithmically. If, however, one assumes that the auditors' assessments of risk components were internally consistent and correct, there are fundamental problems with the model in SAS 39. The authors advocated more behavioral research on how auditors assess risks and more analytical research on how these risks should cohere.

In June 1984, SAS 47 was issued to address more specifically materiality and audit risk. This Statement advised that the auditor should consider audit risk and materiality both in planning the audit and evaluating audit findings. In planning the audit, risk may or may not be quantified. "Considerations of audit risk and materiality vary with the size and complexity of the entity, the auditor's experience with the entity, and his knowledge of the entity's business." (SAS 47, p. 4)

Audit risk at the account balance or transaction level is described in SAS 47 as a function of three types of risk: (1) inherent risk (IH) - the susceptibility of the account to error because of complex calculations, inherent estimates, misappropriation, etc., (2) control risk (IC) - the risk that the error will not be prevented or detected by the system of internal control, and (3) detection risk - the risk that the auditor's procedures, both analytical review (AR) and substantive tests of details (TD), will not find the error. Only the detection risk is controlled by the auditor, and should bear an inverse relationship to the first two types of risk.

Note that the formula in SAS 39 also described audit risk in terms of three component risks. However, in SAS 39 the term for inherent risk was omitted since this risk was set conservatively at one, and detection risk was divided into the two components of analytical review risk and tests-of-details risk. Although SAS 47 did not provide an appendix or formula for combining these risk components, it refers to the SAS 39 model in a manner that implies that the multiplicative combination of components as suggested in SAS 39 would still be appropriate. This assumption has been applied not only in research articles but also in auditing texts. (Robertson and Davis)

Cushing and Loebbecke (1983a) criticized the model outlined in SAS 47 on several points. First of all, the model does not provide any guidance for aggregating the risk as-

sessments made at the component level to the financial statements as a whole. Additionally, the assumption that the risk factors are independent of each other may not be valid. A more reasonable assumption is that inherent risk, analytical review risk, and substantive test of details risk all depend on internal control. Finally, there may be differences between the real and assessed risks for each component due to nonsampling errors associated with either procedural or performance errors during the audit.

Due to these weaknesses, Cushing and Loebbecke suggested that the model not be used when internal controls are not evaluated as good or excellent, or when the auditor believes that the likelihood of material errors is high. Also, strict quality control procedures for planning, supervision, and review should be followed to minimize the risk of non-sampling error.

Leslie (1984) suggested that the formal inclusion of inherent risk in SAS 47 may result in an unjustifiable reduction of substantive tests of details. He advocated instead, using the posterior risk model suggested by the Canadian Institute of Chartered Accountants (CICA) 1980 Extent of Audit Testing Guide. Bayesian statistics underlie this model. Inherent risk is viewed as a prior probability and the posterior probability of the ultimate risk, after the performance of the audit testing, is calculated as follows:

$$UR = \frac{IH \times IC \times AR \times TD}{(IH \times IC \times AR \times TD) + (1.00 - IH)} \qquad (2)$$

Leslie provided numerical examples comparing the effect of the SAS 39, SAS 47, and CICA models on the substantive tests of details risk required to achieve a UR of .05. The SAS 39 model resulted in the lowest level of allowable risk of TD, and SAS 47 the highest, with results of the CICA model in between.

Although it is not clear whether the guidelines provided in the official pronouncements capture the current state of practice with respect to auditor risk assessment decisions, SAS 39 and 47 have provided a starting point for continued research in this area. The Statements suggested that risk assessment decisions should be made first on the account balance or component level and then on the financial statements as a whole. The Statements also indicated the need to consider both qualitative and quantitative factors in audit risk and materiality decisions. Guidance was provided as to some of the factors that should be considered. Additionally, the Statements suggested that the factors influencing audit risk generally fall into three categories – inherent risk, control risk, and detection risk – and provided some guidance as to how these risk components might be combined by the auditor. Since little information has been published as to how these guidelines are currently being implemented in practice, they were incorporated along with other information into the questionnaire instrument used in this study.

This procedure provided a starting point to extract the pertinent factors actually being used by auditors in risk assessment judgments.

The only descriptive study that could be found relating to the current state of practice of major public accounting firms was a study by Cushing and Loebbecke (1983b), who compared the audit methodologies of major accounting firms. Their study was organized into three descriptive analyses. The first analysis consisted of structuring comprehensively the Statements of Auditing Standards 1 through 39, Statement on Quality Control Standards 1, and SAS 43 (then in draft form) into six major categories of activities. This analysis formed a normative GAAS "model" to which they could compare current practice.

In the second analysis, the authors obtained audit process manuals from twelve major accounting firms in order to construct a description of each firm's audit process and extract the portion of each firm's manual that related to the six categories of the GAAS "model". The authors compared these data about each firm's policies to the GAAS model to identify agreement, instances of nonconformity with the GAAS model, and instances where firm requirements exceeded GAAS requirements.

Due to the proprietary nature of the firms' policy materials, results were presented only in summary form. The authors concluded that, with the possible exception of lack of guidelines for developing materiality estimates during

planning, all twelve firms were clearly in conformity with GAAS, and several had many requirements beyond GAAS. However, in the area of considering preliminary estimates of materiality during audit planning, five firms excluded this requirement from their audit guidance, while three firms provided extensive conceptual discussions of materiality. Two of the firms also provided a specific analytical approach for determining amounts and incorporating them into the later steps of their audit process. The results of the study indicated a great deal of variation among firms in the nature and extent of official guidelines for combining audit evidence and making materiality judgments.

The third analysis involved scoring, on a scale of one to five, each firm's policy materials in terms of structure. The results of this measurement process categorized two firms as highly structured, four as semi-structured, four as partially structured, and two as unstructured. The two highly structured firms provided specific criteria for quantification of risk levels based on the assessment of internal control and developed a preliminary estimate of materiality as a guide in the design of substantive audit procedures. Two firms have also developed structured, quantitative approaches to combining the results of various tests, including tests of different accounts.

The Cushing and Loebbecke study, completed prior to the issuance of SAS 47, noted that several of the firms were in the process of revising their overall approach and audit

process materials. Since their study dealt entirely with firm policy as opposed to actual practice and was focused on the general guidance available in audit firms, it provided only a suggestion of what might be considered in developing more specific decision models. The findings also highlighted the need for more guidance in materiality decisions, aggregation of testing information, and audit risk assessment.

Research Involving Model Development

In addition to efforts by the Auditing Standards Board, researchers also have tried to provide some guidance to auditors. As the audit environment has become more competitive and statistical sampling techniques have been developed, there have been many attempts to build models to assist auditors in aggregating the risks and test results from various accounts. The following articles have been summarized as illustrations of possible ways in which auditors might aggregate or combine audit evidence to quantify or control audit risk.

One of the first efforts to develop a model to assist auditors in information aggregation was made by Elliott and Rogers (1972). Their model suggested the use of hypothesis testing techniques in variables sampling to control the risk of incorrect rejection of correct financial statements (α) and the risk of incorrect acceptance of misleading financial statements (β). They defined the following hypotheses:

H_0: The financial statement amount is materially correct.

H_1: The financial statement amount is materially in error.

The auditor specifies α and β as well as the amount of misstatement considered material (M).

Since incorrect rejection tends to result only in unnecessary additional testing after rejection of the account balance, the authors suggest that the level of α be specified as a matter of policy somewhere between .05 and .10. The level of β specified would vary depending on the amount of reliance on internal control and other analytical review procedures and other auditing tests performed. The hypotheses are then tested using confidence limits of $1-\alpha$ and Precision $= M/(1 + Z_\beta/Z_{\alpha/2})$ (where Z_x is the normal table value for the standard normal distribution).

Guidelines for combining the uncertainty from nonstatistically audited accounts with the uncertainty in the statistically audited accounts also were developed in the study. Let M_0 represent overall materiality, the smallest amount by which the financial statements could be in error and still require a qualified auditors opinion, and M_{est} estimate the probable outside limit of possible errors for all nonstatistically audited accounts. Then M_i, the materiality of the ith statistically audited account, must meet the following criteria:

$$\sqrt{\Sigma \ M_i^2} \leq (M_0 - M_{est}) \qquad (3)$$

The approach proposed by Elliott and Rogers can be readily adapted to practice, is intellectually appealing and relatively simple. However, it provided little guidance for the estimation of possible errors for nonstatistically audited accounts. It also assumed that the specified α and β levels for all statistically audited accounts are the same, which may not be efficient in practice.

Heiman and Chesley (1977) attempted to augment the Elliott and Rogers model by developing a model for minimizing total sampling costs for multiple accounts. Their approach provided for various levels of α and β in different accounts, and addressed materiality constraints for individual accounts as well as account aggregations. The model incorporated sample information in deriving initial sample sizes for individual accounts to achieve given acceptable α and β error levels.

Their model assumed a linear sampling cost function, to be specified by the auditor, and minimized the total cost of the audit sampling process, subject to the achievement of the specified α and β levels for the disaggregate and aggregate accounts. This model was similar to Elliott and Rogers' since the auditor specified the levels of α, β, and M beforehand. Precision levels derived from the formula $A = M/(1 + z_\beta/z_{\alpha/2})$ provided a decision rule for accepting a reported value if the sample value fell in the range of recorded value $\pm A$. However, the focus of the model was on minimizing the sampling cost function. An example provided

in the article indicated that the model could be easily applied in practice as long as the sampling cost function was fairly simple. Although the authors recognized the relationships between aggregate and disaggregate accounts, they did not address the problem of nonstatistically audited accounts.

Cushing, Searfoss, and Randall (1979) incorporated elements from both the Elliott and Rogers and Heimann and Chesley models and extended the model in three ways: (1) they provided an explicit technique for the treatment of nonstatistically audited accounts; (2) added the use of the stratified mean-per-unit estimator for statistically audited accounts; and (3) included a method of allocating audit effort among statistically audited accounts in order to minimize the total cost of sampling. A field test of their model on four audit clients of Peat, Marwick, Mitchell & Co. found the model to be feasible for use in practice, possibly because elements of the Elliott and Rogers approach had been incorporated into Peat, Marwick, Mitchell & Co.'s audit planning model. In the field test, the Cushing, et al model was also found to effect moderate cost savings over the approach previously used by the audit teams. It is not known whether a field test of other accounting firms would prove to be easily implemented or would yield any favorable cost results.

A different method of sampling cost minimization was derived by Kinney (1975), who used a decision theory ap-

proach to expand on the earlier work of Elliott and Rogers. Kinney assumed a two state world in which an account balance is either correct or misstated by a material amount. The probability distribution over these possible states is based on the auditor's general experience, his knowledge of the client and the account balance, and the internal controls affecting the balance. The auditor can choose one of two actions, accept or reject the account balance. The auditor, of course, has different utilities for the possible combinations of states and actions, and wants to minimize his expected losses or costs.

Let C_1 represent the cost of incorrect rejection and C_2 the cost of incorrect acceptance. Also, let C_3 and C_4 represent the fixed and variable portions, respectively, of a simple linear sampling cost function. The decision theory approach specifically used: (1) the probability of the balance being correctly stated; (2) the cost vector $C = (C_1, C_2, C_3, C_4)$; (3) the standard deviation of the audited value of items in the population; and (4) the dollar amount of a material error in the reported account balance. From these, the optimum sample size and rejection limits for the audit tests of the balance are derived. The optimal sample size and rejection boundaries in turn imply an optimal α and β for the test, thus resulting in the quantification of these risk factors.

Kinney demonstrated the use of this model under various conditions and found that the total cost function was not

very sensitive to changes in the cost of incorrect rejection or incorrect acceptance, which could be difficult to estimate in practice. Changes in the coefficients in the sampling cost function did significantly influence the models results, but should be subject to reasonably accurate estimation. Although it seems that this model could be applied in practice to quantify audit risk, there is no known current application of it by any of the major firms.

Since the issuance of SAS 39 and 47, most of the guidance for aggregating audit risk has focused on expanding or interpreting those pronouncements. Zuber, Elliott, Kinney, and Leisenring (1983) discussed the factors that should be considered by the auditor when determining a preliminary materiality estimate to be used in the design of appropriate audit procedures. These authors suggested that the auditor might allocate his preliminary materiality estimate to the components of the financial statements, in order to obtain a tolerable error for each component as described in SAS 39. When allocating the preliminary materiality estimate to the financial statement components, the auditor should consider expected unadjusted errors and errors arising in prior years that affect the current year financial statements. The auditor may then use his estimate of tolerable error for the account or financial statement component to design audit procedures to detect such errors. Although the authors outlined some of the practical considerations, the article did not provide any rigorous or even specific guidelines to

determine preliminary materiality or tolerable error in an audit situation.

Gafford and Carmichael (1984) outlined what they termed a "nuts and bolts" approach for determining preliminary materiality and setting sample sizes using a probablity-proportional-to-size (PPS) sampling approach. Using the guidelines of SAS 39 and SAS 47, they proposed determining a preliminary materiality assessment for an account by first determining an overall materiality for the financial statements as a whole. Factors to be considered at this stage included company size and the expected use of the financial statements. The auditor would choose an appropriate percentage of a stable base such as total revenue or pretax income, which would yield an overall materiality estimate. This estimate would then be decreased by uncorrected known and likely errors as well as estimated undetected errors. The remaining materiality would then be the amount that the auditor designs his tests to detect.

In designing the specific audit tests, the auditor might use a "rule of thumb" quotient to divide the remaining materiality to arrive at an amount for testing individually significant items in an account. All items below this dollar limit would constitute a population to be tested using PPS sampling. The sample size would be determined using a factor from a table that incorporates inherent risk, control risk, and detection risk from other audit tests performed.

Errors found as a result of such sampling would then be projected to the population by a PPS formula.

This approach could be easily applied in practice and has some intuitive appeal, but many of the rules of thumb and factors were not fully explained and did not all seem to be statistically supportable. In addition, the authors often suggested unexplained judgmental increases in sample sizes or decreases in materiality levels to achieve an arbitrarily conservative result.

Some of these models could have been adapted to practice, but there is no evidence them have been widely embraced by the profession. With the exception of the adaptation of the Elliott and Rogers approach by Peat, Marwick, Mitchell & Co., none of the other models appears to have been implemented by practitioners. This suggests that a better understanding of the process applied by auditors in assessing audit risk is needed in order to develop models that will be effectively implemented in practice to improve such judgments.

Studies of Materiality Judgments

During the late 1970s and early 1980s several studies were conducted in an effort to determine and compare materiality policies and judgments of auditors and other financial statement users. The studies generally involved the use of various hypothetical cases that were presented to subjects to determine the level at which an item in question was

deemed significant enough to merit adjustment or disclosure in the financial statements, or qualification of the auditor's opinion. Most of the studies reviewed herein involve questionnaire surveys or judgment-capturing experiments using auditors as subjects, but many of them deal with materiality in accounting rather than materiality in auditing, since little research has been done on the latter subject. Leslie (1977, p. 84) explains these two concepts of materiality as follows:

> Materiality in accounting might be described as the materiality decisions which relate to accounting matters such as consistency, classification, valuation, and disclosure in the financial statements. The main concern is with the point at which errors and distortions in a set of financial statements are serious enough to destroy fairness of presentation. Materiality in auditing might be described as the materiality decisions related to planning, executing, and evaluating an audit with a view to determining the extent of audit evidence to be gathered. The main concern is with the point at which audit procedures may be curtailed and the audit objectives considered achieved.

Although this study was more closely related to materiality in auditing, this section of the review has been included because of the interrelationship of audit risk assessments and materiality decisions. The materiality studies also brought to light some of the factors that were included in the questionnaire instrument for this study.

Many of the earliest studies that focused on materiality judgments employed a questionnaire survey technique and generally included responses from all types of financial

statement users. Woolsey (1973) distributed a questionnaire case and received responses from 176 accountants including national CPA's, local and regional CPA's, controllers, financial analysts, and professors of accounting. The case included balance sheet figures for six companies' treatment of the same error in calculating the cost of goods manufactured, and asked whether the respondents considered the amount of error to be material or immaterial in each case. Approximately 65% of the respondents indicated that the primary factor affecting their decision on materiality of the error in question was the ratio of the error to current income before tax. The average dividing line for all groups was 5.8%, but ranged from 4.8% for local and regional CPA's, to 7.0% for national CPA's. All groups indicated that the dividing line should be slightly to significantly lower if the difference in the treatment of the error would produce a noticeable change in the trend of income or would change a satisfactory current ratio to an unsatisfactory one.

In light of his results, Woolsey advocated the issuance by some authoritative board, such as the FASB, of a standard that could take the form of a percentage bracket (e.g., 4.5% to 5.5% of current income) which could be used in a typical situation, and modified by a "sensitivity factor" of say 80% in the existence of certain sensitive situations. The FASB, however, has declined to issue such quantitative guidance.

In a study to determine the direction of research on the materiality issue, Patillo and Siebel (1974) sent a ques-

tionnaire survey to 74 financial executives and 30 CPA's. The subjects were asked to identify those factors that influence or enter into materiality judgments related to the financial accounting and reporting area they had previously identified as most deserving of future research efforts with respect to its materiality. For each factor, the respondent was to say whether that factor was the exclusive determinant of the materiality judgment, was equally important with others, was only of secondary importance, or was not even considered in the materiality judgment. Eight out of ten of the factors presented in the questionnaire were noted as one of several equally important factors. Only the items related to cost of reporting if the item were judged material and deadlines were noted as factors not considered in the materiality judgment. This indicated that the materiality decision is a function of several factors.

In a later study of the importance of various factors in the materiality judgment process, Patillo (1976) mailed questionnaire cases to six groups: (1) financial executives in "Fortune 500" firms, (2) financial executives not in "Fortune 500" firms, (3) bankers, (4) financial analysts, (5) public accountants, and (6) accounting academicians. The nature of the judgment item, the relation of the judgment to net income, and the absolute dollar amount of the judgment item were found to be the most important factors in the participants' decisions. The six groups' means, as a percent of net income, ranged from 5.2% to 8.3%, reflecting

observable and significant differences in the materiality evaluations among the six groups.

After these initial studies on the factors that influence materiality decisions and the percentage of income that would be deemed material, research began to focus on the judgment process itself and on policy-capturing. One of the first policy-capturing experiments was conducted by Boatsman and Robertson (1974), who tested the materiality judgments of 18 CPA firm partners and 15 security analysts by asking them to sort 30 hypothetical cases into three levels of disclosure - no disclosure, footnote disclosure, and separate line item disclosure. The eight variables that were manipulated in the cases were given a realistic intercorrelation by generating the cases through the use of a variance-covariance matrix from a sample of actual annual reports. Each case involved either (a) a gain or loss on the sale of noncurrent assets, (b) a change in accounting principle, or (c) an uncertainty. The financial statement variables that were manipulated included (1) the relationship of the item to current year net income, (2) the relationship of the item to total revenue or expense, (3) the effect of the item on net working capital, (4) the earnings growth rate, (5) whether the item reversed the earnings trend, (6) the absolute size of the item, and (7) risk, as defined by common stock price volatility.

The authors used discriminant analysis to develop three linear classification functions, one for each level of dis-

closure. Univariate F ratio tests indicated that all pre-
dictor variables were significant at the .01 level. Using
the models to predict the disclosure levels chosen resulted
in a predictive accuracy of 63%. However, the relationship
of the item to current year net income contributed 73% of
the total predictive power. The nature of the item contri-
buted another 26%, with remaining predictor variables
accounting for less than 1% of the predictive power. No
significant difference was found between the results of the
auditors and security analysts. Interestingly, using a "4%
of current year net income" rule resulted in correct clas-
sification of cases into the higher two levels of disclosure
65% of the time, thus demonstrating the importance of the
net income variable to the materiality decision process as
presented to the subjects.

Another policy-capturing study to determine the scale
values and basic forms of the decision models for auditors'
materiality judgments was conducted by Moriarity and Barron
(1976). Fifteen audit partners from eight different firms
were presented with eighteen sets of financial statements
representing all combinations of three levels of income,
three levels of asset size, and two levels of earnings
trend. The participants were then told to rank the firms,
from one to eighteen according to the magnitude of material-
ity of the effect of a $500,000 change in depreciation.
Eleven participants were found to use decision models that
were essentially additive, while the other four participant

models could not be explained by an additive model. However, for every participant, the income effect was the dominant factor, which is consistent with the findings of the Boatsman and Robertson study.

In a later study, Moriarity and Barron (1979) fit additive models to five audit partners' responses to a case which involved specifying preaudit materiality levels for thirty hypothetical firms. The five financial variables which were varied at four levels in the cases were (1) net income, (2) total assets, (3) debt to equity ratio, (4) number of shares outstanding, and (5) earnings trend. The response of four subjects indicated that net income was again the single most important contribution to judged materiality. For the fifth partner, asset size was more important. Overall, asset size and earnings trend seemed to be the next most important variables, while number of shares contributed nothing to the judgmental models. Within-judge correlations of predictions derived from the models showed substantial agreement while across-judge correlations showed substantial disagreements. Post-task interviews with the participants indicated that they would want to know more about operations, management, objectives, the industry, past problems, and the nature of controls to make such a materiality judgment in actual audit situations. Such comments prompted the inclusion of such factors in this study to determine their impact on audit risk assessments.

Ward (1976) studied the consensus of auditor judgments concerning the relative importance of twenty factors to the materiality judgment. He also studied the the functional form of the auditors loss function; that is, the relationship between the magnitude of misstatement of an item and the negative consequences to the auditor if the misstatement was undetected.

Twenty-four audit partners and managers from three different firms were asked to sort the twenty factors that might influence materiality decisions into five piles in order of importance. The results indicated a high degree of consensus among the auditors as a group and among the auditors from different firms. The auditors listed compliance with professional standards as the most important influence on materiality decisions. The next highest ranked item was the effect of the error on stated income, followed by losses to client stockholders and creditors and the degree of financial stability demonstrated by the client's statements.

Due to the high degree of consensus about the factors influencing materiality, one might expect a consensus in the form of the loss functions specified by the auditors. However, the auditors showed a lack of consensus in their beliefs about the form of the loss function in relation to the magnitude of misstatement.

In addition to trying to model materiality judgments, researchers have also studied the effects of uncertainty, experience, and firm-type on auditor materiality judgments.

Newton (1977) presented 19 partners of CPA firms with three cases to determine how materiality judgments were influenced by uncertainty. Case 1 was a standard gamble to determine the subjects' risk-aversion, Case 2 involved a decline in the value of marketable securities, and Case 3 involved a contingent liability for a lawsuit that the client expected to lose. Sixteen of 19 partners were classified as risk-averse in Case 1. However, the results of Case 2 classified 11 as risk-averse and six as risk-seeking, and Case 3 classified 10 as risk-averse and seven as risk-seeking. Overall 55% of the partners were classified as risk-averse while 34% were classified as risk-seeking, leading to the conclusion that the decision process employed incorporated the probability that the event would occur.

In order to isolate the effects of uncertainty, the participants were instructed that all materiality decisions were to be made in relation to net income alone. However, all participants claimed they needed more information because of the many factors which merit consideration in materiality decisions. Participants asked questions concerning the firm's balance sheet, environment (industry and economic conditions), history, management, accounting policies, previous materiality decisions, etc. Again, this indicated the need to include such factors in defining the judgment model used in practice by auditors.

The effect of experience and firm type on materiality and disclosure judgments was studied by Messier (1983).

Twenty-nine audit partners from 11 different accounting firms were asked to rate the materiality of a $1,000,000 inventory write down and assess the probability of separate disclosure of the item on the income statement. Thirty-two cases were presented involving the manipulation of four levels of net income and two levels each of earnings trend, total assets, total inventories, and current ratio. The results indicated that net income was significant for virtually all subjects, earnings trend was significant for approximately half of the subjects, and the other three variables were insignificant for most of the subjects. Judgment consensus and insight were relatively high, and judgment stability was comparable to previous studies in accounting. Only consensus of the judgments was affected by experience and firm type.

Krogstad, Ettenson, and Shanteau (1984) conducted a study to determine the effects of experience level and non-financial information on auditors' materiality judgments. Subjects consisted of three groups with varying degrees of auditing experience, including (1) 10 partners from five Big Eight accounting firms, (2) 11 audit seniors from five Big Eight accounting firms, and (3) 11 students (accounting seniors at Kansas State University). Each subject was presented 16 hypothetical auditing cases and asked to indicate the relative materiality of a proposed adjustment to the "Allowance for Doubtful Accounts" along an unmarked 100 milimeter continuum with endpoints defined as "clearly imma-

terial" and "clearly material". Each case involved the manipulation of eight auditing cues that were varied across two levels. Five factors focused on nonfinancial cues while the other three factors were of a financial nature.

As in previous studies, the effect of the item on income was clearly the most important factor with effect on earnings trend a distant second. However, the results of the study showed that 14 of 21 auditing practitioners and 10 out of 11 students made some use of nonfinancial information in making the materiality judgments required by the experimental task. The practitioners showed a high degree of consensus and consistency, and although audit seniors closely resembled audit partners, the accounting students were found not to be good surrogates for practitioners. The use of the nonfinancial factors by the auditors supported the inclusion of such variables in this study.

The results of the earlier materiality studies might lead to the conclusion that materiality judgments are primarily a function of net income. However, the results of the last study as well as the lack of specific guidance about the materiality issue on the part of standard setting bodies and national accounting firms demonstrate that the problem is not so easy to answer. The participants in the earlier studies often indicated that they wanted more information about the hypothetical companies, particularly their qualitative characteristics. It is possible that the degree of reliance on net income shown in the results of the

earlier studies is due to an oversimplification of the judgment process in the design of the case studies used. This study has utilized actual audit information and decisions and included factors for many of the qualitative variables available in actual audit situations to try to develop a richer model to more closely approximate the actual judgment process.

CHAPTER III

THEORETICAL FRAMEWORK AND METHODOLOGY

Theoretical Framework

Audit risk assessment judgments are extremely complex decision processes. This decision complexity is evidenced by the lack of specific guidance provided by authoritative bodies and major accounting firms, as well as from the comments from participants in the materiality studies mentioned previously. This complexity emphasizes the need for a theoretical framework which recognizes the interrelationship of the many variables involved in the judgment and focuses on task representativeness in the decision modeling process. Social Judgment Theory provides one such framework.

Social Judgment Theory (SJT) was developed primarily by Kenneth Hammond, a student of Egon Brunswick, and has as its origins Brunswick's theory of perception. SJT also draws heavily on the properties of Brunswick's Lens model.

The lens model contains three elements (see Figure 2). The task environment, which is defined by a set of interrelated cues, the criterion event, and the judge's estimate of the event. The judge or decision maker is separated from the event of interest by time or space and is faced with multiple overlapping cues which are imperfect predictors of the environment. The decision maker views the environment

through this "lens" of imperfect cues and combines the cues in a probablistic manner to form a judgment.
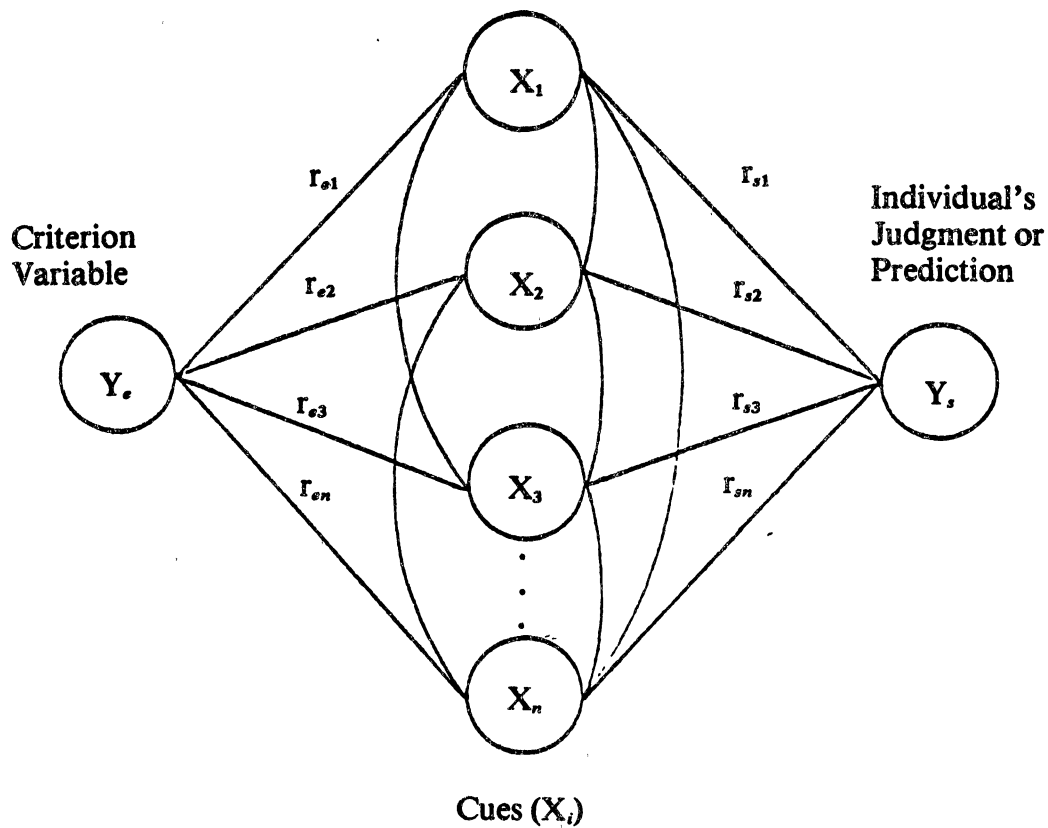
Figure 2. Brunswick's Lens Model

The decision maker's reliance on individual cues, the utilization coefficient, is measured by the univariate correlation between the cue and the response. The multivariate relationship of the set of cues to the decision maker's response can be assessed using linear regression techniques. Similarly on the environmental side, the ecological

validity of a given cue, and the environmental predictability of the cue set can be measured using univariate correlations and linear regression, respectively. The similarity of the decision maker's weightings of cues to the environmental relationships may be determined by comparing the two linear regression models, and correlating the predictions of the two equations. An achievement index indicating the degree of correspondence between the subject's response and the environmental event can provide a measure of judgment accuracy.

Like the lens model, SJT also uses this principle of parallel concepts, which describes the individual decision maker and environmental systems in symmetrical terms. The relations between cues and distal variables on the ecological side may assume various functional forms as may the relations between cues and judgments on the decision maker side. In both systems there exists a separation between what is given and what is inferred, that is, between surface data from cues to inferred depth conditions in the judgment task. This region between depth and surface variables, referred to as the "zone of ambiguity", involves the relations between cause (depth) and effect (surface).

> Because a single effect may be produced by several causes, as well as because multiple effects may be produced by a single cause, there is ambiguity from cause to effect and effect to cause. Because causes may be related, and because effects are interrelated, the network of task relations can be said to be entangled. Moreover, causal ambiguity is produced because (1) surface data are less than perfectly related to depth variables, (2) func-

tional relations between surface and depth variables may assume a variety of forms (linear, curvilinear), and (3) the relations between surface and depth may be organized (or combined) according to a variety of principles (for example, additivity or pattern). (Hammond, Stewart, Brehman, and Steinman 1975, p. 275)

SJT is directed to reducing causal ambiguity in judgment tasks and policies by externalizing the properties of the zone of ambiguity in both the decision maker and environmental systems. Since SJT is intended to be descriptive and relevant to actual judgment situations, there is a strong emphasis on task representativeness. There is also the intent not only to understand human judgment but to create and develop ways of improving it.

In the application of SJT, the analysis of an individual's cognitive system begins with the identification of the judgment problem which involves defining the judgment to be made, identifying the information or cues on which the judgment is based, and discovering the formal properties, such as intercorrelations, distributions, and ranges, of the set of cue variables in the task. Information is then gathered from the exercise of judgment on a representative task.

The next step in the analysis of the cognitive system is to analyze the judgment data in terms of multiple regression statistics. Linear or nonlinear models may be fitted to the data to describe the cognitive system. Measures of cognitive "control" (similarity between an individual's judgment and predictions based on a specific model) and "consistency"

(similarity between repeated judgments of identical pro-
files) can then be applied. If there are different models
that provide equally high predictability of a subject's
judgments, the model which is most useful as a cognitive aid
in helping an individual learn or in managing conflict
should be selected.

If there is no criterion variable against which to mea-
sure the accuracy of the judgment, the "single-system case"
results, in which the judgment processes of the person mak-
ing the judgment are the only phenomena of interest. The
single-system case places particular emphasis on the iden-
tification of all major cues, since the validity of the
judgment model developed depends on the proper identifica-
tion of the judgment problem. When established criteria are
available, the analysis may be extended to the "double-sys-
tem case" in which a measure of "achievement" or accuracy of
the judgments can be made. In the final step of SJT, feed-
back is provided to the decision maker about the weights and
function forms of the decision model.

The most frequent application of Social Judgment Theory
(SJT) is in policy formation, since it is useful in specify-
ing the relative weights of the factors involved in the
decision and in providing cognitive feedback to the decision
maker concerning the task properties of the judgment. Al-
though there have been no SJT studies identified in auditing
or accounting, there have been applications in other fields
concerning judgments similar to auditor risk assessments.

Steinmann, Smith, Jurden, and Hammond (1977) provided an example of the application of SJT in a study of policy formation focused on the relative importance of cues rather than outcomes.

The Open Space Board of Trustees of Boulder, Colorado was to formulate a policy to decide which parcels of open space land the city should acquire. Seven variables were identified by the board. These included aesthetics, cost, favorability of location, need for action, use potential, contribution to protection of environment, and availability. Forty hypothetical parcels of land were described in terms of these variables and each board member was asked to make a judgment about the desirability of acquiring the parcel of land. The board members were then provided with cognitive feedback concerning their judgment policy models, including the weights and function form for each of the variables and a measure of the consistency of their judgments. This feedback was used to provide information about the individual judgment policies and as a means for reducing conflict and achieving a compromise policy.

A tentative compromise model was developed incorporating the mean of the board members' weights on each variable. This model was then used to judge the 40 hypothetical parcels of land. From these results, the board members decided to decrease the relative importance of some cues and increase the importance of others in the final model.

Hammond, Mumpower, and Smith (1977) used an interactive computer technology as a tool to develop a symmetrical linkage system between the environmental model and the model of human judgment. In this application, SJT was used in the development of a policy for planning the future faculty characteristics at the University of Colorado. The authors generated 500 simulations of faculty characteristics outcomes, using a previously developed environmental model intended to forecast the faculty characteristics which would result from various sets of initial conditions.

Each of the outcomes of 30 randomly selected simulation runs was displayed to the planner via an interactive computer graphics terminal. The planner then rated the desirability of each outcome on a 1 to 20 scale. On the basis of these ratings, a model of the planner's judgment policy was constructed using multiple regression techniques to weight the individual outcome variables. The planner then applied the 1 to 20 rating procedure to 30 randomly selected sets of initial conditions. These ratings were used to construct a model of the planner's judgment policy for initial conditions indicating the relative weighting of each variable in the set of initial conditions. In both situations the planner's judgment model was displayed and he was given the opportunity to modify it.

The models were then used to rank order the 500 original simulation outcomes and the top 20 were displayed to the subject. Using the models of initial conditions and out-

comes, a display was then shown of the (a) outcomes and (b) predicted desirability of the outcomes for the sets of initial conditions which were indicated to be most desirable by the subject's judgment policy. A similar procedure was followed for the outcomes that were most desirable. This procedure demonstrated to the planner that contradictions existed between his two policies.

Finally, from the initial sets of 30 rankings, a model was constructed and displayed to the subject. This model included (1) the outcome policy congruent with the subject's judgment policy for initial conditions and (2) the policy for initial conditions that was congruent with the subject's judgment policy for outcomes. From this information the planner could review the policies, make changes in the policies as desired, and view the results of various combinations of initial condition and outcome policies.

Similar techniques have been used to determine the judgment policy for bank loan decisions (Wilsted, Hendrick, and Stewart, 1975). One hundred and sixty-five bankers were asked to rate 50 simulated loan applications on a nine-point scale and then indicate whether the loan would be granted or rejected or whether the status was uncertain. The simulated applications provided 14 cue characteristics with appropriate intercorrelations to provide realistic applicant characteristics. Multiple regression analysis was then used to determine each banker's policy function, providing infor-

mation about the relative weights for each of the cue characteristics.

These studies demonstrate the capabilities of this framework in modeling judgments and policy-capturing. The judgments in these studies are similar to auditor risk assessments in that they involved both quantitative and qualitative cues, some of which were themselves judgments. There was also no criterion by which to measure the accuracy of the subjects' judgments. Rather, the primary focus of the studies was to obtain information about the decision process so that the decision makers could become cognizant of the relative importance placed on the various cues and the subsequent impact of this on the decision outcome. This feedback could then be used by the subjects to improve the judgment process.

Methodology

The objective of this study was to describe the auditor's decision process in assessing the risk that an undetected material error may exist in a financial statement component. Since the study was descriptive, it was imperative that representative values be obtained for the independent and dependent variables to be used in the judgment models. However, there was no published information about the interrelationships and intercorrelation between the many factors that enter into audit risk assessment decisions. Rather than use a hypothetical task when the basic charac-

teristics of the judgment itself had not yet been defined, the study elicited data from audit managers with respect to actual audit engagements they had recently completed.

Subjects

Audit managers were selected as the subjects whose judgment processes were described, since they are intimately involved in the planning and execution of an audit. In general, audit managers have significant client contact and are sufficiently experienced to provide risk assessment judgments on both the financial statement component and on the financial statements taken as a whole.

Thirty-four audit managers from eight large public accounting firms and one partner from a small CPA firm participated in the study. The subjects were obtained by contacting a partner in each participating accounting firm, explaining the nature of the experiment, and requesting that audit managers be provided to complete the questionnaire. In all but two of the firms, the partner or someone designated by him served as the firm's contact for the researcher. Copies of the questionnaire instrument were provided to this contact and then distributed by him to the participating audit managers. Since information from actual audit engagements was being provided, this helped to insure the confidentiality of the clients and auditors involved. In two firms, the audit managers designated by the partner were

contacted directly by the researcher and provided with a copy of the questionnaire.

The questionnaire and cover letter were self-explanatory and, although the subjects were provided with the researcher's address and the phone number, no additional information or instruction was requested by any of the participants. Questionnaires were returned to the researcher in self-addressed, stamped envelopes provided with the questionnaires.

The Questionnaire

The original questionnaire was drafted using factors included in the authoritative literature, prior studies, auditing texts, accounting firm brochures, and the researcher's audit experience. The first draft of the questionnaire was pretested by 15 students in a senior level auditing class using information provided in an auditing text case problem. Revisions were then made to correct ambiguous questions and instructions.

The second version of the questionnaire was pretested by nine graduate auditing students using the case problem information, and by three practicing audit managers using information from recently completed engagements. The questionnaire also was critiqued by a senior manager in the executive office of one of the participating firms. These pretests resulted in format changes as well as the deletion

of some items and the addition of new factors suggested by the practicing auditors.

Revisions from this pretest were made and the third draft questionnaire completed by one practicing auditor with no revisions suggested. This third draft questionnaire was used as the final instrument in the experiment. A copy of the instrument is included in the Appendix.

Characteristics of Sample Audit Engagements

The audit managers participating in the study were asked to complete the questionnaire by referring to a single specific audit engagement they had recently completed. Since many of the questions referred to accounts receivable, the cover letter asked the managers to select an engagement in which the audit work in accounts receivable was significant. Also, since there were specific questions about internal controls and audit procedures, they were advised that it might be more pertinent to provide the information with respect to a division or subsidiary of a conglomerate, rather than the combined conglomerate entity. With these guidelines, the subjects were free to select any audit client they wished.

The 34 audit engagements selected by the participants represented a wide range of industries and sizes of companies. Table I summarizes the characteristics of the companies. Net sales of the sample companies ranged from a minimum of $1.2 million to a maximum of $2 billion with an

average of $127 million. Total assets ranged from $2.3 million to $1.8 billion with an average of $115 million. Net accounts receivable ranged from $403 thousand to $221 million, with an average of $27 million.

Twelve of the sample engagements involved manufacturing clients, five were in wholesale trade, and five were in the oil and gas industry. Overall, the types of industry seemed to be representative of the applicable economic environment.

Many of the companies were rather closely held. There were 10 family owned corporations, partnerships, or sole proprietorships and 14 corporations in which a member of management owned 10% of more of the outstanding stock or an outside person or company owned 20% or more of the outstanding stock.

The primary users of the financial statements were banks, creditors, and management. Only about one third of the financial statements were used by regulatory agencies, generally the SEC. The length of the audit firm's relationship with the client was three to seven years for 14 of the clients, while nine had been clients for seven or more years. The number of years the individual audit manager had been assigned to the engagement ranged from one to nine years, with an average of three years.

An unqualified opinion was rendered in 30 of the audit engagements, while four received opinions that were qualified due to uncertainties. Three of these four qualifications were noted as "going concern" qualifications.

TABLE I

CHARACTERISTICS OF SAMPLE AUDIT ENGAGEMENTS

	(Thousands)		
	Mean	Minimum	Maximum
Net sales or revenues	$126,784	$ 1,230	$2,031,000
Cost of goods sold or costs and expenses applicable to sales or revenues	$ 90,918	$ 861	$1,376,000
Gross profit or gross margin	$ 35,819	$ -6,500	$ 655,000
Other income	$ 1,169	$ -350	$ 7,200
Other operating costs and expenses (if separate line item)	$ 17,978	$ 0	$ 346,000
Selling, general and administrative expense	$ 9,814	$ -2,700	$ 69,082
Pretax net income (or loss)	$ 3,767	$-49,344	$ 90,982
Income (or loss) after taxes before extraordinary items and cumulative effect of accounting change	$ 2,001	$-49,344	$ 48,220
Accounts receivable (net)	$ 26,611	$ 403	$ 221,000
Allowance for doubtful accounts	$ 892	$ 0	$ 8,235
Current assets	$ 42,666	$ 0	$ 780,000
Total assets	$115,378	$ 2,342	$1,792,000
Current liabilities	$ 21,361	$ 0	$ 396,000
Total liabilities	$ 67,220	$ -6,769	$1,032,000
Working capital provided by operations	$ 10,828	$ -4,178	$ 164,000
Average earnings trend (1=sharp decline, 7=sharp increase)	3.44		

Total in
sample

Industry (SIC division)

Agriculture, forestry, fishing	—
Mining	2
Construction	—
Manufacturing	12
Transportation, communications, electric, gas, and sanitary services	2
Wholesale trade	5
Retail trade	1
Finance, insurance, and real estate	3
Services	1
Public administration	1
Oil and gas industry	5
Hospitals	1

TABLE I (Continued)

	Total in sample
Ownership	
Widely held (no shareholder owns more than 5% of outstanding common stock	2
A member of top management or a director owns more than 5% but less than 10% of the outstanding common stock; or an outside person or company owns more than 5% but less than 20% of the outstanding stock	3
A member of top management or a director owns 10% or more of the oustanding common stock, or an outside person or company owns 20% or more of the outstanding common stock	14
Family owned corporation, partnership, sole proprietorship	10
Subsidiary of large widely held corporation	3
Public trust	1
Length of the firm's relationship as auditors with client	
0 to 3 years	11
3 to 7 years	14
7 or more years	9
Average number of years the audit manager has been assigned to this engagement	3.2
Use of financial statements	
Routine SEC reporting requirements	12
Routine debt covenants	21
Management information	24
Acquire new financing	5
Other	6
Primary financial statement users	
Regulatory agencies	11
Banks and creditors	29
Stockholders, bondholders	24
Board of Directors	23
Management	28
Stock analysis	1

TABLE I (Continued)

	Total in sample
Form of audit report	
Unqualified	30
Qualified due to:	
Scope limitation	–
Uncertainty	4
Departure from GAAP	–
Inconsistency	–
Inadequate disclosure	–
Other	–
Disclaimer	–
Adverse	–
Total number of audits in sample	34

The Judgment Task

The questionnaire instrument was very comprehensive and required about one and one-half hours to complete. The initial group of questions requested condensed financial statement data and general information about the size and ownership of the client. Answers also were solicited to a series of questions about the overall inherent risk for the engagement.

The questions dealing specifically with accounts receivable were divided into five sections. The first section solicited information about various factors thought to influence inherent risk and asked the auditor to assess, on a five-point scale, the inherent risk (IH) associated with the accounts receivable for this engagement. The second section

solicited information about the internal controls over accounts receivable in effect on this engagement and asked the subject to assess the risk associated with the internal controls (IC) on a five-point scale and as a percentage probability.

Information about the analytical review procedures and the substantive tests of details applied during the engagement was gathered in the next two sections. The subject was also asked to assess, on a five-point scale and as a percentage probability, the risks related to analytical review procedures (AR) and tests of details (TD). The last section of the questionnaire asked the subject to specify the total dollar amount of error that would be material to accounts receivable. The auditor's assessment of the risk of such an error occurring was solicited on a five-point scale and as a percentage probability. Thus, the questionnaire solicited risk assessments for each of the components of the model specified in SAS 47 as well as information about some of the factors influencing those risk assessment components.

The inherent risk and internal control questions included in the questionnaire reflected factors specified as considerations in the professional guidelines and also factors requested by the participants in earlier empirical studies as discussed in the review of the prior research. The pretest procedures previously discussed were useful in determining what factors should be included in this section. Interviews were conducted with representatives of

each of the participating firms at the conclusion of the study to aid in the interpretation of the results.

Judgment Decomposition

The experiment focused on two levels of judgment decomposition. The first level involved decomposing the assessment of audit risk (UR) for accounts receivable into the four components of inherent risk (IH), internal control risk (IC), risk from analytical review procedures (AR), and the risk from tests of details (TD). The following research question was associated with this phase of the analysis:

1. How do auditors combine the four components of risk in their assessment of ultimate risk for accounts receivable?

This question was tested using various functional forms of the model:

$$UR = f\ (IH\ ,\ IC\ ,\ AR\ ,\ TD\ ) \tag{4}$$

where:

UR = the subject's assessment of the ultimate risk for accounts receivable on the engagement selected.

IH = the subject's assessment of risk associated with the inherent risk of the accounts receivable.

IC = the subject's assessment of risk associated with internal controls over the accounts receivable.

AR = the subject's assessment of the detection risk associated with analytical review procedures performed on the accounts receivable.

TD = the subject's assessment of the detection
risk associated with tests of details of
balances or transactions performed on the
accounts receivable.

The functional form of this judgment was analyzed by
developing various models from the scalar or percentage
probability assessments provided by the subjects for the
four risk components. In this analysis, the assessment of
ultimate risk provided by the subjects (UR) was compared to
the values of ultimate risk computed by applying the assump-
tions of SAS 39, SAS 47, and the CICA models to the data.
The following formulas define the values computed from the
assumptions of these models:

$$SAS\ 39 = IC \times AR \times TD \qquad (5)$$

$$SAS\ 47 = IH \times IC \times AR \times TD \qquad (6)$$

$$CICA = \frac{IH \times IC \times AR \times TD}{(IH \times IC \times AR \times TD) + (1.00 - IH)} \qquad (7)$$

Several additive models were also developed using multiple
regression techniques. The four risk assessments provided
values for the independent variables and the auditor assess-
ments of UR served as the dependent variable.

Nonlinear models also were constructed using squared
terms and interactive terms for the independent variables.
The nonlinear models attempted to determine whether some of
the terms or properties of the nonlinear models proposed in
the authoritative literature were being used by the auditors
as terms in an additive risk assessment model.

The second level of decomposition involved the decomposition of the cues relating to the two risk components of inherent risk (IH) and internal control risk (IC). The first two sections of the questionnaire provided assessments, on a five point scale, for eight qualitative variables affecting inherent risk (see Table II) and and 24 qualitative variables affecting internal control risk (see Table III). Because of the number of variables involved, two processes were used to analyze the data. The first process involved the use of factor analysis as a data reduction technique. The resulting rotated factors were used as independent variables to develop multiple regression models of the auditors' assessment of inherent risk and internal control risk. The second process involved the use of stepwise multiple regression techniques to develop models of the risk assessments using the original variables.

The following two research questions formalize this phase of the analysis:

2. How do auditors combine the variables in Table II in their assessment of the inherent risk for accounts receivable?

3. How do auditors combine the variables in Table III in their assessment of the internal control risk for accounts receivable?

The form of the linear models fitted by this technique was:

$$Y_j = \sum_{K=1}^{M} b_k X_{jk} + e_j \tag{8}$$

where:

Y_j =   The component audit risk assessment (IH or IC) for audit engagement j

m   =   the number of cues or factors

b_k =   the raw score regression weight for cue k

X_{jk} =   the value of cue or factor k on audit engagement j

e_j =   the residual error (unexplained variation) from the model for audit engagement j

The multiple correlation (R) was used to provide a measure of goodness of fit in the models.

Figure 3 illustrates how Social Judgment Theory was applied in the analysis of judgment decomposition in this experiment. In addition to the judgment decomposition analysis, the study provided some basic generalizations and quantifications of the various analytical review procedures, tests of details, and sampling methods currently in use by the participating auditors. Observations and insights provided in post interviews with representatives of each of the participating firms are included in the discussion of the results.

TABLE II

ACCOUNTS RECEIVABLE INHERENT RISK
FACTOR ANALYSIS

Variable Name	Variable	Rotated Factor Loadings	
		Location and Unusual Transactions	Sales and Industry Competition
NUMLOC	Due to numerous shipping, billing, and collection locations, control over receivables is difficult to maintain.	.90	.70
ESTCOLL	Estimating the collectibility of receivables and determining an appropriate allowance for doubtful accounts is highly judgmental.	.83	-.07
RPUNU	Due to related party transactions, unusual sales transactions, or consignment arrangements, receivables are difficult to control.	.76	.05
COMPET	Increased competition within the industry has created undue emphasis on obtaining sales.	.18	.76
BONUS	Sales bonuses or other sales compensation plans create undue emphasis on obtaining sales.	-.06	.67
BUSFAL	Significant number of customers are in industries in which there exists a high rate of business failure.	.53	.19
CANCELS	There is a high incidence of cancelled sales, returns, or refunds.	.53	.24
CREDPOL	Credit policies have been eased to spur sales.	.17	.37

TABLE III

ACCOUNTS RECEIVABLE INTERNAL CONTROLS
FACTOR ANALYSIS

Variable Name	Variable	Rotated Factor Loadings		
		Authorization	Cash Collections	Follow Up
VALADJ	Only valid sales adjustments and credit memos are recorded.	.83	.31	.15
VALSALE	Only valid sales are recorded.	.82	.35	.16
CREDAUTH	Credit is granted on the basis of management's established policies and limits.	.82	.28	.16
MNGAUTH	Orders for sales or services are accepted in accordance with management's authorized criteria.	.82	.11	.07
COLLPOST	Collections from customers are promptly posted to customer accounts.	.13	.82	.46
SALEPOST	All sales are promptly recorded to customer accounts.	.22	.80	.32
COLLSUM	Customer remittances are totaled, verified, and summarized by authorized personnel.	.27	.77	.20
AGEREV	Customer accounts are aged regularly and reviewed by authorized personnel.	.56	.19	.68
DELREV	Delinquent accounts are listed periodically and reviewed by authorized personnel.	.66	.05	.59
VERBAL	Recorded customer balances are independently verified with customers at reasonable intervals.	-.03	.15	.59
POSTAMT	All valid sales are correctly journalized and posted as to amount.	.77	.42	.20
POSTACT	All valid sales are correctly journalized and posted as to classification.	.67	.49	.29

TABLE III (Continued)

Variable Name	Variable	Rotated Factor Loadings		
		Autho- rization	Cash Col- lections	Follow Up
POSTPER	All valid sales are correctly journalized and posted as to accounting period.	.74	.47	.14
BILLING	All shipments of goods or rendering of services are billed at authorized prices and terms.	.67	.43	.04
AUTHRET	Returns and allowances are granted in accordance with management's policies.	.77	.21	.25
ADJAMT	Valid adjustments are correctly recorded as to amount.	.68	.39	.35
ADJACCT	Valid adjustments are correctly recorded as to classification.	.58	.41	.53
ADJPER	Valid adjustments are correctly recorded as to accounting period.	.67	.34	.43
POSTADJ	Sales adjustments are promptly posted to customer accounts.	.28	.59	.57
SEPDUT	Customers' ledgers are maintained by employees that do not handle cash receipts or their records.	.43	.53	-.06
ACCESS	Access to customer ledgers is limited to authorized accounting personnel.	.30	.73	.10
SUBCON	Customer ledgers are periodically agreed with general ledger control accounts.	.56	.03	.45
POLCWO	Uncollectible accounts are deter- mined on the basis of established criteria.	.15	.29	.56
AUTHWO	Write-offs of bad debts are ap- proved by authorized personnel.	.66	-.00	.54

Guidelines of Social Judgment Theory Framework	Method of Implementation of SJT in in this Study
1. Identification of the judgment problem, in which the substantive and formal properties of the judgment problem are identified.	Reviewed appropriate literature to determine the pertinent factors involved in audit risk assessments and incorporated these factors into the preliminary questionnaire which was pretested and revised.
2. Exercise of judgment by the decision maker on a representative task.	The auditors provided assessments of audit risk and other cue variables for accounts receivable, from recently completed audit engagements.
3. Analysis of the judgment to determine the components of the decision model.	Linear and nonlinear models were developed to describe the cognitive system. Multiple regression, factor analysis, and other statistical analysis were performed to help describe the task properties.
4. Provide feedback to the decision maker about the form of the decision model.	The final results of the study were made available to the auditors who participated in the study.

Figure 3.   Implementation of Social Judgment Theory
            Framework

CHAPTER IV

RESULTS OF THE ANALYSIS

The analysis explored two levels of judgment decomposition, each of which are discussed separately. The first level dealt with the assessment of overall audit risk (UR) for accounts receivable; the second dealt with the assessment of the two risk components of inherent risk (IH) and internal control (IC).

Decomposition of Ultimate Risk

The first stage of the analysis was focused on the following research question.

1. How do auditors combine the four component risk assessments associated with inherent risk (IH), internal control (IC), analytical review procedures (AR), and tests of details (TD) in assessing ultimate risk (UR) for accounts receivable?

The analysis included testing various functional forms of the model:

$$UR = f (IH , IC , AR , TD) \qquad (9)$$

The subjects had provided risk assessments for IC, AR, TD, and UR on both a five-point scale and as a percentage probability. Inherent risk (IH) was assessed using the five-point scale only, since it was thought that the subjects would not be able to provide a percentage assessment

for inherent risk. SAS 39 conservatively sets this value at 1.00 due to the difficulty in estimating it. SAS 47 mentions that inherent risk may be assessed in quantitative terms or in nonquantitative terms that range from a minimum to a maximum. However, none of the participating firms required their personnel to assess inherent risk in quantitative terms. Thus, the scalar values for this variable were converted to a percentage by dividing by four, the highest rating of IH assessed by any of the subjects.

A few respondents were unable to provide percentage probability estimates for all the component risk assessments. One auditor provided all the scalar assessments of risk but did not supply any percentages. Two other respondents were unable to assess the percentage risk for internal control. One person did not provide a percentage assessment for ultimate risk, one did not provide a percentage assessment for tests of details, and another did not provide a scalar assessment for overall risk. In such cases the entire set of assessments for the subject was omitted from the analysis.

The auditors' assessments of the four risk component variables were combined using the three models outlined in SAS 39, SAS 47, and the CICA study to form three values which could be compared with the UR assessments provided by the auditors. The following formulas define the values computed using these models:

$$SAS\ 39 = IC \times AR \times TD \tag{10}$$

$$SAS\ 47 = IH \times IC \times AR \times TD \tag{11}$$

$$CICA = \frac{IH \times IC \times AR \times TD}{(IH \times IC \times AR \times TD) + (1.00 - IH)} \tag{12}$$

The results of this analysis are listed in Table IV. As can be seen, the multiplicative forms assumed in SAS 39 and SAS 47 generally resulted in much lower ultimate risk values than those specified by the auditors. Tests of significant differences between the auditor assessments and the SAS 39 and SAS 47 models yielded t values of 4.06 and 5.42, both of which were significant at the .01 level. Because of the method of converting the scalar value of inherent risk specified by the subjects to a percentage, the results of the CICA model often yielded risk assessments of 1.00. This caused the value of t in the test of significant to be -1.80, which was significant at the .10 level. (See Table V)

The results of the tests for significant differences clearly showed that the auditor assessments differed from those computed using the authoritative models. However, the multiplicative form of the authoritative models may have resulted in values which, although much smaller than the auditor assessments, may be linearly related to the auditor assessments.

TABLE IV

ACCOUNTS RECEIVABLE ULTIMATE RISK ASSESSMENT
AUDITOR ASSESSMENTS AND VALUES DERIVED
FROM VARIOUS AUTHORITATIVE MODELS

Sample	ID no.	Participant Percentage Risk Assessment					SAS 39 model	SAS 47 model	CICA model
		IH	IC	AR	TD	UR			
1	1	0.75	0.10	0.30	0.10	0.10	0.0030	0.0023	0.0089
2	3	1.00	0.85	0.60	0.05	0.02	0.0255	0.0255	1.0000
3	4	0.75	0.05	0.20	0.05	0.05	0.0005	0.0004	0.0015
4	5	0.50	0.05	0.40	0.05	0.01	0.0010	0.0005	0.0010
5	6	0.75	0.10	0.90	0.05	0.05	0.0045	0.0034	0.0133
6	8	0.75	.	.	.	.	.	.	.
7	9	0.50	0.03	0.05	0.05	0.03	0.0001	0.0000	0.0001
8	10	0.50	0.03	0.10	0.05	0.05	0.0002	0.0001	0.0002
9	11	0.50	0.85	0.50	0.05	0.05	0.0213	0.0106	0.0208
10	14	0.50	0.14	0.00	.	0.05	.	.	.
11	15	0.50	0.37	0.37	0.63	0.05	0.0862	0.0431	0.0794
12	16	0.50	0.05	0.30	0.10	0.05	0.0015	0.0008	0.0015
13	17	1.00	0.05	0.60	0.20	0.05	0.0060	0.0060	1.0000
14	20	0.75	0.20	0.20	0.05	0.05	0.0020	0.0015	0.0060
15	23	0.50	0.01	0.05	0.01	0.01	0.0000	0.0000	0.0000
16	24	0.50	0.90	0.60	0.30	0.05	0.1620	0.0810	0.1394
17	25	0.50	0.05	0.05	0.10	0.01	0.0003	0.0001	0.0002
18	26	0.25	0.50	0.99	0.05	0.05	0.0248	0.0062	0.0082
19	27	0.75	0.05	0.01	0.05	0.03	0.0000	0.0000	0.0001
20	30	0.25	.	0.05	0.05	0.05	.	.	.
21	33	0.75	0.35	0.50	0.45	.	0.0788	0.0591	0.1911
22	34	0.75	0.25	0.40	0.20	0.05	0.0200	0.0150	0.0566
23	36	1.00	0.30	0.10	0.15	0.05	0.0045	0.0045	1.0000
24	37	0.25	0.10	0.10	0.10	0.05	0.0010	0.0003	0.0003
25	39	1.00	0.20	0.75	0.10	0.15	0.0150	0.0150	1.0000
26	40	0.25	.	0.05	0.05	0.03	.	.	.
27	42	1.00	0.20	0.10	0.10	0.05	0.0020	0.0020	1.0000
28	44	0.50	0.05	0.05	0.05	0.05	0.0001	0.0001	0.0001
29	46	0.50	0.10	0.75	0.10	0.20	0.0075	0.0038	0.0074
30	47	0.50	0.90	0.70	0.04	0.04	0.0252	0.0126	0.0246
31	50	0.50	0.95	0.45	0.05	0.05	0.0214	0.0107	0.0209
32	51	0.50	0.20	0.20	0.05	0.05	0.0020	0.0010	0.0020
33	52	0.75	0.10	0.80	0.05	0.08	0.0040	0.0030	0.0119
34	53	0.50	0.05	0.10	0.75	0.20	0.0038	0.0019	0.0037
Average		0.61	0.26	0.34	0.13	0.06	0.0175	0.0103	0.1866

To explore this possible relationship between the auditors' risk assessments and the values computed from the models of SAS 39, SAS 47, and CICA, three regression analyses were performed in which the values of SAS 39, SAS 47, and CICA, as previously defined, were regressed against the auditors' assessed values for UR. The significance of the linear relationship between each of the model's values and the auditor assessments could then be measured using the F statistic for the regression model. This analysis revealed no significant relationships, yielding F values of .052, .035, and .043, for the SAS 39, SAS 47 and CICA models, respectively. (See Table V)

TABLE V

ACCOUNTS RECEIVABLE ULTIMATE RISK ASSESSMENT
COMPARISON OF AUDITOR ASSESSMENTS OF
ULTIMATE RISK (UR) TO VARIOUS
AUTHORITATIVE MODELS

	SAS 39	SAS 47	CICA
Mean difference between value of UR specified by auditor and value computed from model	0.0443	0.0510	-0.1269
Standard error of the mean	0.0109	0.0094	0.0706
T for paired differences	4.06	5.42	-1.80
Prob > T	0.0004	0.0001	0.0831
F statistic for regression of model values against auditor assessments	0.052	0.035	0.043
Prob > F for regression of model values against auditor assessments	0.8213	0.8532	0.8373

These results suggest that, as a group, the auditors in this sample did not apply intuitively any of the formulas specified by SAS 39, SAS 47, or CICA. The auditors' assessed values of overall audit risk for accounts receivable did not bear a strong relationship to the values computed using any of these models.

The next step in the analysis involved the search for an additive model that might describe the relationship between the four risk components and the ultimate risk as assessed by the auditors. Since Moriarity and Barron (1979) found that auditor materiality judgments could be described by an additive model, auditor risk assessments might also be described by an additive model, combining the four component risk assessments. Accordingly, several additive models were fitted to the data using multiple regression analysis.

Both linear and squared forms of the risk components were used as independent variables, as suggested by the theoretical framework of Social Judgment Theory. Because the models described in the authoritative literature suggested the multiplication of the risk components, a regression model using interactive terms also was constructed to determine whether some of the elements of the authoritative models were being combined by the auditors in an additive fashion. The results of this analysis are shown in Table VI.

TABLE VI

ACCOUNTS RECEIVABLE ULTIMATE RISK ASSESSMENT
REGRESSION ANALYSIS

Model 1

$$UR = .026 + .007 \text{ IH} - .049 \text{ IC} + .066 \text{ AR} + .134 \text{ TD}$$
$$(.3128) \quad (.8316) \quad (.0780) \quad (.0256) \quad (.0063)$$

$R^2 = .36$ Adjusted $R^2 = .26$

Model 2

$$UR = 3.10 - .050 \text{ IC} + .067 \text{ AR} + .134 \text{ TD}$$
$$(.0276) \quad (.0678) \quad (.0208) \quad (.0055)$$

$R^2 = .36$ Adjusted $R^2 = .29$

Model 3

$$UR = .044 - .038 \text{ IC}^2 + .063 \text{ AR}^2 + .188 \text{ TD}^2$$
$$(.0002) \quad (.1553) \quad (.0354) \quad (.0047)$$

$R^2 = .35$ Adjusted $R^2 = .28$

Model 4

$$UR = .039 - .074 \text{ IC} + .096 \text{ AR} - .005 \text{ TD} +$$
$$(.0656) \quad (.5896) \quad (.3853) \quad (.9799)$$

$$.023 \text{ IC}^2 - .029 \text{ AR}^2 + .195 \text{ TD}^2$$
$$(.8692) \quad (.8053) \quad (.4651)$$

$R^2 = .38$ Adjusted $R^2 = .22$

Model 5

$$UR = .012 + .051 \text{ IC} + .110 \text{ AR} + .237 \text{ TD} -$$
$$(.4966) \quad (.5554) \quad (.0619) \quad (.0035)$$

$$.137 \text{ ICAR} - .236 \text{ ICTD} - .237 \text{ ARTD}$$
$$(.3601) \quad (.5059) \quad (.6159)$$

$R^2 = .48$ Adjusted $R^2 = .26$

TABLE VI (Continued)

Model 6 (all risk assessments made on a five point scale)

$$UR = 1.026 + .107 \ IH - .178 \ IC + .038 \ AR + .234 \ TD$$
$$(.0729) \quad (.3987) \quad (.2295) \quad (.7559) \quad (.0668)$$

$R^2 = .18$ Adjusted $R^2 = .05$

The first model constructed regressed the percentage risk assessments provided by the auditors for IC , AR , and TD and the computed percentage assessment of IH against the percentage assessment of UR . Tests of significance of the coefficients in this model indicated that IC, AR, and TD were significant at the .10 level, while the coefficient for IH and the intercept were not significant. In the interest of parsimony, a second model was constructed eliminating the IH term. Both of these simple linear models yielded R^2's of .36. The adjusted R^2 of the simpler model was .29.

Following the suggestions of Social Judgment Theory, a third model was built with squared values for IC , AR , and TD . This model resulted in an R^2 of .35 with the intercept, AR^2 and TD^2 terms significant at the .10 level. To determine whether the squared terms added information to the simple linear model above, a fourth model was constructed combining both unsquared and squared values for IC, AR, and TD. Although this model yielded a slightly higher R^2 of .38, only the intercept term was significant. The signs of the coefficients in the model indicated that the linear and

squared terms offset each other resulting in no significant increase in explanatory power.

Elements of the multiplicative risk models suggested by the authoritative literature were explored in the fifth model. This model included IC, AR, and TD and all possible combinations of their interactions. This model yielded an R^2 of .48 with AR and TD being the only significant terms. Again, the signs of the interactive terms indicated that they offset against the original linear variables. The adjusted R^2 of .26 in this model indicated no significant improvement for the additional variables.

The results of this regression analysis indicated that the auditor risk assessments are best described by model two, a simple linear combination of IC, AR, and TD. It is interesting to note that the coefficient for internal control was negative in this model. This suggests that auditors may use a compensatory model in which a high internal control risk is offset by low risk levels in substantive testing. This is consistent with traditional audit theory. The R^2 of .36 achieved by this model also indicated that other factors which were not captured in this study may be considered by auditors in assessing ultimate risk. Such factors might be related to the inherent risk factors discussed in the literature or some other factors not yet known.

It is possible that the insignificance of the IH term in these models was due to measurement error, since this

variable was computed from a scalar value. Model 6 shows the results of regressing the values of the risk component variables assessed on a five-point scale against UR assessed on a five-point scale. This model yielded an R^2 of only .18, with only the intercept and the TD variable significant at the .10 level. This indicates that the percentage proba- bility estimates offer a greater explanatory power than the scalar values in the risk assessment model. Therefore, had the subjects provided an assessment of IH as a percentage probability, this variable may have been a more significant term in these regression models.

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Decomposition of Inherent Risk

and Internal Control Risk

</div>

The second level of decomposition focused on research questions two and three dealing with the assessment of in- herent risk and internal control risk, respectively. Because of the number of variables involved in each assess- ment, two processes were used to analyze the data. The first process involved the use of factor analysis as a data reduction technique. The resulting rotated factors were then used as independent variables to develop multiple re- gression models of the auditors' assessments of inherent risk and internal control risk. The second process involved the use of stepwise multiple regression techniques to devel- op models of the risk assessments using the original vari- ables. This provided two sets of regression models for each

risk assessment, and allowed the researcher to choose the models that demonstrated the highest predictive ability or the most usefulness as a cognitive aid. It should be noted that although the same type of analysis was performed on both sets of data, the analysis involved two separate research questions which will be dealt with individually in the remainder of this section.

Inherent Risk

Research question two explored the relationship between the eight variables, in the form of the statements listed in Table II, and the auditor assessments of inherent risk for accounts receivable.

Since inherent risk is concerned with the company's industrial and economic environment, the eight variables rated by the auditors included elements of the client's industrial and physical environment that might affect accounts receivable. NUMLOC rated the difficulty in controlling the billing, shipping, and collecting of receivables due to physically decentralized locations. ESTCOLL reflected the fact that the collectibility of receivables is more difficult to estimate in some industries than others. The presence of related party or unusual sales transactions was rated in RPUNU. The effects of industry competition and sales compensation plans were rated in COMPET and BONUS, and the incidence of business failures in the industry was rated in BUSFAL. CANCELS reflected the presence of cancelled

sales, returns, and refunds and CREDPOL provided a rating for changes in the client's credit policy.

The auditors were asked to assess, on a five point scale, the degree to which the eight statements applied to the accounts receivable for the engagement selected. A rating of five indicated that the statement was applicable and indicated high risk, while a rating of one indicated that the statement did not apply and indicated low risk. A column for a "don't know" response was also provided. Six of the questionnaires contained at least one "don't know" response. These were coded by the researcher as if the statement did not apply at all, since if the auditor did not know if the item applied, it was probably not a significant factor in his assessment of the inherent risk for accounts receivable.

Factor analysis was applied to the variable ratings, using principal components techniques with a varimax rotation. Prior to rotation, a graph of the eigenvalues for the unrotated factors was examined so that the number of factors retained for rotation could be manipulated to determine the stability and interpretability of the final factors. Rotations of two, three, and four factors revealed that the data contained two stable factors that were somewhat interpretable. The rotated factor loadings for the two factors are presented in Table II.

The two factors account for 46% of the variance in the original variables. The first factor can be interpreted as

Location and Unusual Transactions, since the three variables with high loadings for this factor were NUMLOC, ESTCOLL, and RPUNU. The second factor can be interpreted as Sales and Industry Competition and was primarily a function of COMPET, NUMLOC, and BONUS.

These two factors were then regressed against the auditor assessments of inherent risk. The questionnaire required the auditors to make three different assessments of inherent risk, all on a five-point scale, with a rating of one indicating a low risk and five indicating a high risk. The first assessment was of inherent risk with respect to the validity of accounts receivable, that is, the original authenticity or existence of the claim against the debtor. The second assessment was with respect to the collectibility of the receivable, while the third was of the overall inherent risk for accounts receivable. This provided three dependent variables against which to regress the two factors previously derived.

The results of the regression of the two factors (1) Location and Unusual Transactions and (2) Sales and Industry Competition against these three risk assessment are presented in Table VII. In all three regressions the intercept and factor one are significant at the .10 level. The most predictive power was evidenced by the model using collectibility as the dependent variable (R^2=.47). This seems logical since factor one had a high loading for the variable concerning the degree of client judgment involved in esti-

mating collectibility. The model using validity as the dependent variable yielded an R^2 of only .16 while the overall model R^2 was .37. Factor two, Sales and Industry Competition, was not a significant variable for any of these regressions. This implies that the auditor assessments of inherent risk were mostly correlated with their ratings for decentralized locations, estimating collectibility, and unusual transactions.

TABLE VII

ACCOUNTS RECEIVABLE INHERENT RISK
REGRESSION ANALYSIS USING
ROTATED FACTORS

Independent variable	Dependent Variable		
	Validity	Collectibility	Overall
	[Beta Coefficient (Prob > F)]		
Intercept	1.79 (.0001)	2.76 (.0001)	2.44 (.0001)
Factor 1 Location and unusual transactions	.28 (.0585)	.71 (.0001)	.51 (.0004)
Factor 2 Sales competition	.22 (.1461)	.19 (.1779)	.19 (.1419)
R^2	.16	.47	.37
Adjusted R^2	.11	.44	.33

The second analysis technique involved the use of a stepwise multiple regression technique using the eight original variables as independent variables and the auditor risk assessments as dependent variables. The stepwise technique selected the model with the maximum R^2 for the given number of variables included in the model. Models with two to six variables were produced for each of the three inherent risk assessments. One model for each assessment was chosen based on predictive ability and parsimony. These models are presented in Table VIII.

TABLE VIII

ACCOUNTS RECEIVABLE INHERENT RISK
STEPWISE REGRESSION ANALYSIS
USING ORIGINAL VARIABLES

Dependent variable	Independent Variable Beta Coefficient (Prob > F)		
Inherent risk for validity $R^2 = .42$	= .16 + .43 CREDPOL (.0040)	+ .33 NUMLOC (.0586)	+ .24 RPUNU (.0468)
Inherent risk collectibility $R^2 = .58$	= -.09 + .22 BUSFAL (.0529)	+ .29 COMPET (.0563)	+ .51 ESTCOLL (.0001)
Overall inherent risk $R^2 = .43$	= .29 + .22 BUSFAL (.0545)	+ .26 COMPET (.0806)	+ .30 ESTCOLL (.0061)
Overall inherent risk for account receivable $R^2 = .79$	= .27 (.2247)	+ .21 Validity (.0285)	+ .65 Collectibility (.0001)

The most interpretable model for the regression of the variables against the inherent risk assessment with respect to validity was a three variable model including CREDPOL, NUMLOC, and RPUNU. The R^2 for this model was .42, and indicated that auditor assessments of the inherent validity risk for accounts receivable were most correlated with their ratings for credit policies, decentralized locations, and unusual sales transactions. This model is similar to factor one in that NUMLOC and RPUNU were important variables, but the regression model included CREDPOL and excluded ESTCOLL. Since the stepwise regression model had a higher predictive value (R^2=.42) than the regression using the rotated factors (R^2=.16), it was considered superior to the factor model.

Regression using the collectibility assessment as the dependent variable resulted in a three variable model with an R^2 of .58. As might be expected, the most significant variable in this model was ESTCOLL, which rated the difficulty in estimating the collectibility of receivables and determining an appropriate allowance for doubtful accounts. The other two variables in this stepwise model were COMPET, which rated the degree of competition within the industry, and BUSFAL, a rating of the extent to which the client's customers were in industries experiencing high rates of business failure. High ratings for the variables in this model are intuitively consistent with a high assessment of collectibility risk. The higher predictive value and inter-

pretive appeal of this model make it superior to the model using the rotated factors.

Regression of the eight variables against the overall inherent risk assessment resulted in a three variable model which was very similar to the previous model for collectibility. Overall inherent risk also was a function of EST-COLL, COMPET, and BUSFAL, although in this model, the three variables were more equally weighted. Thus, high auditor ratings of the difficulty in estimating the collectibility of receivables and determining an appropriate allowance for doubtful accounts, a significant number of the client's customers in industries experiencing a high risk of failure, and increased industry competition resulted in high auditor assessments of inherent risk for accounts receivable.

The relationship between collectibility and inherent risk are more clearly evidenced by regressing the risk assessments for validity and collectibility against the overall risk assessment. (See Table VIII) This regression resulted in an R^2 of .79. Both components were significant at the .10 level but collectibility played a more important role in the overall assessment as indicated by a coefficient estimate of .65 as compared to .21 for validity. This makes sense on an intuitive level since inherent risk involves factors, such as the general economy and the nature of the industry that the client operates in, which are more likely to relate to the collectibility of an accounts receivable rather than the validity of the claim.

Internal Control Risk

Research question three explored the relationship between the 24 variables, in the form of the statements listed in Table III, and the auditor assessments of internal control risk for accounts receivable. The variables included in this portion of the questionnaire were typical of items on a standard internal control questionnaire for accounts receivable. They were concerned with the client's controls over the validity, completeness, authorization, accuracy, classification, and proper period of recorded accounts receivable.

The questionnaire requested the auditor to rate, on a five-point scale, the effectiveness of the controls as they applied to the accounts receivable for the audit engagement selected. A rating of one indicated excellent controls while a rating of five indicated no controls. Although no space was provided for "not applicable", three subjects indicated a "not applicable" response for at least one question. Since it was not clear how these responses might affect the analysis, the researcher compared the results of coding the "not applicable" responses as a "5" indicating no controls, as a "3" the midpoint of the scale, and as a "1" indicating excellent controls. No significant differences in the results were observed under the various assumptions. In the results presented, each "not applicable" response was coded as a "one".

The procedures for analyzing the data for internal control risk were essentially the same as those used to analyze inherent risk. However, since there were a larger number of original internal control variables to deal with, the factor analysis proved to be of greater value as a data reduction technique. The factor analysis applied principal components techniques with a varimax rotation. Prior to rotation, a graph of the eigenvalues for the unrotated factors was examined so that the number of factors retained for rotation could be manipulated to determine the stability and interpretability of the factors. Rotations of three, four, and five factors revealed that two factors were stable and appeared in every rotation. The retention of a third factor resulted in 71% of the variance in the variables being accounted for and yielded three factors that could be intepreted.

The factor loadings given in Table III indicated that the first factor had high loadings for VALADJ, VALSALE, CREDAUTH, and MGTAUTH. This factor represents the controls over the authorization of sales and credit and has been labled "Authorization". Three variables had high loadings in factor two. These were COLLPOST, SALEPOST, and COLLSUM, which all dealt with the controls over the postings of re-mittances and sales to individual customer accounts. Thus, the second factor can be interpreted as controls over cash collections from customers and was labeled "Cash Collec-tions". The third factor deals with the controls over the

review of the accounts receivable aging and follow up on delinquent accounts. This factor had high loadings for AGEREV, DELREV, and VERBAL and was labeled "Follow Up".

These three factors were then regressed against the auditor assessments of internal control risk. The questionnaire asked the auditors to assess the effectiveness of internal controls with respect to validity and with respect to collectibility. These assessments were made on a five point scale, with one indicating very effective and five indicating very ineffective. The auditor was also asked to assess the risk that, given material errors occur, the system of internal controls over accounts receivable would fail to detect them. This risk assessment was solicited on a five-point scale, with one indicating virtually no risk and five indicating extremely high risk, and as a percentage, on a scale of 0-100%. These assessments provided four dependent variables against which to regress the three factors previously derived.

The results of the regression of the rotated factors are shown in Table IX. The model demonstrating the most predictive power ($R^2 = .66$) was the regression against the validity risk assessment. This is primarily a result of the effect of factor one, Authorization, which had high loadings for the controls over the authorization of sales and credit which are directly related to the validity of receivables. Cash Collections and Follow Up were also significant at the

.10 level in this model, but had smaller coefficient weightings than Authorization.

TABLE IX

ACCOUNTS RECEIVABLE INTERNAL CONTROLS
REGRESSION ANALYSIS USING
ROTATED FACTORS

| | Beta Coefficients for Model (Prob > F) | | | |
| | 1 | 2 | 3 | 4 |
Factor	Validity	Collectibility	Overall	Overall % risk
Intercept	2.09 (.0001)	2.52 (.0001)	2.22 (.0001)	26.35 (.0001)
Factor 1 – Authorization	.71 (.0001)	.31 (.0454)	.41 (.0016)	8.74 (.1329)
Factor 2 – Cash Collections	.36 (.0039)	.35 (.0203)	.21 (.0808)	2.66 (.6331)
Factor 3 – Follow Up	.20 (.0778)	.45 (.0026)	.17 (.1247)	5.21 (.3272)
R^2	.66	.45	.41	.12
Adjusted R^2	.63	.39	.35	.02

The regression of the factors against the collectibility risk assessment yielded an R^2 of .45. As might be expected, the most significant factor in this model was Follow Up, which showed high loadings for controls over the review of the accounts receivable aging and the follow up of delinquent accounts. All three factors were significant at the .10 level and were relatively evenly weighted.

The regression of the factors against the assessment of overall internal control risk on the five-point scale resulted in an R^2 of .41. In this model the significance of factor three, Follow Up, decreased somewhat, and the significance of Authorization increased. The coefficient weightings indicated that controls over the authorization of sales and credit were more highly correlated with overall internal control risk than the other two factors.

Regression of the factors against the percentage probability assessment of internal control risk yielded an R^2 of only .12, with none of the factors showing a significance at the .10 level. This result could be due to measurement error caused by the subjects' changing from scalar assessments of the controls to a percentage assessment of the risk related to those controls.

The second analysis of internal control risk involved the use of a stepwise multiple regression technique using the twenty four original variables as independent variables and the auditor risk assessments as dependent variables. The stepwise technique yielded the model with the maximum R^2 for the given number of variables included in the model. Models with two to ten variables were produced for each of the four internal control risk assessments. One model for each assessment was chosen based on predictive ability and interpretability. These models are presented in Table X. The first model regressed the variables against the auditor assessment of the controls over the validity of accounts

receivable. A three variable model with an R^2 of .75 was selected from the models produced. This model contains the variables POSTPER, SEPDUT, and SUBCON. POSTPER rated the controls that all valid sales are correctly posted as to accounting period. SEPDUT concerned controls over the separation of duties in the custody and recording of cash receipts, and controls over the periodic balancing of customer subledgers with the control account were rated in SUBCON. Each of these variables is concerned with the validity of customer accounts, and it is reasonable that they would be highly correlated with an assessment of the controls over the validity of accounts receivable. The high weighting of POSTPER could indicate that good cutoff procedures are among the most important controls with respect to validity.

The auditor assessments of the internal controls over collectibility were regressed against the original variables in model two. A five variable model with an R^2 of .73 was chosen as the most interpretable. Significant variables in this model were VERBAL, POSTADJ, DELREV, AGEREV, AND POLCWO. VERBAL concerned the periodic independent verification of customer balances, and POLCWO rated the presence of an established criteria for determining uncollectible accounts. The periodic review by authorized personnel of the accounts receivable aving and list of delinquent accounts were rated in AGEREV and DELREV. POSTADJ reflects the controls over the prompt posting of adjustments, such as credits for re-

TABLE X

ACCOUNTS RECEIVABLE INTERNAL CONTROLS
STEPWISE REGRESSION ANALYSIS
USING ORIGINAL VARIABLES

Dependent variable Independent Variable Beta Coefficient (Prob >F)

Internal control = -.30 + .57 POSTPER + .17 SEPDUT + .36 SUBCON
 validity   (.0001)   (.0570)   (.0020)

R^2 = .75

Internal control = .025 + .40 VERBAL + .43 POSTADJ + .45 DELREV
 collectibility   (.0070)   (.0068)   (.0288)

        - .78 AGEREV + .48 POLCWO
         (.0014) (.0001)

R^2 = .73

Internal control = .54 + .25 POSTPER - .31 COLLPOST +
 overall   (.0553)   (.0449)

       .37 ACCESS + .43 SUBCON
       (.0047) (.0002)

R^2 = .67

Internal control = -23.09 + 21.31 POSTPER - 14.11 SALEPOST +
 overall %   (.0048)   (.0575)

       9.58 VERBAL
       (.0213)

R^2 = .36

Internal control = .76 + .59 Validity + .09 Collectibility
 overall scalar (.0022) (.0001)   (.3051)

R^2 = .71

Internal control = -8.26 + 8.79 Validity + 6.30 Collectibility
 overall %   (.5867) (.1406)   (.2942)

R^2 = .19

turns and allowances, to customer accounts. All the variables, except AGEREV, were given virtually equal positive weightings. The negative weighting of AGEREV was probably caused by a high degree of multicolinearity with DELREV (correlation coefficient of .85). High ratings for the variables included in this model would seem consistent with a high assessment of collectibility risk.

The third model involved the regression of the overall internal control risk assessment made on a five-point scale. The most interpretable model contained four variables and had an R^2 of .67. Two of the variables in this model, POSTPER and SUBCON, were consistent with the validity model, while another variable, ACCESS, concerned the controls over access to the customer ledger. COLLPOST, which reflects the prompt posting of collections to customer accounts, entered the model with a negative coefficient. This was most likely caused by a moderate amount of multicolinearity with ACCESS (correlation coefficient of .63). This model stresses the impact on auditor internal control assessments of proper cutoff controls, subledger to control account balancing, and access controls over the customer ledger. It also illustrates the strong relationship between accounts receivable validity risk assessments and accounts receivable overall internal control risk assessments.

The regression of the percentage assessments of internal control risk against the original variables resulted in models that bore little resemblance to those previously

described, and exhibited less predictive power. The most interpretative model included three variables and had an R^2 of .36. This model included positive coefficients for POST-PER, as in the validity model, and VERBAL, as in the collectibility model. However, SALEPOST, which rated controls over the prompt posting of sales to customer accounts, entered with a negative coefficient. This was likely the result of the correlation between POSTPER and SALEPOST (correlation coefficient of .65). This model exhibits the importance of proper cutoff controls and periodic independent verification of customer balances to auditor internal control assessments.

The final phase of the analysis of internal control risk involved regressing the risk assessments for validity and collectibility against the overall risk assessments. (See Table X) The regression against the overall assessment made on a five-point scale yielded an R^2 of .71, with the intercept and validity being significant at the .10 level. The regression against the percentage probability resulted in a very low R^2 (.19) with none of the variables being significant at the .10 level.

The comparison of the internal control risk assessment models developed using factor analysis with the models derived with the stepwise technique indicate a slightly higher predictive power for the latter. However, confusion caused by the multicolinearity of the variables in the stepwise models and the intuitive appeal of the interpreted factors

appeared to make the factor analysis models preferable as a cognitive aid in improving decisions.

It is interesting to compare how the relationship of validity and collectibility to the overall risk assessment changes from inherent risk to internal control risk. The analysis indicates that collectibility and inherent risk are more closely related, while validity and internal control risk are more closely related. This result is somewhat intuitive because it is generally easy to ensure the validity of recorded receivables by designing effective internal accounting controls. However, the collectibility of receivables is often affected by factors outside the company's control, such as the state of the economy or industry in which the company operates, which are essentially inherent risks.

Other Observations and Analyses

The remainder of this chapter describes the information and risk assessments obtained from the auditors for the final two risk components, analytical review procedures and tests of details. Because of the nature of the data gathered, few statistical procedures other than sums or averages were practical.

Analytical Review Procedures

The auditors were asked to provide information as to what analytical review procedures were performed and the

timing of these procedures on the engagement selected. Table XI summarizes the results of this inquiry. As can be seen, most analytical procedures are performed as part of the substantive testing. The main procedures used in planning involved comparing the current year balances to prior years. It is interesting to note that few of the procedures involving industry comparisons were performed. As might be expected, many of the procedures applied were focused on the review of the adequacy of the allowance for doubtful accounts.

The auditors were also asked to indicate, on a five-point scale, with one indicating low reliance and five indicating high reliance, the degree of reliance placed on analytical review procedures. The average reliance rating of 2.85 indicated a moderate amount of reliance on these procedures.

Tests of Details

The auditors were asked to provide information as to the performance and timing of the tests of details of accounts receivable for the engagement selected. Table XII summarizes this information.

Two of the subjects indicated that they did not test mathematical accuracy of the accounts receivable aging. One noted that lack of testing occurred because the auditor already knew the aging was in error. The other indicated

TABLE XI

ACCOUNTS RECEIVABLE
ANALYTICAL REVIEW PROCEDURES

Procedure	Number of sample audits to which procedure was applied during timing indicated			
	Planning stage	During conduct of substantive tests	Overall review at or near conclusion	Procedure not performed
Compare accounts receivable ending balance to prior years	23	30	18	0
Review relationship of average receivables to net sales during the period and consider its reasonableness in relation to credit policy	8	20	11	8
Compare collection period to prior years	6	27	7	6
Compare collection period to industry average	2	4	5	28
Compare accounts receivable turnover to prior years	2	19	2	14
Compare accounts receivable turnover to industry average	0	2	2	31
Compare ending balance in allowance for doubtful accounts to prior year	15	27	16	4
Compare amounts of current year write offs to prior years	6	30	12	3
Compare current year write offs to allowance for doubtful accounts	4	29	11	4
Compare current year write offs to total accounts receivable	5	26	10	7
Compare aging of accounts receivable to prior year	8	31	11	2
Compare aging of accounts receivable to industry average	0	3	2	31

Tests of Details

The auditors were asked to provide information as to the performance and timing of the tests of details of accounts receivable for the engagement selected. Table XII summarizes this information.

Two of the subjects indicated that they did not test mathematical accuracy of the accounts receivable aging. One noted that lack of testing occurred because the auditor already knew the aging was in error. The other indicated that the client waited until the year-end audit to write off bad debts, and this procedures was inferred to be the reason that the aging was not tested.

Six of the auditors indicated that positive confirmations were not used on the engagement. Two of these used negative confirmations, and all six indicated extensive testing of the subsequent collections of receivables.

The auditors were also asked to indicate, on a five-point scale, the degree of reliance placed on tests of details. The average reliance rating was 4.09, indicating extremely high reliance to these tests. Table XIII summarizes the average values for all the risk assessments provided by the auditors. As would be expected, the averages show that the risk assessments for tests of details were much lower than the risk assessments for internal control and analytical review procedures. This is consistent with the high degree of reliance placed on the substantive testing.

TABLE XII

ACCOUNTS RECEIVABLE TESTS OF DETAILS

Procedure	Number of sample audits to which procedures were applied		
	Timing of Procedures Performed		Procedures not Performed
	Interim	Year-end	
Test the accuracy of the accounts receivable detail balances	8	28	0
Test the mathematical accuracy of the accounts receivable aging	6	27	2
Review accounts receivable control account for the period for unusual entries	5	22	10
Review receivables for any which have been assigned or discounted	3	17	14
Review receivables for amounts due from group and related companies, employees, etc., credit balances and unusual items	1	29	4
Confirm accounts receivable with debtors:			
- Positive confirmation	10	18	6
- Negative confirmation	5	2	27
Examination of subsequent collections:			
- Used as follow up on confirmations	5	22	8
- Used other than as follow up on confirmations	1	19	14
Examine evidence of sales authorization and shipment of goods:			
- Used as follow up on confirmations	6	11	17
- Used other than as follow up on confirmations	6	9	20
Tests of sales cutoff:			
- Trace recorded sales entries to sales invoices for period surrounding year-end	3	24	8
- Trace recorded sales to shipping documents for period surrounding year-end	3	21	11
Review the collectibility of receivables and determine the adequacy of the allowance for bad debts	7	33	0

TABLE XII (Continued)

Procedure	Number of sample audits to which procedures were applied		
	Timing of Procedures Performed		Procedures not
	Interim	Year-end	Performed
Review the financial presentation of accounts receivable for appropriate classification	4	33	0
Review the financial statements and footnotes for adequacy of disclosure	0	34	0

Other Information

The auditors also provided information about the type of sampling used in their compliance and substantive testing. Table XV indicates that many of the auditors did no compliance testing of internal controls, and most of those who did test for compliance used nonstatistical sampling methods. Some of the auditors commented that the most critical internal controls were of a nature that could not be tested by traditional tests of compliance. Such controls would probably include segregation of duties and management supervision.

TABLE XIII

SUMMARY OF ACCOUNTS RECEIVABLE
RISK ASSESSMENTS

Overall Risk Assessments (UR)

Average dollar materiality for accounts
   receivable $621,471

Average materiality as a percent of pretax
   net income   55%

Average materiality as a percentage of
   accounts receivable   5%

Average risk of undetected error in accounts
   receivable (UR) (1 = very unlikely, 5 =
   very likely)   1.42

Average risk of undetected error in accounts
   receivable (UR)   5.81%

Inherent Risk (IH)

Average inherent risk with respect to validity
   (1 = low risk, 5 = high risk)   1.79

Average inherent risk with respect to collect-
   ibility (1 = low risk, 5 = high risk)   2.76

Average overall inherent risk for accounts
   receivable (1 = low risk, 5 = high risk)   2.44

Internal Control Risk (IC)

Average controls with respect to validity
   (1 = very effective, 5 = very ineffective)   2.06
Average controls with respect to collectibility
   (1 = very effective, 5 = very ineffective)   2.58

Average risk that internal controls will fail to
   detect a material error (1 = low risk, 5 =
   high risk)   2.19

Average risk that internal controls will fail to
   detect a material error (0-100%)   26.23%

TABLE XIII (continued)

Analytical Review Procedures (AR)

Average degree of reliance placed on analytical review procedures (1 = low, 5 = high)	2.85
Average risk that analytical review procedures will fail to detect material error (1 - low risk, 5 = high risk)	2.82
Average risk that analytical review procedures will fail to detect material error (0-100%)	34.30%

Tests of Details (TD)

Average degree of reliance placed on tests of details (1 = low, 5 = high)	4.09
Average risk that tests of details will fail to detect material error (1 = low risk, 5 = high risk)	1.79
Average risk that tests of details will fail to detect material error (0-100%)	13.42%

Most of the substantive testing involved nonstatistical sampling. Many of the auditors indicated that they selected high dollar and older accounts for testing and achieved a fairly high percentage of coverage of the dollar balance. Two questionnaires indicated that no testing was performed when actually 100% of the items comprising the account had been examined. These auditors, when asked about the sampling method used, considered that the balance had not been examined on a test basis. Participants from one of the firms indicated that dollar unit sampling was the primary testing technique used by them. It is interesting to note that only one audit applied statistical variables testing,

contrary to the amount of space given to this topic in most auditing texts.

TABLE XIV

UTILIZATION OF STATISTICAL VERSUS NONSTATISTICAL TESTING IN THE AUDIT OF ACCOUNTS RECEIVABLE

	Total number of firms in sample
Method of sampling used in compliance testing:	
Nonstatistical	10
Statistical attribute testing	6
Statistical dollar unit sampling	3
No compliance testing was performed	15
Method of sampling used in testing the accounts receivable balance:	
Nonstatistical	24
Statistical variables testing	1
Statistical dollar unit sampling	7
No tests of details were performed	2

CHAPTER V

SUMMARY AND CONCLUSION

Overview

The purpose of this study was to describe the task structure for auditor assessments of ultimate risk for a particular item in the financial statements. The methodology investigated relevant factors and the functional form for combining these factors in the risk assessment decision for accounts receivable.

Two levels of judgment decomposition were analyzed. At the first level, the audit risk assessment decision was decomposed into the components of inherent risk, internal control risk, the risk of analytical review procedures, and the risk from tests of details, as discussed in SAS 39 and 47. Risk assessments for each of these four components as well as the ultimate risk assessment for accounts receivable were solicited from a sample of audit managers with respect to actual audit engagements they had recently completed. This information was then analyzed to determine how the risk assessment components were combined to assess audit risk.

The second level decomposed the assessments of inherent risk and internal control risk. The auditors answered various questions about inherent risk and internal control risk for their audit engagements. This information was analyzed

to determine what factors were most important to the assessments of inherent risk and internal control risk provided by the auditors.

Unlike most studies of auditor judgments, this study did not use case studies to represent the judgment task. Rather, the auditors were asked to provide information about an actual audit engagement. Although this approach limited statistical analysis of the data, it provided the subjects with a more representative and realistic judgment task and allowed the researcher to study many variables that may have been difficult or impossible to include in a case study.

The analysis of the data in the first level of judgment decomposition indicated that the auditors did not combine the components of audit risk in the manner suggested by any of the authoritative models in the extant literature (e.g., SAS 39, SAS 47, or CICA). Rather, a simple additive model including the components of internal control risk, analytical review risk, and tests of details risk appeared to more accurately describe the auditor's ultimate risk assessment decision. Furthermore, even the simple additive model provided little explanatory power.

The results of the second level of decomposition revealed that inherent risk is more closely related to the collectibility of receivables, while internal control risk is more closely related to the validity of the receivables. Analysis of eight variables pertaining to inherent risk indicated that 43% of the variance in the overall inherent

risk and 58% of the variance in the assessment of the inherent risk pertaining to the collectibility of accounts receivable could be explained by a linear combination of three variables dealing with the difficulty in estimating the collectibility of receivables, the number of customers in industries experiencing a high rate of business failure, and increased industry competition.

The factor analysis of 24 internal control variables extracted three factors that explained 71% of the variance in the original variables. These factors were (1) controls over the authorization of sales and credit, (2) controls over cash collections from customers, and (3) controls over the review and follow up of delinquent accounts. A linear combination of these three factors accounted for 41% of the variance in the overall assessment of internal control risk and 66% of the assessment of the internal control risk pertaining to the validity of accounts receivable.

The results of the study imply that auditors do not follow literally the models suggested by the authoritative bodies. Although the models in SAS 39 and SAS 47 were provided only as illustrations of possible aggregation models, it might be expected that practitioners would have applied them as few other guidelines are available. Based on the difficulty that some subjects had in providing quantitative risk assessments, it appears reasonable to conclude that many of them may have encountered difficulty in aggregating information in the form of probabilities. This difficulty

may have accounted for some of the difference between the auditors risk assessments and the assessments derived by applying the authoritative models. The possibility also exists that there are other factors or components in the audit risk decision model that have not been identified and addressed by the authoritative literature.

Significance

Based on the results of this study, it would appear that auditors are not following a literal interpretation of any authoritative risk assessment model in assessing audit risk for accounts receivable. Examination of the auditor assessments of the ultimate risk for accounts receivable in Table IV revealed that many of the auditors assessed this risk at 5%. One possible explanation for this is that the controllable components of ultimate risk were manipulated in the engagement so that the resulting actual audit risk was 5%. This inference would imply, however, that the auditors were using a well defined risk model, which does not seem to be the case, since none of the firms has issued specific guidelines for calculating ultimate risk. It seems more likely that a 5% risk level represents (1) the auditor's desired risk level, (2) a maximum acceptable risk suggested by the firm or, (3) is the result of a heuristic decision anchored on an ultimate risk level often used in examples in the literature. Whatever the explanation, it is clear that,

as a group, the auditors in the study did not follow a well-defined model to assess ultimate risk.

As discussed at the beginning of this paper, research in decision making has shown that improvements in judgment are difficult in situations in which little or no feedback is available. If auditors are to become more adept at making accurate audit risk assessments, they will require more feedback about the accuracy of their judgments. This feedback is possible only if a more well-defined risk assessment model is available. More research on auditor risk assessments is necessary in order to assist the audit firms in developing such a model.

Audit firms should develop and disseminate explicit guidelines and policies for audit risk assessments. Such guidelines should specify the factors to be considered and the weights to be given to the factors. The development of structured decision aids, similar to the questionnaires and checklists used by auditors for other judgments and evaluations, might be useful in improving auditor risk assessments.

Finally, auditors need more training in decision making to improve their judgments. This should include training in general decision making theory and judgment processes as well as the specific judgments involved in auditing. The use of practice sets and interactive computer techniques could be used to provide feedback in this training to improve the auditor's judgment ability.

Limitations

The audit managers involved in this study were selected based on their availability and willingness to participate. This factor may have resulted in some unknown bias in the results that might not have been present if the subjects had been selected on a random basis. Similarly, the nature of the audit engagements selected by them may have had an influence on the results of the study, although neither the dates of the audited financial statements nor the types of clients selected indicated any bias. Since all of the managers practice in one state, there also may have been a regional bias in the data. Because the study focused on accounts receivable, the results may not be applicable to risk assessments made for other financial statement components.

The other characteristic of the study that may limit its validity was the complexity of the judgment task. This resulted in an unusually long questionnaire instrument. Although audit managers are accustomed to completing long checklists and forms and should have been familiar with the information requested in the questionnaire, the length of the questionnaire may have biased the results.

The task complexity may also have manifested itself in measurement error, particularly in the assessment of probabilities. Past studies involving the solicitation of probabilities have indicated that subjects often have difficulty making such assessments. This factor raises an interesting

problem that may explain why none of the quantitative models that have been developed in the past has gained wide acceptance. This inability of decision makers to assess probabilities may present a major stumbling block in the improvement of audit risk assessments. Such quantitative assessment skills may need to be developed before auditor judgments can be improved.

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APPENDIX

EXPERIMENTAL INSTRUMENT

Shirley Daniel Dale, CPA
4228 South Detroit
Tulsa, Oklahoma 74105

Dear Helpful Friend:
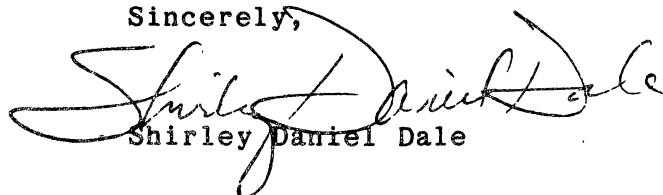
I am currently conducting a research project concerning the assessment of audit risk and need your help.

Probably the most important skill that an experienced auditor may possess is the ability to assess accurately the risk that material undetected errors may remain in the financial statements after the audit work has been completed. Yet there is little specific authoritative guidance available to assist in making such decisions, nor any prescribed method for developing these judgment skills other than through experience. Because little is known about these judgment processes and feedback is not readily available to the decision maker, auditors may often be unable to evaluate their own or other's abilities to make these important risk assessments. The purpose of this study is to collect and analyze information from experienced auditors about the audit risk assessments made for audit engagements they recently completed. This information should provide a better understanding of the nature of these judgments in the hope that such knowledge can be used to develop guidelines or techniques to refine and improve these judgments.

To respond to the questions you should refer to a single specific audit engagement you have recently completed. Many of the questions refer to accounts receivable. Therefore, please select an engagement in which the audit work in this area is significant in relation to the total engagement. Since there are specific questions about internal controls and audit procedures, it may be more pertinent to provide the information with respect to a division or subsidiary of a conglomerate, rather than the combined conglomerate entity. In order to protect the confidentiality of you and your client, the attached questionnaire has been designed to collect the requested information in a manner that will not require you to reveal either your or your client's identity or any information that could jeopardize your anonymity.

When you have completed the questionnaire, please return it to me in the self-addressed envelope enclosed. If you have any questions, you may call me collect at (918) 749-6284. I greatly appreciate your help in this research.

Sincerely,

Shirley Daniel Dale

GENERAL INFORMATION

The following questionnaire has been designed in connection with a study of the decision process used by auditors in the assessment of audit risk. For the purposes of this study, audit risk at the financial statement level is defined as the risk that the auditor may unknowingly fail to modify appropriately his opinion on financial statements that are materially misstated. At the account balance or class-of-transactions level, audit risk consists of (a) the risk that the balance or class contains errors that could be material to the financial statements when aggregated with errors in other balances or classes and (b) the risk that the auditor will not detect such error. (SAS 47)

The questionnaire is designed to solicit information pertinent to the assessment of audit risk with respect to accounts receivable and the financial statements as a whole on an actual audit engagement which you have recently completed. The information requested has been grouped into general information and factors affecting inherent risk, control risk, and detection risk. You are also asked to provide information about your assessment of these types of risk with respect to accounts receivable and the overall financial statements for this engagement.

For purposes of this questionnaire:

1. The factors considered to affect inherent risk pertain to the susceptibility of the financial statements or a component thereof to errors that could be material.

2. The factors considered to affect control risk pertain to the effectiveness of internal accounting control procedures in preventing or detecting, on a timely basis, material errors that could occur in the financial statements or a component thereof.

3. The factors considered to affect detection risk pertain to the effectiveness of applied auditing procedures in detecting material errors that could occur in the financial statements or a component thereof.

GENERAL INSTRUCTIONS

Please respond to each item on this questionnaire by providing the requested information using the financial statements, working papers, engagement files, or your personal knowledge with respect to a recently completed audit engagement to which you were assigned. Please do not in any way refer to the client's name or identify the client in any way.

I. GENERAL INFORMATION

A. Quantitative financial statement data

(Please check here if information is in thousands of dollars _____)
1. Period of financial statements: _____ Months ended _____
2. Date of audit report: _____
3. Form of audit report (check one):
   Unqualified   _____
   *Qualified due to:
      Scope limitation   _____
      Uncertainty
      Departure from GAAP   _____
      Inconsistency   _____
      Inadequate disclosure   _____
      Other   _____
   *Disclaimer   _____
   *Adverse   _____

3a. *Describe departure, if any_____
_____

4. Net sales or revenues	$_____
5. Cost of goods sold or costs and expenses applicable to sales or revenues	$_____
6. Gross profit or gross margin	$_____
7. Other income	$_____
8. Other operating costs and expenses (if separate line item)	$_____
9. Selling, general and administrative expense	$_____
10. Pretax net income (or loss)	$_____
11. Income (or loss) after taxes before extraordinary items and cumulative effect of accounting change	$_____
12. Accounts receivable (net)	$_____
13. Allowance for doubtful accounts	$_____
14. Current assets	$_____
15. Total assets	$_____
16. Current liabilities	$_____
17. Total liabilities	$_____
18. Working capital provided by operations	$_____

19. Earnings trend (circle one):

Sharp decline						Sharp Increase
1	2	3	4	5	6	7

I. GENERAL INFORMATION

B. Qualitative Factors - Information relating to overall engagement

1. **Industry (SIC division)**

   A. Agriculture, foresty, fishing ____   F. Wholesale trade ____

   B. Mining ____   G. Retail trade ____

   C. Construction ____   H. Finance, insurance, and real estate ____

   D. Manufacturing ____   I. Services ____

   E. Transportation, communications, electric, gas, and sanitary services ____   J. Public administration ____

   K. Nonclassifiable establishments (describe) _____

2. **Ownership (check one)**

   a. Widely held (no shareholder owns more than 5% of outstanding common stock

   b. A member of top management or a director owns more than 5% but less than 10% of the outstanding common stock; or an outside person or company owns more than 5% but less than 20% of the outstanding stock ____

   c. A member of top management or a director owns 10% or more of the oustanding common stock, or an outside person or company owns 20% or more of the outstanding common stock ____

   d. Family owned corporation, partnership, sole proprietorship ____

   e. Subsidiary of large widely held corporation ____

3. **Length of the firm's relationship as auditors with client** (check one)

   0 to 3 years ____

   3 to 7 years ____

   7 or more years ____

4. Number of years you, individually, have been assigned to this engagement ____

5. **Use of financial statements** (check all that apply)

   Routine SEC reporting requirements ____

   Routine debt covenants ____

   Management information ____

   Acquire new financing ____

   Other: _____ ____

6. **Primary financial statement users** (check all that apply)

   Regulatory agencies ____

   Banks and creditors ____

   Stockholders, bondholders ____

   Board of Directors ____

   Management ____

   Other: _____ ____

II. FACTORS AFFECTING INHERENT RISK

The following list contains a series of statements about your client's management. Please indicate your opinion as to the degree to which each statement applies to this audit engagement by checking the appropriate column.

A. Management	Not at all 1	2	3	4	Completely 5	Don't know
1. There is turnover in key management positions						
- In accounting and finance	___	___	___	___	___	___
- In operations	___	___	___	___	___	___
2. Management is inexperienced.	___	___	___	___	___	___
3. Management is incompetent.	___	___	___	___	___	___
4. Management lacks integrity.	___	___	___	___	___	___
5. Management overrides significant internal accounting controls.	___	___	___	___	___	___
6. Members of management are experiencing personal financial difficulties.	___	___	___	___	___	___
7. Members of management have conflicts of interest with respect to the Company.	___	___	___	___	___	___
8. There is undue interest in maintaining the market value of securities.	___	___	___	___	___	___
9. There is undue interest in staying within the budget.	___	___	___	___	___	___
10. Bonuses and other forms of management compensation depend on net income.	___	___	___	___	___	___
11. There is a desire to maintain a favorable earnings record in hope of supporting the price of the Company's stock.	___	___	___	___	___	___
12. Management is reluctant to provide additional information to improve clarity and comprehensiveness of the Company's financial statements.	___	___	___	___	___	___
13. Management is not concerned with reporting accurate financial information.	___	___	___	___	___	___

II. FACTORS AFFECTING INHERENT RISK

The following list contains a series of statements pertaining to industry, operations, and the regulatory environment. Please indicate your opinion as to <u>the degree to which each statement applies to this audit engagement</u> by checking the appropriate column.

B. Industry, operations, and regulatory environment

	Not at all 1	2	3	4	Completely 5	Don't know
1. The Company is unable to maintain operating schedules.						
2. There are unfavorable changes in the general conditions in the client's industry.						
3. There is existing or impending litigation affecting the industry.						
4. The industry has business failures.						
5. The client's position in the industry is declining.						
6. Competition within the industry is increasing.						
7. Demand for the client's product is declining.						
8. The industry is highly regulated by the federal and/or state government.						
9. The industry is subject to strict environmental controls.						
10. There are adverse political conditions.						
11. There are adverse social conditions.						
12. There are adverse economic conditions.						
13. Raw material supplies are unstable because of the nature of the market.						
14. Raw material prices are unstable because of the nature of the market.						
15. Production cycles are long which may have an adverse impact in light of unstable or highly competitive markets.						
16. A high-technology environment necessitates obsolescence.						
17. Sales are made primarily to just a few customers.						
18. The Company's success depends on a single or small number of products or transactions.						
19. The physical location of the Company's operations makes effective management difficult.						

II. FACTORS AFFECTING INHERENT RISK

The following list contains a series of statements pertaining to cash flow and financing activities. Please indicate your opinion as to <u>the degree to which each statement applies to this audit engagement</u> by checking the appropriate column.

C. Cash flow and financing activities	Not at all 1	2	3	4	Completely 5	Don't know
1. Sales have declined in recent years.						
2. Gross margins have declined in recent years.						
3. The income trend has deteriorated in recent years.						
4. There have been work stoppages or other labor difficulties.						
5. Employee morale is low.						
6. Cash flow and/or working capital is insufficient to meet operations and debt payments.						
7. Sufficient lines of credit are not available to meet current operating needs.						
8. Debt or financing are being restructured, or there are plans to restructure in the near future.						
9. The financial position indicates that restrictive covenants or loan agreements may not be complied with, or such covenants have been waived.						
10. Payments to stock options, bonus or incentive compensation plans have been delayed.						
11. Operations have been discontinued in order to generate cash or reduce losses.						
12. There are demands for new capital.						
13. There have been inventory increases without comparable sales increases.						
14. Collections of accounts receivable from customers have been impaired.						

II. FACTORS AFFECTING INHERENT RISK

The following list contains a series of statements pertaining to accounting and auditing problems. Please indicate your opinion as to <u>the degree to which each statement applies to this audit engagement</u> by checking the appropriate column.

D. Accounting and auditing problems	Not at all 1	2	3	4	Completely 5	Don't know
1. The client has made unusual adjustments, especially at the end of the accounting period.	___	___	___	___	___	___
2. Electronic processing of accounting data has resulted in complex auditing problems.	___	___	___	___	___	___
3. The client's recorded balances are adjusted each year based on the audit.	___	___	___	___	___	___
4. There are loss contingencies.	___	___	___	___	___	___
5. There have been changes in accounting estimates.	___	___	___	___	___	___
6. Management takes the most aggressive position when choosing between alternative accounting methods and procedures.	___	___	___	___	___	___
7. There are related-party transactions.	___	___	___	___	___	___
8. There is existing or pending litigation between shareholders and management.	___	___	___	___	___	___
9. It is likely there will be a contest for control of the Company.	___	___	___	___	___	___
10. Financial and investment analysts have reported adverse conditions						
- For the Company	___	___	___	___	___	___
- For the industry	___	___	___	___	___	___
11. There is incentive and opportunity for illegal payments to domestic or foreign governments or officials.	___	___	___	___	___	___
12. There is possibility of exappropriation of assets by foreign governments.	___	___	___	___	___	___
13. The complexity of the corporate structure seems unwarranted by the Company's operations or size.	___	___	___	___	___	___
14. Management is decentralized with widely dispersed business locations.	___	___	___	___	___	___
15. Management has not provided for an adequate reporting system from branches, divisions, or remote locations.	___	___	___	___	___	___

II. FACTORS AFFECTING INHERENT RISK

Please indicate your opinion of the inherent risk associated with this audit engagement with respect to each of the following questions by checking the appropriate column.

E. Auditors assessment of inherent risk with respect to this engagement

	Low Risk 1	2	3	4	High risk 5
1. What is your firm's assessment of inherent risk as it pertains to the client's management?	___	___	___	___	___
2. What is your firm's assessment of inherent risk as it pertains to the client's industry, operations, and regulatory environment?	___	___	___	___	___
3. What is your firm's assessment of inherent risk as it pertains to the client's cash flow and financing activities?	___	___	___	___	___
4. What is your firm's assessment of inherent risk as it pertains to the client's accounting and auditing problems?	___	___	___	___	___
5. What is your firm's assessment of the overall inherent risk with respect to this client?	___	___	___	___	___

The following list contains a series of statements about the
inherent risk or susceptibility to error of accounts receiv-
able. Please indicate your opinion as to <u>the degree to which
each statement applies to accounts receivable for this engagement</u>
by checking the appropriate column.

A. <u>Inherent risk – susceptibility of account to material errors and irregu-
larities due to economic or industry factors</u>

	Not at all 1	2	3	4	Completely 5	Don't know
1. Credit policies have been eased to spur sales.						
2. Significant number of customers are in industries in which there exists a high rate of business failure.						
3. Increased competition within the industry has created undue emphasis on obtaining sales.						
4. Sales bonuses or other sales compensation plans create undue emphasis on obtaining sales.						
5. There is a high incidence of cancelled sales, returns, or refunds.						
6. Due to numerous shipping, billing, and collection locations, control over receivables is difficult to maintain.						
7. Estimating the collectibility of receivables and determining an appropriate allowance for doubtful accounts is highly judgmental.						
8. Due to related party transactions, unusual sales transactions, or consignment arrangements, receivables are difficult to control.						

9. What is your firm's assessment of inherent risk with respect to the
<u>validity</u> of accounts receivable?

<u>Low</u>   <u>High</u>

  1   2   3   4   5

10. What is your firm's assessment of the inherent risk with respect to the
<u>collectibility</u> of accounts receivable?

<u>Low</u>   <u>High</u>

  1   2   3   4   5

11. What is your firm's assessment of the <u>overall</u> inherent risk with respect
to accounts receivable?

<u>Low</u>   <u>High</u>
  1   2   3   4   5

III. QUESTIONS RELATING TO ACCOUNTS RECEIVABLE

The following list contains a series of statements about the internal accounting controls over accounts receivable. Please indicate your assessment of each control by checking the appropriate column.

B. Internal controls over accounts receivable

Controls exist to ensure that:

	Excellent controls 1	2	3	4	No controls 5
1. Orders for sales or services are accepted in accordance with management's authorized criteria.					
2. Credit is granted on the basis of management's established policies and limits.					
3. All shipments of goods or rendering of services are billed at authorized prices and terms.					
4. Only valid sales are recorded.					
5. All valid sales are correctly journalized and posted as to:					
- Amount					
- Classification					
- Accounting period					
6. All sales are promptly recorded to customer accounts.					
7. Customer remittances are totaled, verified, and summarized by authorized personnel.					
8. Collections from customers are promptly posted to customer accounts.					
9. Returns and allowances are granted in accordance with management's policies.					
10. Only valid sales adjustments and credit memos are recorded.					
11. Valid adjustments are correctly recorded as to:					
-Amount					
-Classification					
- Accounting period					
12. Sales adjustments are promptly posted to customer accounts.					
13. Customers' ledgers are maintained by employees that do not handle cash receipts or their records.					
14. Access to customer ledgers is limited to authorized accounting personnel.					
15. Recorded customer balances are independently verified with customers at reasonable intervals.					
16. Customer ledgers are periodically agreed with general ledger control accounts.					
17. Delinquent accounts are listed periodically and reviewed by authorized personnel.					
18. Customer accounts are aged regularly and reviewed by authorized personnel.					
19. Uncollectible accounts are determined on the basis of established criteria.					
20. Write-offs of bad debts are approved by authorized personnel.					

The following section relates to sampling information for tests of compliance or dual purpose tests of internal controls over accounts receivable. Please indicate which method of sampling was used, and complete the section applicable to that method.

21. Method of sampling used in compliance testing (check one):
    Nonstatistical (section a) _____
    Statistical attribute testing (section b) _____
    Statistical dollar unit sampling (section c) _____
    No compliance testing was performed _____

    Please indicate if interim testing was used primarily _____

  a. Nonstatistical testing:
    1. Description of population sampled _____
    _____
    2. Number of items in population _____
    3. Sample size _____
    4. Sample selection method _____
    5. Description of testing procedures_____
    _____
    _____

  b. Statistical attribute testing (acceptance sampling __, discovery sampling __):
    1. Description of population sampled_____
    2. Number of items in population _____
    3. Number of attributes to be tested
    4. Expected error rate _____%
    5. Acceptable tolerable error rate _____%
    6. Actual sample size
    7. Computed upper precision limit (error rate) _____%
    8. Computed reliability (confidence level) _____%

  c. Statistical dollar unit sampling:
    1. Description of population sampled_____
    2. Total dollars in population $_____
    3. Number of items in population _____
    4. Number of attributes tested _____
    5. Number of errors expected
    6. Monetary precision (maximum tolerable error) $_____
    7. Sample size
    8. Number of errors found _____
    9. Computed monetary precision $_____
    10. Computed reliability (confidence level) _____%
    11. Audited book value $_____

22. What is your firm's assessment of the effectiveness of internal accounting controls in preventing or detecting, on a timely basis, material errors with respect to the <u>validity</u> of accounts receivable?

<u>Very effective</u>   <u>Very ineffective</u>

     1   2   3   4   5

23. What is your firm's assessment of the effectiveness of internal accounting controls in preventing or detecting, on a timely basis, material errors with respect to the <u>collectibility</u> of accounts receivable?

<u>Very effective</u>   <u>Very ineffective</u>

     1   2   3   4   5

24. What is your firm's assessment of the risk that, given material errors occur, the system of internal accounting controls over accounts receivable would fail to detect them?

<u>Virtually no risk</u>   <u>Extremely high risk</u>

     1   2   3   4   5

25. One a scale of 0 to 100%, what is your firm's assessment of the <u>risk</u> that the system of internal accounting controls over accounts receivable would <u>fail</u> <u>to</u> <u>detect</u> material errors? _____ %

III. QUESTIONS RELATING TO ACCOUNTS RECEIVABLE

The following items relate to the substantive tests performed during the examination of accounts receivable. Please indicate whether the following analytical review procedures were performed and the timing of the procedures for this engagement by checking all columns that apply. Please describe any other procedures performed that are not specifically listed.

C. Detection risk from substantive tests

1. Analytical review procedures:

Procedure	Timing of Procedures Performed (check all that apply)			
	Planning stage	During conduct of substantive tests	Overall review at or near conclusion	Procedure not performed
a. Compare accounts receivable ending balance to prior years	___	___	___	___
b. Review relationship of average receivables to net sales during the period and consider its reasonableness in relation to credit policy.	___	___	___	___
c. Compare collection period to prior years	___	___	___	___
d. Compare collection period to industry average	___	___	___	___
e. Compare accounts receivable turnover to prior years	___	___	___	___
f. Compare accounts receivable turnover to industry average	___	___	___	___
g. Compare ending balance in allowance for doubtful accounts to prior year	___	___	___	___
h. Compare amounts of current year write offs to prior years	___	___	___	___
i. Compare current year write offs to allowance for doubtful accounts	___	___	___	___
j. Compare current year write offs to total accounts receivable	___	___	___	___
k. Compare aging of accounts receivable to prior year	___	___	___	___
l. Compare aging of accounts receivable to industry average	___	___	___	___

m. Other analytical review procedures:

_____

_____

_____

n. Degree of reliance placed in analytical review procedures used in this audit on this account:

<u>Low</u>   <u>High</u>

1   2   3   4   5

o. What is your firm's assessment of the risk that the analytical review procedures used on this audit would fail to detect a material error in this account, given that such errors occur and are not detected by the system of internal accounting control?

<u>Low</u>   <u>High</u>

1   2   3   4   5

p. On a scale of 0% to 100%, what is your firm's assessment of the risk that analytical review procedures used in this audit would fail to detect a material error in this account, given that such errors occur and are not detected by the system of internal accounting control?

_____ %

The following items relate to the substantive tests performed during the examination of accounts receivable. Please indicate whether each procedure was performed and the timing of the procedures for this engagement by checking all columns that apply. Please describe any other procedures performed that are not specifically listed.

2. Substantive tests of details of balances or transactions:

| | | (Check all that apply) | |
| | Timing of Procedures Performed | | Procedures Not |
Procedure	Interim	Year-end	Performed
a. Test the accuracy of the accounts receivable detail balances	___	___	___
b. Test the mathematical accuracy of the accounts receivable aging	___	___	___
c. Review accounts receivable control account for the period for unusual entries	___	___	___
d. Review receivables for any which have been assigned or discounted	___	___	___
e. Review receivables for amounts due from group and related companies, employees, etc., credit balances and unusual items	___	___	___
f. Confirm accounts receivable with debtors:			

1) Positive confirmation
    Number of accounts selected ___
    Dollar criteria for selection ___
	___	___	___

2) Negative confirmation
    Number of accounts selected ___
    Dollar criteria for selection ___
	___	___	___

g. Examination of subsequent collections:			
1) Used as follow up on confirmations	___	___	___

2) Used other than as follow up on confirmations
    Number of accounts selected ___
    Dollar criteria for selection ___
	___	___	___

h. Examine evidence of sales authorization and shipment of goods:			
1) Used as follow up on confirmations	___	___	___

2) Used other than as follow up on confirmations
    Number of accounts selected ___
    Dollar criteria for selection ___
	___	___	___

i. Tests of sales cutoff:			
- Trace recorded sales entries to sales invoices for period surrounding year-end	___	___	___
- Trace recorded sales to shipping documents for period surrounding year-end	___	___	___
j. Review the collectibility of receivables and determine the adequacy of the allowance for bad debts	___	___	___
k. Review the financial presentation of accounts receivable for appropriate classification	___	___	___
l. Review the financial statements and footnotes for adequacy of disclosure	___	___	___
m. Other detailed procedures:			

_____

_____

_____

The following section relates to sampling information for tests of the accounts receivable balance. Please indicate which method of sampling was used, and complete the section applicable to that method.

3. Method of sampling used in testing the accounts receivable balance (check one):
    Nonstatistical (section a)
    Statistical variables testing (section b)   _____
    Statistical dollar unit sampling (section c)   _____
    No tests of details were performed   _____

    a. Nonstatistical testing:
        1) Description of population to be sampled _____
        _____

        2) Number of items in population _____
        3) Population unaudited book value $ _____
        4) Amount of tolerable error $ _____
        5) Risk of incorrect acceptance   _____ %
        6) Risk of incorrect rejection   _____ %
        7) Sample size _____
        8) Sample selection method _____
        _____

        9) Description of procedures to which sample items were subjected:
           Positive confirmation _____
           Negative confirmation _____
           Other procedures _____

        10) Audited book value $ _____

    b. Statistical variables testing (estimation testing _____, hypothesis acceptance testing _____):
        1) Description of population to be sampled _____
        _____

        2) Number of items in population _____
        3) Population unaudited book value $ _____
        4) Amount of tolerable error $ _____
        5) Planned risk of incorrect acceptance   _____ %
        6) Planned risk of incorrect rejection   _____ %
        7) Sample size _____
        8) Sample selection method (check one):
           Stratified random _____
           Unrestricted random _____
           Systematic random _____
           Other _____
        9) Description of procedures to which sample items were subjected:
           Positive confirmation _____
           Negative confirmation _____
           Other procedures _____
        _____

10) Evaluation technique (check all that apply):
    Mean per unit method
    Ratio method
    Difference method
    Regression method
11) Audited book value $ _____
12) Upper limit of monetary error $ _____
13) Achieved risk of incorrect acceptance   ____ %
14) Achieved risk of incorrection rejection   ____ %
15) Achieved reliability (confidence level)   ____ %

c. Statistical dollar unit sampling:
   1) Description of population sampled _____

   2) Total dollars in population   · $ _____
   3) Number of items in population   _____
   4) Number of overstatement errors expected   _____
   5) Monetary precision (maximum tolerable error) $ _____
   6) Sample size   _____
   7) Sample selection method _____

   8) Description of procedures to which sample items
      were subjected:
      Positive confirmation   _____
      Negative confirmation   _____
      Other procedures _____

   9) Number of errors found   _____
   10) Computed monetary precision $ _____
   11) Reliability (confidence level)   ____ %
   12) Audited book value $ _____

4. Degree of reliance placed on substantive tests of details
    used in this audit on this account:

    Low   High

    1   2   3   4   5

5. What is your firm's assessment of the risk of incorrect
    acceptance of the recorded account balance for the substan-
    tive tests of details used in this audit on this account,
    given that material errors occur and are not detected by the
    system of internal accounting control or analytical review
    procedures?

    Low   High
    1   2   3   4   5

6. On a scale of 0% to 100%, what is your firm's assessment of
    the risk of incorrect acceptance of the recorded account
    balance for the substantive tests of details used in this
    audit on this account, given that material errors occur and
    are not detected by the system of internal accounting con-
    trol or analytical review procedures?
    _____ %

III. QUESTIONS RELATING TO ACCOUNTS RECEIVABLE

Please answer the following questions which relate to your over-all final risk assessment for accounts receivable after the completion of all audit work.

D. Combined audit risk assessment for accounts receivable

1. What is your firm's assessment of the maximum acceptable amount of known unadjusted errors that could have been allowed to exist in this account without necessitating a change in the audit report issued?
   $_____

1a. How was this amount determined?

   _____

   _____

   _____

2. After all audit work is completed, there exists a risk of an undetected error in an account that would result in the total unadjusted error exceeding the maximum acceptable amount.

   a. What is your firm's assessment of the likelihood of such an undetected error?

   <u>Very unlikely</u>   <u>Very likely</u>

      1   2   3   4   5

   b. On a scale of 0% to 100%, what is your firm's assessment of the percentage risk of such an undetected error?
   _____%

4. Describe any errors determined to be so material that an adjustment was made to this account.

   _____

   _____

   _____

IV. DATA CONCERNING UNADJUSTED ERRORS
(EFFECT ON PRETAX INCOME)

Please provide the information below concerning the effect on pretax income of aggregate errors that the entity (client) had not corrected in the audited financial statements.

(Please check here if information is in thousands of dollars _____)

| | Affect on Pretax Income (Understatement) Overstatement | | |
	A/R	All Other	Total
1. Errors from sampling and other tests of details			
a. Specific	$ _____	$ _____	$ _____
b. Projected			
c. Total likely (a.+b.)			
2. Judgmental differences from client estimates	_____	_____	_____
3. Other sources of errors	_____	_____	_____
4. Effect of prior year errors on current year	_____	_____	_____
5. Total known unadjusted error	$ _____	$ _____	$ _____

6. What, if any, additional information was gathered or computed in the final error aggregation process used in this audit?

   _____

   _____

   _____

7. Does your firm have guidelines or procedures for combining the results of audit tests, unadjusted errors, or the degree of audit risk from various accounts or financial statement components?

   Written guidelines _____

   Informal guidelines _____

   No specific guidelines _____

7a. If Yes, briefly describe _____

   _____

   _____

V. AUDITOR RISK ASSESSMENT FOR THE
FINANCIAL STATEMENTS AS A WHOLE

Please indicate your opinion or assessment of audit risk as it relates to the financial statements as a whole after the completion of all audit work.

1. With respect to this audit only, what is your firm's assessment of the maximum acceptable dollar amount of known unadjusted error that could have been allowed to exist in the financial statements without necessitating a change in the audit report issued?
   $ _____

1a. How was this amount determined?

   _____

   _____

   _____

2. After all audit work is completed there exists a risk of undetected error in an amount that would result in the total unadjusted error exceeding the maximum acceptable amount as specified in item 1.

   a. With respect to this audit what is your firm's assessment of the likelihood of such an undetected error?

   Very unlikely   Very likely

   1   2   3   4   5

   b. With respect to this audit only, on a scale of 0% to 100%, what is your firm's assessment of the percentage risk of such an undiscovered error?
   _____ %

3. List or describe any errors determined to be so material that an adjustment was made to the financial statements.

   _____

   _____

   _____

4. Describe any audit procedures extended after the accumulation of errors.

   _____

   _____

   _____

VITA

Shirley June Daniel

Candidate for the Degree of

Doctor of Philosophy

Thesis: AUDITOR JUDGMENTS: A DESCRIPTIVE STUDY OF THE ASSESSMENT OF AUDIT RISK

Major Field: Accounting

Biographical:

Personal Data: Born in Altus, Oklahoma, November 1, 1953, the daughter of Loyd A. and Adeline Daniel.

Education: Graduated from Bristow High School, Bristow, Oklahoma, in May 1971; received Bachelor of Science Degree in Accounting from Oklahoma State University in May 1975; received Master of Science degree in Accounting from Oklahoma State University in May 1976; completed requirements for the Doctor of Philosophy degree at Oklahoma State University in December 1985.

Professional Experience: Staff accountant, Arthur Young & Company, Tulsa, Oklahoma 1976-1980; Audit Manager, Arthur Young & Company, Tulsa, Oklahoma 1980-1982; Part-time Lecturer, University of Tulsa, 1982-1983; Graduate Teaching Assistant, Oklahoma State University, 1983-1984; Adjutant Lecturer, University of Tulsa, 1984-1985; Instructor, Becker CPA Review Course, Tulsa, Oklahoma 1984-1985.

Professional Certification and Memberships:
Certified Public Accountant, Oklahoma
American Institute of Certified Public Accountants
Oklahoma Society of Certified Public Accountants
American Accounting Association